2.1 Influenza and Other Respiratory Viruses

Summary

2013/2014 influenza season summary:
Peak influenza-like illness rate: 54.1 / 100,000 population
Total confirmed influenza cases hospitalised: 693
Total confirmed influenza cases admitted to ICU: 83
Total influenza-associated deaths: 43

HPSC has worked in collaboration with the National Virus Reference Laboratory (NVRL), the Irish College of General Practitioners (ICGP) and the Departments of Public Health on the influenza sentinel surveillance project since 2000. During the 2013/2014 influenza season, 60 general practices (located in all HSE-Areas) were recruited to report electronically, on a weekly basis, the number of patients who consulted with influenza-like illness (ILI). Sentinel GPs were requested to send a combined nose and throat swab to the NVRL on one ILI patient per week. The NVRL also tested respiratory non-sentinel specimens, referred mainly from hospitals.

Other surveillance systems set up to monitor ILI/ influenza activity include:

- Surveillance of all calls to GP out-of-hours (OOHs) centres, monitored for self-reported influenza. These data were provided by HSE-NE.
- Surveillance of all confirmed influenza notifications, including hospitalisation status reported to the Computerised Infectious Disease Reporting System (CIDR) in Ireland.
- Enhanced surveillance of hospitalised influenza cases aged 0-14 years.
- Intensive Care Society of Ireland (ICSI) enhanced surveillance of all critical care patients with confirmed influenza
- Surveillance of all reported influenza-associated deaths.
- A network of sentinel hospitals reporting admissions data.

The data presented in this summary were based on all data reported to HPSC by the 28th November 2014.

Due to the current legislation regarding the registration of deaths in Ireland; there can be significant delays between the date of death and the registration of deaths and subsequent reporting to HPSC. Further information on the registration of deaths in Ireland is available on the General Register Office website.

Sentinel GP Clinical Data
Influenza activity in Ireland was moderate during the 2013/2014-influenza season, with sentinel GP ILI consultation rates peaking at 54.1 per 100,000 population during week 9 2014 (late February/ early March) (figure 1). ILI rates first increased above baseline levels (21.0/100,000) during week 6 2014 and remained there for eight consecutive weeks, a shorter period than for the previous season (2012/2013). The highest age specific ILI rates were reported in the 5-14 year age group (peaking at 71.6/100,000), followed by those aged 15-64 years (59.3/100,000), 0-4 years (56.6/100,000) and those aged 65 years or older (46.8/100,000).

Virological Data - Influenza
The NVRL tested 581 sentinel specimens for influenza virus during the 2013/2014 season. Two hundred and seventy-five (47.3%) sentinel specimens were positive for influenza: 264 influenza A (160 A(H3), 98 A(H1) pdm09 and 6 A not subtyped) and 11 influenza B. Data on underlying medical conditions and vaccination status were reported from the sentinel GP network for 54 confirmed influenza cases. Of these 54 cases reported with underlying medical conditions and known vaccination status, 82% were not vaccinated.

The NVRL tested 8391 non-sentinel respiratory specimens during the 2013/2014 season, 1283 (15.3%) of which were positive for influenza: 1269 influenza A (797 A(H3), 369 A(H1)pdm09 and 103 A (not subtyped)) and 14 influenza B.

Influenza A(H3) was the predominant influenza virus circulating during the 2013/2014 season, co-circulating with influenza A(H1)pdm09. Influenza A accounted for 98.4% of all influenza positive specimens and influenza B for 1.6%. Of the 1424 influenza A sentinel and non-sentinel specimens that were subtyped, influenza A(H3) accounted for 67.2% and influenza A(H1)pdm09 for 32.8%.

