2.1 Influenza and Other Respiratory Viruses

Summary

2012/2013 influenza season summary:
Peak influenza-like illness rate: 59.3 /100,000 population
Total confirmed influenza cases hospitalised: 471
Total confirmed influenza cases admitted to ICU: 38
Total influenza-associated deaths: 32

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. Sixty-one 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 and enhanced surveillance of all severe acute respiratory infections (SARI) at two ICU sites, one adult and one paediatric.
- Enhanced surveillance of all confirmed influenza 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 17th October 2013. 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.

Sentinel GP Clinical Data
Influenza activity in Ireland was low to moderate during the 2012/2013-influenza season, with sentinel GP ILI consultation rates peaking twice, at 59.3 per 100,000 population during week 1 2013 (January) and again at 59.1 per 100,000 population during week 6 2013 (February) (figure 1). ILI rates first increased above baseline levels (21.0 per 100,000) during week 50 2012 and remained there for 14 consecutive weeks, one of the longest seasons on record, with the exception of the pandemic period. The highest age specific ILI rates were reported in the 5-14 year age group (peaking at 100.3/100,000), followed by those aged 15-64 years (70.8/100,000), 0-4 years (39.6/100,000) and those aged 65 years or older (39.3/100,000).

Virological Data - Influenza
The NVRL tested 932 sentinel specimens for influenza virus during the 2012/2013 season. Five hundred and sixteen (55.4%) sentinel specimens were positive for influenza: 151 influenza A (86 A (H3), 51 A (H1)pdm09 and 14 A unsubtyped) and 365 influenza B.

The NVRL tested 7,199 non-sentinel respiratory specimens during the 2012/2013 season, 1033 (14.3%) of which were positive for influenza: 669 influenza A (412 A(H3), 170 A(H1)pdm09 and 87 A (unsubtyped)) and 364 influenza B.

Influenza B was the predominant influenza virus circulating until February 2013, followed by influenza A(H3) and influenza A(H1)pdm09 for the remainder of the season. Influenza A accounted for 52.9% of all influenza positive specimens and influenza B for 47.1% during the 2012/2013 season. Of the 719 influenza A sentinel and non-sentinel specimens that were subtyped, influenza A(H3) accounted for 69.3% and influenza A(H1)pdm09 for 30.7%.

The NVRL genetically characterised 66 influenza viruses during the 2012/2013 influenza season. Of 43 influenza B viruses analysed, 38 (88.4%) belong to the B/ Yamagata lineage (which is included in the 2012/2013 influenza vaccine) and five (11.6%) belong to the B/ Victoria lineage. Seventeen influenza A(H3N2) viruses were genetically characterised and were similar to the vaccine strain A/Victoria/361/2011. Sequence analysis of

six influenza A(H1N1)pdm09 viruses identified them as related to the vaccine strain A/California/07/2009.

Virological Data - Other respiratory viruses
During the 2012/2013 season, of 7,199 non-sentinel specimens tested by the NVRL, 669 (9.3%) positive detections of respiratory syncytial virus (RSV) were reported, peaking at 35.9% during week 52 2012. A total of 220 (3.1%) positive detections of parainfluenza virus type 3 (PIV-3) were reported, peaking towards the end of the season, at 11.3% during week 17 2013. Positive detections of human metapneumovirus (n=165; 2.3%) also peaked at the end of the season, at 9.4% during week 20 2012. 138 (1.9%) positive detections of adenovirus were reported, nine (0.1%) parainfluenza virus type 1 (PIV-1) and eight (0.1%) parainfluenza virus type 2 (PIV-2).

Outbreaks, GP OOHs & Sentinel hospital data
Seventy-two influenza/ILI outbreaks were reported: influenza was confirmed for 63 of these outbreaks. Of the 63 outbreaks predominantly associated with influenza, 52 were associated with influenza A (42 A(H3), 6 A (H1)pdm09 and 4 with influenza A (subtyping not reported) and 11 with influenza B. No pathogens were identified for nine ILI outbreaks. One third of the influenza/ILI outbreaks were reported from HSE-E (table 1). The majority of outbreaks were associated with the elderly, in health care facilities/residential institutions. In total 23 deaths were recorded during these 72 outbreaks, 10 of these deaths were officially reported as influenza-associated deaths (all in those over 75 years of age).

