

# 2.1 Influenza and Other Seasonal Respiratory Viruses

## Summary

### 2014/2015 influenza season summary:

Peak influenza-like illness rate: **70.4/100,000 population**

Confirmed influenza cases hospitalised: **1,009**

Confirmed influenza cases admitted to ICU: **69**

Notified influenza cases that died: **66**

Estimated excess deaths in those aged 65 years and older: **726**

Number of acute respiratory infection/influenza outbreaks: **117**

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 2014/2015 influenza season, 61 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.
- All-cause mortality monitoring associated with the European mortality monitoring group ([EuroMOMO](#))

- A network of sentinel hospitals reporting admissions data.
- Outbreak surveillance – acute respiratory infections and influenza
- Influenza vaccine effectiveness study (I-MOVE)

This report summarises influenza and other seasonal respiratory virus activity in Ireland during the 2014/2015 influenza season. The 2014/2015 season commenced on 29/09/2014 (week 40 2014) and ended on 17/05/2015 (week 20 2015). The data presented in this summary were based on all data reported to HPSC by 3<sup>rd</sup> December 2015.

### *Sentinel GP clinical data*

Influenza activity reported from the sentinel GP network in Ireland was at moderate levels during the 2014/2015-influenza season, with ILI consultation rates peaking at 70.4 per 100,000 population during week 7 2015 (early February) (figure 1). ILI rates first increased above baseline levels (18.2 per 100,000) during week 2 2015 and remained there for 11 consecutive weeks, a longer period than for the previous season (2013/2014). The highest age specific ILI rates were reported in the 5-14 year age group (peaking at 82.7/100,000), followed by those aged 15-64 years (74.9/100,000), those aged 65 years and older (64.1/100,000) and the 0-4 year age group (43.4/100,000). It is notable that the age specific rates in those aged 65 years and older were the highest reported in this age group since the 2010/2011 season and were only higher during the 2003/2004, 2008/2009 and 2010/2011 seasons.

### *Virological data from NVRL – influenza*

**Sentinel GP data:** The NVRL tested 782 sentinel specimens for influenza virus during the 2014/2015 season. Three hundred and seventy-eight (48.3%) sentinel specimens were positive for influenza: 266 influenza A (227 A(H3), 35 A(H1)pdm09 and 4 A not subtyped) and 112 influenza B. Sixty percent of all confirmed influenza sentinel cases were positive for influenza A(H3). One hundred and twenty (16%; n=752 with known vaccination status) ILI cases tested for influenza were vaccinated with the 2014/2015 influenza vaccine; 47% (56/120) were positive for influenza. Fifty-nine percent of those aged 65 years and older were

vaccinated, 42% (17/41) of these cases were positive for influenza. One third of those aged less than 65 years with an underlying risk factor were vaccinated; 44% of these cases were positive for influenza. Only four cases were known to have commenced antiviral treatment.

**Non-sentinel data:** The NVRL tested 9,830 non-sentinel respiratory specimens during the 2014/2015 season, 1,578 (16.1%) of which were positive for influenza: 1,200 influenza A [1,003 A(H3), 129 A(H1)pdm09 and 68 A (not subtyped)] and 378 influenza B. Sixty-four percent of all confirmed influenza non-sentinel cases were positive for influenza A(H3).

Influenza A(H3) was the predominant influenza virus circulating during the 2014/2015 season, followed by an increase in the predominance of influenza B later in the season. Influenza A accounted for 75% of all influenza positive specimens and influenza B for 25%. Of the 1,394 influenza A sentinel and non-sentinel specimens that were subtyped, influenza A(H3) accounted for 88% and influenza A(H1)pdm09 for 12%. In total 1,230 positive influenza A(H3) cases were detected by the NVRL during the 2014/2015 season, this is the highest number of A(H3) viruses ever detected in any season by the NVRL.

**Influenza virus characterisation:**

For the 2014/2015 influenza season, genetic characterisation of influenza viruses circulating in Ireland was carried out by the NVRL on 91 positive samples: 49 A(H3), 22 A(H1)pdm09 and 20 B. Of the

49 A(H3N2) viruses attributed to a genetic group, the majority (79.6%) fell into genetic subgroups that were shown to be antigenically dissimilar to the A(H3N2) 2014/2015 vaccine virus. Over 75% (37/49) of A(H3) viruses tested were in genetic subgroup 3C.2a, represented by A/Hong Kong/5738/2014; and two viruses were in genetic subgroup 3C.3a, represented by A/Switzerland/9715293/2013. Of the remaining A(H3) viruses, 18.4% (9/49) fell into the genetic group 3C.3, represented by A/Samara/73/2013, which was shown to be antigenically similar to the A(H3N2) 2014/2015 vaccine virus. One additional A(H3) virus could not be attributed to a genetic group. Of the 18 B/Yamagata-lineage viruses characterised genetically, all fell in clade 3, and were represented by B/Phuket/3073/2013 which is related to, but antigenically and genetically distinguishable, from the B/Massachusetts/2/2012 2014/2015 vaccine virus. Two B/Victoria-lineage viruses were also genetically tested during the 2014/2015 season and belonged to the B/Brisbane/60/2008 clade (clade 1A), similar to the influenza B/Victoria-lineage component (B/Brisbane/60/2008) of the 2014/2015 quadrivalent vaccine. Of the 22 influenza A(H1)pdm09 viruses genetically characterised during the 2014/2015 season, all were similar to the 2014/2015 A(H1)pdm09 vaccine strain. The majority of influenza A(H3) and influenza B viruses and all influenza A(H1)pdm09 viruses genetically characterised during the 2014/2015 season in Ireland, belonged to genetic groups antigenically similar to the vaccine virus strains selected for the 2015/2016 Northern Hemisphere influenza vaccines.