For the 2013/2014 influenza season, the National Virus Reference Laboratory (NVRL) genetically and/or antigenically characterised 156 influenza specimens (87 A(H3), 61 A(H1)pdm09 and 8 B). Further confirmatory testing was conducted on specimens by the WHO Collaborating Centre for Reference and Research on Influenza, Mill Hill. All influenza A(H1)pdm09 specimens sequenced clustered closely with the Group 6 strain A/St. Petersburg/27/2011. Viruses in this genetic clade remain antigenically similar to the clade representative vaccine strain A/California/7/2009. All influenza A(H1) pdm09 viruses successfully isolated and antigenically characterised by the NVRL during the 2013/2014 season were similar to the A/California/07/2009 vaccine strain. Influenza A(H3) viruses sequenced by the NVRL all clustered with the A/Texas/50/2012 subgroup 3C. Antigenic characterisation determined that the majority of viruses characterised throughout the season were antigenically similar to the A/Texas/50/2012 H3N2 2013/2014 vaccine strain. Of the few influenza B viruses characterised, seven belonged to the B/Yamagata lineage (the same lineage as the influenza B virus included in the 2013/2014 vaccine) and one belonged to the B/Victoria lineage (clustering closely with B/Brisbane/60/2008).

Virological Data - Other respiratory viruses
During the 2013/2014 season, of 8391 non-sentinel specimens tested by the NVRL, 675 (8.0%) positive detections of respiratory syncytial virus (RSV) were reported, peaking (at 32.7% positivity) during week 1 2014. A total of 114 (1.4%) positive detections of human metapneumovirus (hMPV) were reported, with the majority of these detected in January and February 2014. Seventy-seven (0.9%) positive detections of adenovirus were reported, 47 (0.6%) parainfluenza virus type 1 (PIV-1), 28 (0.3%) PIV-2, 24 (0.3%) PIV-3 and 1 (0.01%) PIV-4, during the 2013/2014 season.

Of the 581 sentinel specimens tested during the 2013/2014 season, 7 (1.2%) were positive for RSV, 6 (1.0%) were positive for hMPV, 2 (0.3%) adenovirus, 3 (0.5%) for PIV-1, 3 (0.5%) for PIV-2 and one (0.2%) for PIV-3.

Outbreaks, GP OOHs & Sentinel hospital data
Fifty-nine influenza outbreaks were reported during the 2013/2014 influenza season; all were associated with influenza A (53 A(H3), 1 A(H1)pdm09 and 5 A - not subtyped). Over 40% of all influenza outbreaks were reported from HSE-E (table 1). The majority of outbreaks were associated with the elderly/those with intellectual disabilities, in health care facilities/residential institutions. In total 28 deaths were recorded associated with these 59 outbreaks, 13 deaths linked with these outbreaks were officially reported as influenza-associated deaths. It is probable that the actual number of influenza-associated deaths linked with these outbreaks exceeds this number. Vaccination status was reported for patients from 26 healthcare facilities/residential institutions, with over 90% (1020/1126) of patients vaccinated prior to these outbreaks. Vaccination status was reported for staff from 17 healthcare facilities/residential institutions, with only 28.7% (316/1101) of staff reported as vaccinated prior to these outbreaks.