A further 13 acute respiratory infection (ARI) general outbreaks (negative for influenza) were reported during the 2012/2013 influenza season, four associated with human metapneumovirus (hMPV), two with parainfluenza viruses, one with respiratory syncytial virus (RSV) and six associated with unidentified pathogens. The majority of cases associated with these ARI outbreaks displayed atypical ILI symptoms.

The percentage of influenza-related calls to GP out-of-hours services in Ireland, peaked during week 1 2013 at 6.0% (coinciding with the first peak in ILI activity, which was associated with influenza B). During the peak of activity, each service received on average, 1.7 calls per hour relating to influenza.

Hospital respiratory admissions in sentinel hospitals peaked during week 50 2012, with 413 respiratory admissions reported during that week. Respiratory admissions remained at elevated levels between week 49 2012 and week 1 2013. Total emergency admissions reported from sentinel hospitals also peaked during week 50 2012, at 2820.

Influenza and RSV notifications
A total of 1619 confirmed influenza notifications were reported on CIDR during the 2012/2013 influenza season. Of the 1619 notifications, 488 (30.1%) were influenza A(H3), 218 (13.5%) were influenza A(H1) pdm2009, 132 (8.2%) were influenza A (not subtyped) and 781 (48.2%) were influenza B. A total of 1608 RSV notifications were reported on CIDR during the 2012/2013 season, peaking at 253 during week 1 2013.

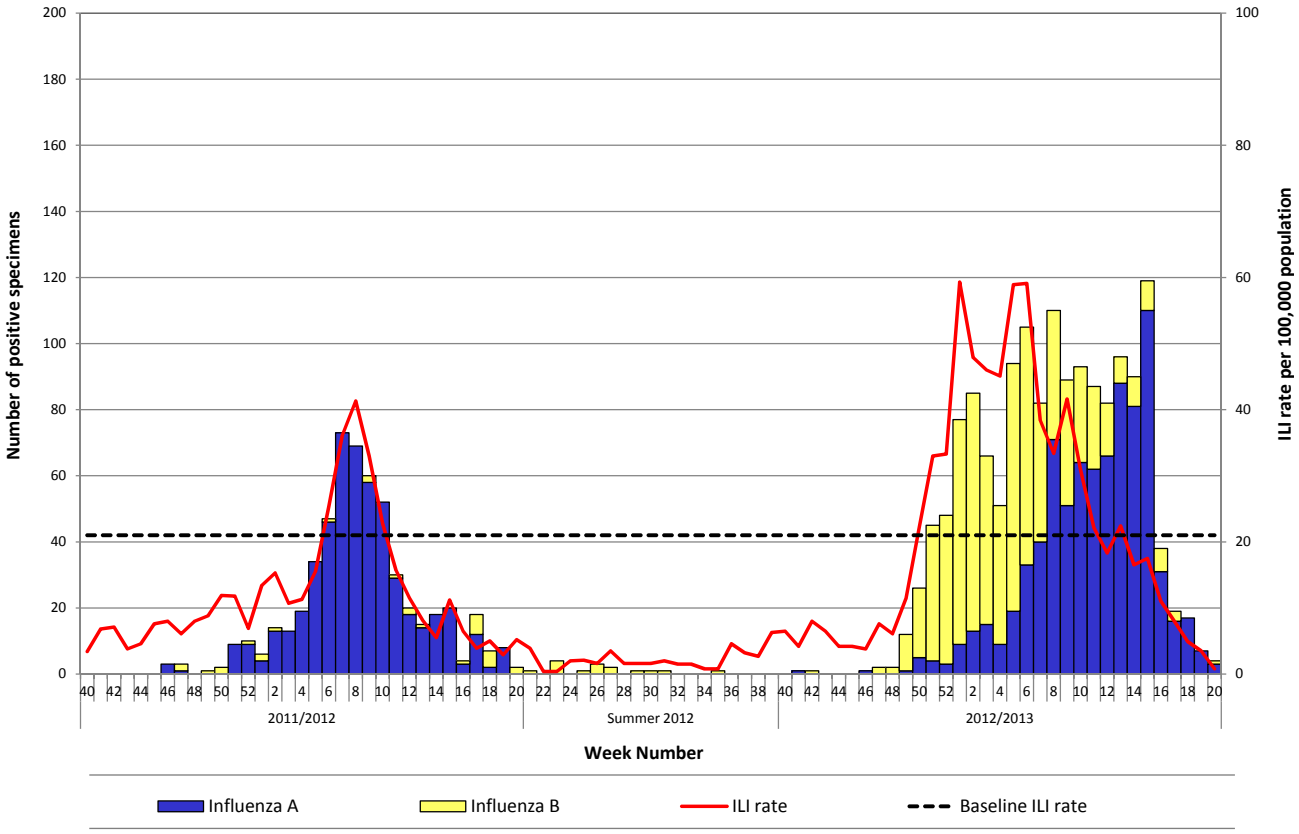

Figure 1: ILI sentinel GP consultation rates per 100,000 population, baseline ILI threshold rate, and number of positive influenza A and B specimens tested by the NVRL, by influenza week and season. Source: Clinical ILI data from ICGP and virological data from the NVRL.

Confirmed influenza cases hospitalised
Four hundred and seventy one cases with confirmed influenza were hospitalised during the 2012/2013 influenza season. The highest age specific rate in hospitalised cases for the 2012/2013 season was in those less than one year of age (56.6 per 100,000 population), followed by those aged 1-4 years of age (28.2 per 100,000) and those aged 65 years or older (19.1 per 100,000) (table 2). Of the 471 hospitalised cases, 130 (27.6%) were influenza A(H3), 79 (16.8%) were influenza A(H1)pdm09, 39 (8.3%) were influenza A (not subtyped) and 223 (47.3%) were influenza B.

Confirmed influenza cases admitted to ICU
Of the 471 hospitalised confirmed influenza cases, 38 (8.1%) were admitted to critical care (28 adults and 10 paediatric cases). Of the 38 critical care cases, five (13.2%) were associated with influenza A (H3), 16 (42.1%) were influenza A(H1)pdm09, two (5.3%) influenza A (not subtyped) and 15 (39.5%) were influenza B. Age specific rates for patients admitted to ICU were highest in those aged less than 1 year of age (5.5 per 100,000 population) followed by those aged 65 years and over (1.5 per 100,000 population) (table 2). The median age of paediatric cases was 17 months of age and the median age of adult cases was 51.5 years. Twenty-five (25/28, 89.3%) adults and nine (9/9, 100%) paediatric cases had pre-existing medical conditions. Pre-existing medical conditions were unknown for one paediatric case, aged 2 months old. The most frequently reported underlying medical condition for adults was chronic heart disease (7/25, 28.0%), followed by immunosuppression/malignancy (6/25, 24.0%). Four adult cases were pregnant. Seven (25.0%) adult cases were reported as current/former smokers. Underlying medical conditions for paediatric cases included chronic respiratory disease (n=3), neurological/neuromuscular conditions (n=3), cardiovascular conditions (n=2), and metabolic disorder (n=1). Nineteen (19/22, 86.4%) adults and nine (9/9, 100.0%) paediatric cases were ventilated during their stay in ICU. Ventilation status was unknown for six adult cases and one paediatric case. The median length of stay in ICU for adult cases was 9 days (ranging from 1 - 17 days) and for paediatric cases was 5.0 days (ranging from 1 - 85 days). Vaccination status was only known for nine of the 38 cases admitted to ICU, three cases were vaccinated (all three had underlying medical conditions) and six were not (four did have underlying medical conditions and two did not). Eleven deaths in confirmed influenza cases were reported from ICU units, two of these deaths were due to influenza.

Mortality data
During the 2012/2013 influenza season, 32 influenza-associated deaths[†] were reported. The case classification of influenza was confirmed for 21 of these cases, probable for three cases and possible for eight cases. Of the 21 cases with known virology, eight were associated with influenza A(H3), one with influenza A(H1)pdm09, five influenza A (not subtyped) and seven with influenza B. The median age of cases who died during the 2012/2013 influenza season was 86 years, ranging from <1 year – 95 years. Ten of the 32 deaths (31.3%) were associated with influenza outbreaks. Vaccination status was known for nine of the 32 (28.1%) cases. Five (55.6%) cases were vaccinated and four (44.4%) were not vaccinated with the 2012/2013 influenza vaccine. Of these 32 cases, 26 were known to have underlying medical conditions. Data on underlying medical conditions was unknown for six cases, with an age range of 84 - 94 years.