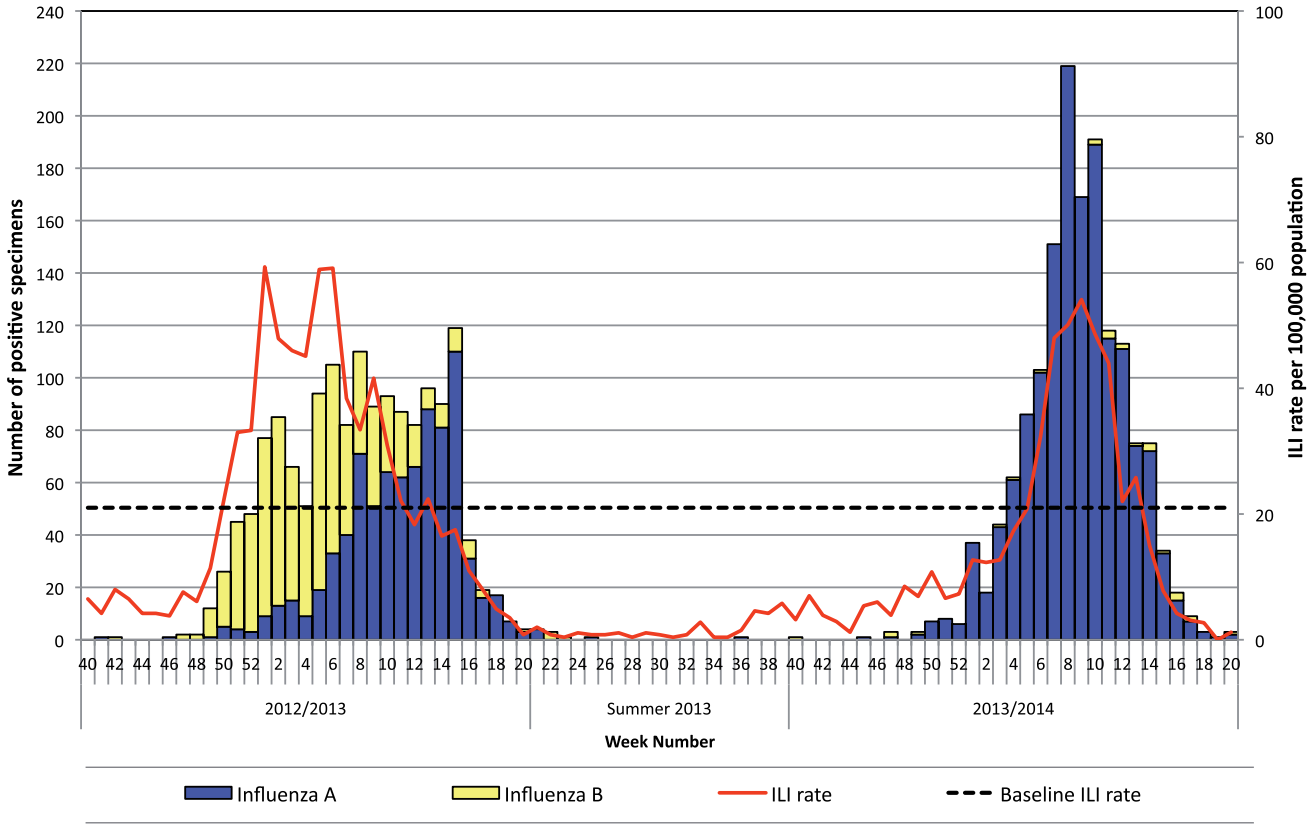

Figure 1: ILI sentinel GP consultation rates per 100,000 population, baseline ILI threshold rate, and number of positive influenza A and B specimens tested by the NVRL, by influenza week and season.
Source: Clinical ILI data from ICGP and virological data from the NVRL.

A further 19 acute respiratory infection (ARI) general outbreaks (the majority reported as negative for influenza) were reported during the 2013/2014 influenza season, two associated with hMPV, four with RSV and 13 associated with unidentified pathogens.

The percentage of influenza-related calls to GP out-of-hours services in Ireland, peaked during week 8 2014 at 4.3% (one week prior to the peak in sentinel GP ILI consultation rates). During the peak of activity, each service received on average, one call per hour relating to influenza.

Hospital respiratory admissions in sentinel hospitals were at elevated levels for eight weeks, between weeks 52 2013 and 7 2014, coinciding with increased RSV and influenza activity. Respiratory admissions peaked during week 7 2014, with 386 respiratory admissions reported. Total emergency admissions reported from sentinel hospitals were also elevated during the period of peak influenza activity, peaking at 2946.

Influenza and RSV notifications
A total of 1718 confirmed influenza notifications were reported on CIDR during the 2013/2014 influenza season. Of the 1718 notifications, 909 (52.9%) were influenza A(H3), 467 (27.2%) were influenza A (H1) pdm2009, 306 (17.8%) were influenza A (not subtyped) and 36 (2.1%) were influenza B. A total of 1770 RSV notifications were reported on CIDR during the 2013/2014 season, peaking at 264 during week 1 2014.

Confirmed influenza cases hospitalised
Six hundred and ninety-three cases with confirmed influenza were reported as hospitalised during the 2013/2014 influenza season. The highest age specific rate in hospitalised cases for the 2013/2014 season was in those less than one year of age (58.0 per 100,000 population), followed by those aged 65 years and older (48.6 per 100,000) (table 2). Of the 693 hospitalised cases, 349 (50.4%) were influenza A(H3), 191 (27.6%) were influenza A(H1)pdm09, 142 (20.5%) were influenza A (not subtyped) and 11 (1.6%) were influenza B.