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

Overview of the 2012/2013 season
During the 2012/2013 influenza season, although influenza activity in Ireland rose to relatively low levels, activity was prolonged, and reached levels higher than those reported during the previous season. Influenza-like illness (ILI) GP consultation rates were above baseline levels for 14 consecutive weeks, a longer than average period. A mix of influenza viruses meant both children and adults were affected; influenza B was

*Table 1: Number of influenza/ILI outbreaks by HSE-Area for the 2012/2013 influenza season (n=72).**

HSE-Area	No. of outbreaks	Total number ill	Total number hospitalised	Total number dead	Total number lab confirmed	Total number lab investigated
HSE-E	24	815	16	10	132	93
HSE-M	6	152	11	6	19	16
HSE-MW	4	39	50	0	9	11
HSE-NE	3	22	4	3	6	16
HSE-NW	14	146	9	0	40	62
HSE-SE	4	77	6	1	16	29
HSE-S	10	130	9	2	7	21
HSE-W	7	136	20	1	11	9
Total	72	1517	125	23	240	257

**It should be noted that only 10/23 of the deaths reported in these outbreaks were officially reported as influenza-associated deaths.*

[†] 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.

predominantly circulating until February 2013, followed by influenza A(H3) co-circulating with influenza A(H1) pdm09 for the remainder of the season. The unusual pattern of influenza B circulating prior to influenza A, was also reported in England, Northern Ireland and Wales but not in Scotland. The number of influenza/ILI outbreaks during the 2012/2013 season reached the highest number ever reported to HPSC, with the exception of the pandemic period. These outbreaks mainly affected the elderly in healthcare/residential care facilities, the majority of which were associated with influenza A(H3). An increase in influenza severity was observed relative to the 2011/2012 influenza season with a higher number of hospitalisations, ICU admissions and influenza-associated deaths. As in previous seasons, hospitalisations and ICU admissions mainly affected those under 5 years of age and those aged 65 years and older. Cumulative excess all-cause mortality was high in the elderly, with the highest levels reported since the 2008/2009 influenza season, coinciding with high levels of influenza A(H3) activity in the elderly.

Globally, the majority of influenza A viruses characterised during 2012/2013 influenza season were antigenically related to those contained in the 2012/2013 influenza vaccine. Among influenza B viruses characterised globally, 10-30% of reported B viruses were of the Victoria lineage. The remainder were of the Yamagata lineage, and were antigenically related to the vaccine recommended component. For the 2013/2014 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(H3N2) virus antigenically like the cell-propagated prototype virus A/Victoria/361/2011 (with a recommendation for A/Texas/50/2012) and a B/Massachusetts/2/2012-like virus (Yamagata lineage).[1]

Early estimates of influenza vaccine effectiveness in Europe undertaken by the IMOVE consortium reported an early adjusted influenza vaccine effectiveness (VE) of 78.2% (95% CI: 18.0 to 94.2) against influenza B, 62.1% (95% CI: −22.9 to 88.3%) against A(H1)pdm09, 41.9 (95% CI: −67.1 to 79.8) against A(H3N2) and 50.4% (95% CI: −20.7 to 79.6) against all influenza types in the target groups for influenza vaccination. These early estimates suggest a moderate VE against all influenza viruses. By type and subtype, the highest VE was against influenza B and the lowest against influenza A(H3N2). As in 2011/12, the results suggest a low-to-moderate VE for influenza A(H3N2). Efforts to improve influenza vaccines should continue to better protect those at risk of severe illness or complications. [2]

Positive proportions of parainfluenza virus type 3 and adenovirus were higher than those reported to HPSC in previous seasons. Activity from other circulating respiratory viruses during the 2012/2013 season was similar to previous seasons. Two novel respiratory viruses emerged during the 2012/2013 season, Middle East Respiratory Syndrome coronavirus (MERS-CoV) in the Middle East and avian-origin influenza A(H7N9) in Eastern China. Both have high reported case fatality ratios, with the source of both viruses yet to be fully established. No cases of MERS-CoV or influenza A(H7N9) were identified in Ireland during the 2012/2013 season. Surveillance procedures for these viruses will continue while the risk remains. Information on MERS-CoV is available on the ECDC website. Further information and guidance documents are also available on the HPSC and WHO websites. For up to date information on human infection with avian influenza A(H7N9) virus in China including the current case numbers and the WHO assessment of the situation please see here.