Enhanced surveillance hospital data on 0-14 year age group
A total of 247 confirmed influenza cases aged between 0 and 14 years were notified on CIDR for the 2013/2014 influenza season, 169 (68.4%) of these cases were hospitalised. One hundred and sixty-six cases (98.2%) were positive for influenza A [83 A(H3), 46 A(H1) pdm09 and 37 A (not subtyped)] and three (1.8%) was positive for influenza B. The median age of cases was 2 years. Over 67% of cases were aged between 0 and 4 years, with one quarter of cases aged less than one year. Enhanced surveillance data was available for 129 (76.3%) cases. The most frequently reported symptoms included: fever (80.6%), cough (76.0%), gastroenteric manifestations (30.2%) and fatigue (31.0%). Complications were reported for 43.4% of cases; of these cases more than one complication was reported for 30.4% of cases. The most frequently reported complications included secondary bacterial pneumonia, primary influenza viral pneumonia and other respiratory complications. The median length of stay in hospital was 3 days (ranging from 1 - 50 days). Approximately, 36% of cases were reported as having an underlying medical condition, with chronic respiratory disease (including asthma), immunosuppression, conditions that can compromise respiratory function and other medical conditions being the most frequently reported. In addition, three cases were reported as being premature. Of the 39 cases with reported underlying medical conditions and known vaccination status, 95% were not vaccinated. Approximately, 22.5% of cases (25/111) commenced antiviral treatment and 77.5% (86/111) of cases did not. Nineteen cases were admitted to critical care units (for further details, see below).

Confirmed influenza cases admitted to ICU
Of the 693 hospitalised confirmed influenza cases, 83 (12.0%) were admitted to critical care (64 adults and 19 paediatric cases). Nineteen cases aged between 0 and 15 years were reported from paediatric hospitals. Of the 83 critical care cases, 31 (37.3%) were infected with influenza A(H3), 42 (50.6%) with influenza A(H1)pdm09, 8 (9.6%) influenza A (not subtyped) and 2 (2.4%) with influenza B. Age specific rates for patients admitted to critical care units were highest in those aged less than 1 year of age (8.3 per 100,000 population) followed by those aged 65 years and over (4.5 per 100,000 population) (table 2). The median age in years for paediatric cases was 4, and 59 years for adult cases. Fifty-five (55/62, 88.7%) adults and 14 (14/19, 73.7%) paediatric cases had pre-existing medical conditions. Pre-existing medical conditions were unknown for two adults. The most frequently reported underlying medical conditions for adults were chronic respiratory disease

*Table 1: Number of influenza outbreaks by HSE-Area for the 2013/2014 influenza season (n=59).**

HSE-Area	No. of outbreaks	Total number ill	Total number hospitalised	Total number dead	Total number lab confirmed
HSE-E	24	514	121	13	146
HSE-M	2	10	0	1	5
HSE-MW	4	41	23	0	13
HSE-NE	6	90	12	0	18
HSE-NW	4	30	11	0	14
HSE-SE	7	154	11	6	26
HSE-S	9	110	18	7	2
HSE-W	3	40	2	1	12
Total	**59**	**989**	**198**	**28**	**236**

**It should be noted that only 13/28 of the deaths reported in these outbreaks were officially reported as influenza-associated deaths.*

(34/55, 61.8%), followed by chronic heart disease (18/55, 32.7%), and chronic neurological disease (12/55, 21.8%). Four adult cases were pregnant. Twenty-four (37.5%) adult cases were reported as current/former smokers and five (7.8%) adult cases were reported to have alcohol related disease. The most frequently reported underlying medical conditions for paediatric cases were respiratory disease (7/14; 50%) and neurological/neuromuscular conditions (7/14, 50%). Fifty-seven (57/60, 95.0%) adults and four (4/5, 80.0%) paediatric cases were ventilated during their stay in critical care units. Ventilation status was unknown for four adult cases and 14 paediatric cases. The median length of stay in critical care for adult cases was 9 days (ranging from 1 - 55 days) and for paediatric cases 8.0 days (ranging from 1 - 61 days). Of the 55 cases with underlying medical conditions and known vaccination status, 63.6% were not vaccinated. Vaccination status was known for 11 paediatric cases with underlying medical conditions, none of these cases were vaccinated. Twenty-seven (27/83, 32.5%) confirmed influenza cases admitted to critical care units died, 22 of these deaths were reported as due to influenza.

Mortality data

During the 2013/2014 influenza season, of the 1718 confirmed influenza cases notified, 54 (3.2%) cases died. Influenza was reported as a cause of death for 43 cases[†]. The case classification of influenza was confirmed for 40 of these cases, probable for two and possible for one. Of the 40 cases with known virology, 20 were associated with influenza A(H3), 13 with influenza A(H1)pdm09, six influenza A (not subtyped) and one with influenza B. The median age of cases who died during the 2013/2014 influenza season was 75 years, ranging from 0-95 years. Almost one third of these influenza-associated deaths were linked to influenza outbreaks. Cumulative excess all-cause mortality was high in those aged 65 years and older, between weeks 6 and 9 2014 and again during weeks 15 and 16 2014.

Summary tables of confirmed influenza hospitalised and critical care cases and influenza-associated deaths for all ages are detailed in tables 2, 3 & 4.

Overview of the 2013/2014 season

During the 2013/2014 influenza season, overall influenza activity was at moderate levels. Sentinel GP ILI consultation rates were above baseline levels for eight consecutive weeks, a shorter period than the previous season. The predominant circulating influenza virus was influenza A(H3), which was co-circulating with influenza A(H1)pdm09. Higher influenza positivity levels were reported during the period of peak activity, compared to recent seasons. An increase in influenza severity was also observed relative to recent influenza seasons with a higher number of hospitalisations, critical care admissions and influenza-associated deaths reported. The highest age specific rates in hospitalised cases were in those aged less than 1 year and those aged 65 years and over. There was a significant increase in hospitalisation rates for those aged 65 years and over, at 48.6/100,000, compared to 19.1/100,000 in 2012/2013 and 6.7/100,000 in 2011/2012. As with previous seasons, the majority of cases with underlying medical conditions and known vaccination status admitted to hospital (data only available for paediatric cases) and/or critical care units (adult and paediatric cases) were not vaccinated. This highlights the importance of promoting influenza vaccination for those in risk groups to prevent influenza-related morbidity and mortality.[1]

The number of acute respiratory outbreaks reported during the 2013/2014 influenza season remained at high levels, similar to the 2012/2013 season. The majority of these outbreaks were caused by influenza. These outbreaks mainly affected the elderly and those with intellectual disabilities in residential care facilities. Cumulative excess all-cause mortality was high in the elderly during the 2013/2014 season, coinciding with increased reporting of confirmed influenza A(H3) outbreaks. Reported influenza vaccination status of patients/clients in these outbreaks was high, whilst

Table 2: Age specific rate for confirmed influenza cases hospitalised and admitted to critical care during the 2013/2014 influenza season. Age specific rates are based on the 2011 CSO census.

	Hospitalised		Admitted to ICU	
Age (years)	Number	Age specific rate per 100,000 pop.	Number	Age specific rate per 100,000 pop.
<1	42	58.0	6	8.3
1-4	67	23.6	6	2.1
5-14	52	8.3	6	1.0
15-24	25	4.3	1	0.2
25-34	70	9.3	4	0.5
35-44	68	9.0	13	1.9
45-54	38	6.6	9	1.6
55-64	71	15.3	14	3.0
65+	260	48.6	24	4.5
Total	**693**	**15.1**	**83**	**1.8**

[†] Influenza-associated deaths include all deaths where influenza is reported as the primary/main cause of death by the physician or if influenza is listed anywhere on the death certificate as the cause of death.

vaccination status of staff was low, further highlighting the need to improve influenza vaccine uptake amongst health-care workers in order to reduce influenza-related morbidity and mortality. Further information on seasonal influenza vaccine uptake in hospitals and long term care facilities is available in the Immunisation uptake chapter of the HPSC Annual Epidemiological Report, 2013.