For the 2013/2014 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, severe influenza and influenza-associated deaths. Work is also in progress to improve reporting of influenza vaccine uptake in health care workers and risk groups for influenza. HPSC are continuing participation in a WHO pilot project to automatically calculate the intensity of influenza each week using sentinel GP ILI consultation rates. Surveillance of influenza notifications (including hospital status), ILI/influenza outbreaks,

Table 2: Age specific rate for confirmed influenza cases hospitalised and admitted to critical care during the 2012/2013 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	41	56.6	4	5.5
1-4	80	28.2	4	1.4
5-14	64	10.3	2	0.3
15-24	21	3.6	0	0.0
25-34	52	6.9	5	0.7
35-44	51	6.8	7	1.0
45-54	34	5.9	3	0.5
55-64	26	5.6	5	1.1
65+	102	19.1	8	1.5
Total	471	10.3	38	0.8

and enhanced surveillance of confirmed hospitalised influenza cases (aged 0-14 years) and of confirmed influenza cases in critical care units (all ages) will continue for the 2013/2014 season. Additional projects include an all-cause mortality monitoring project associated with the European mortality monitoring group (EuroMOMO), participation in a European influenza vaccine effectiveness study (I-MOVE project) and a project on severe acute respiratory infections (SARI) cases admitted to two critical care units, one adult and one paediatric. Work is in progress to automate the extraction of data on SARI cases from one paediatric intensive care unit (PICU). The work at this PICU site should hopefully pave the way for further automation of SARI data extraction from similar sites. 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. WHO recommended composition of influenza virus vaccines for use in the 2013-2014 northern hemisphere influenza season. Available online: http://www.who.int/influenza/vaccines/virus/recommendations/2013_14_north/en/index.html
2. Valenciano M, Kissling E, I-MOVE case–control study team. Early estimates of seasonal influenza vaccine effectiveness in Europe: results from the I-MOVE multicentre case–control study, 2012/13. Euro Surveill. 2013;18(7):pii=20400. Available online: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20400

Acknowledgements

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Table 3: Summary table of confirmed influenza cases hospitalised and admitted to ICU for all ages by influenza season: 2009-2013. 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	Pandemic period	2010/2011	2011/2012	2012/2013
Total cases	1059	945	146	471	100	121	15	38
Crude rate /100,000 pop.	23.1	20.6	3.2	10.3	2.2	2.6	0.3	0.8
Age range (years)	0-84	0-97	0-97	0-99	0-79	0-80	0-80	0-88
Median age (years)	17	29	27	32	34	49	60	39
Females	533	513	83	270	50	64	12	17
	50.3%	54.3%	56.8%	57.3%	50.0%	52.9%	80.0%	44.7%
Cases with risk factor	507	No data	No data	No data	81	90	13	34
	47.9%				81.0%	74.4%	86.7%	89.5%

Table 4: Summary table of influenza-associated deaths for all ages by influenza season: 2009-2013. It should be noted that risk factor data were not available for all cases during the 2011/2012 and 2012/2013 seasons. Rates are based on the 2011 CSO census.

	Influenza-associated deaths			
	Pandemic period	2010/2011	2011/2012	2012/2013
Total cases	29	38	13	32
Crude rate /100,000 pop.	0.6	0.8	0.3	0.7
Age range (years)	8-83	2-83	81-98	0-95
Median age (years)	54	57	88	86
Females	15	18	5	16
	51.7%	47.4%	38.5%	50.0%
Cases with risk factor	27/29	32/38	7/8	26/26
	93.1%	84.2%	87.5%	100.0%