Globally, as reported by the WHO, the majority of influenza A viruses characterised during the 2013/2014 influenza season were antigenically similar to those contained in the WHO recommended 2013/2014 trivalent influenza vaccine. Of the influenza B viruses characterised globally, both the B/Yamagata and B/Victoria lineages circulated. For the 2014/2015 influenza season in the northern hemisphere, WHO have recommended trivalent influenza vaccines contain the following strains: an A/California/7/2009(H1N1)pdm09-like virus; an A/Texas/50/2012 (H3N2)-like virus; a B/Massachusetts/2/2012-like virus.[2]

HPSC will continue ongoing collaborative work with the National Virus Reference Laboratory (NVRL) for the early detection of novel respiratory viruses, such as Middle East Respiratory Syndrome coronavirus (MERS-CoV), avian-origin influenza A(H7N9) and enterovirus EV-D68. Surveillance procedures for these viruses will remain in place while the risk remains. Further information on these novel viruses is available on the HPSC and ECDC websites.

For the 2014/2015 influenza season, existing surveillance systems in Ireland have been strengthened. A number of additional measures have been put in place to improve the surveillance of influenza/ILI outbreaks, including the inclusion of a category for Acute Respiratory outbreaks on Ireland's Computerised Infectious Disease Reporting System (CIDR). HPSC are focusing on improving influenza vaccine uptake data on severe influenza cases, outbreaks, health care workers and those in risk groups for influenza. Additional projects not detailed in this report include an all-cause mortality monitoring project associated with the European mortality monitoring group (EuroMOMO) and the European influenza vaccine effectiveness study (I-MOVE project). Efforts have been made to increase patient participation in the I-MOVE project in order to improve Irish and international estimates on influenza vaccine effectiveness. Data from all of these surveillance systems will assist in guiding the management and control of influenza and any future epidemics or pandemics. www.hpsc.ie

References

1. The Immunisation Guidelines for Ireland, 2013. http://www.hse.ie/portal/eng/health/immunisation/hcpinfo/guidelines/immunisationguidelines.html
2. WHO recommendations on the composition of influenza virus vaccines http://www.who.int/influenza/vaccines/virus/recommendations/en/

Acknowledgements

HPSC would like to thank the sentinel GPs, ICGP, NVRL, Departments of Public Health, sentinel hospitals, ICSI and HSE-NE for their contributions towards influenza surveillance throughout the influenza season.

Table 3: Summary table of confirmed influenza cases hospitalised and admitted to critical care units for all ages by influenza season: 2009-2014. It should be noted that risk factor data were not available for hospitalised cases in all age groups (with the exception of the pandemic period). Rates are based on the 2011 CSO census.

	Hospitalised					Admitted to ICU				
	Pandemic period	2010/2011	2011/2012	2012/2013	2013/2014	Pandemic period	2010/2011	2011/2012	2012/2013	2013/2014
Total cases	1059	968	147	469	693	100	121	15	39	83
Crude rate /100,000 pop.	23.1	21.1	3.2	10.2	15.1	2.2	2.6	0.3	0.8	1.8
Age range (years)	0-84	0-97	0-92	0-99	0-98	0-79	0-80	0-80	0-88	0-88
Median age (years)	17	29	27	32	51	34	49	60	39	50
Females	533	529	83	267	398	50	64	12	19	34
	50.3%	54.6%	56.5%	56.9%	57.4%	50.0%	52.9%	80.0%	48.7%	41.0%
Cases with risk factor	507	No data	No data	No data	No data	81	90	13	35	69
	47.9%					81.0%	74.4%	86.7%	89.7%	83.1%

Table 4: Summary table of influenza-associated deaths for all ages by influenza season: 2009-2014. Rates are based on the 2011 CSO census.

	Influenza-associated deaths				
	Pandemic period	2010/2011	2011/2012	2012/2013	2013/2014
Total cases	29	38	13	32	43
Crude rate /100,000 pop.	0.6	0.8	0.3	0.7	0.9
Age range (years)	8-83	2-83	81-98	0-95	0-97
Median age (years)	54	57	88	86	80
Females	15	18	5	16	22
	51.7%	47.4%	38.5%	50.0%	51.2%