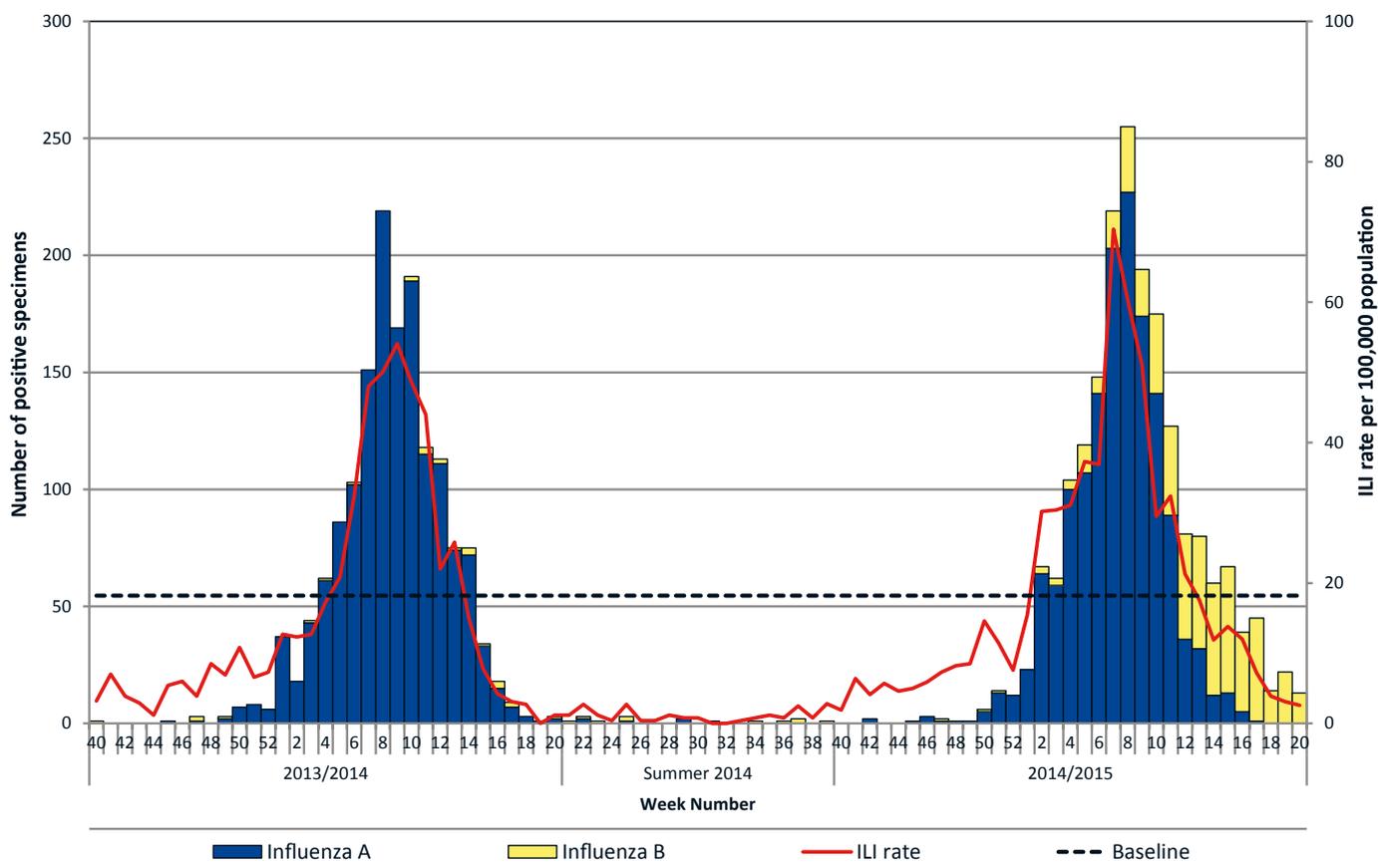


Figure 1: ILI sentinel GP consultation rates per 100,000 population, baseline ILI threshold rate, and number of positive influenza A and B specimens tested by the NVRL, by influenza week and season. Source: Clinical ILI data from ICGP and virological data from the NVRL.

### Virological data from NVRL - Other seasonal respiratory viruses

During the 2014/2015 season, of 9,830 non-sentinel specimens tested by the NVRL, 896 (9.1%) positive detections of respiratory syncytial virus (RSV) were reported, peaking (at 34.1% positivity) during week 49 2014, a slightly earlier season than usual. A total of 204 (2.1%) positive detections of human metapneumovirus (hMPV) were reported, peaking during late January. Seventy-six (0.8%) positive detections of adenovirus were reported, 3 (0.03%) parainfluenza virus type 1 (PIV-1), 77 (0.8%) PIV-3 and 4 (0.04%) PIV-4 during the 2014/2015 season. There were no positive detections of PIV- 2 from non-sentinel sources reported during the 2014/2015 season.

Of the 782 sentinel GP specimens tested during the 2014/2015 season, 28 (3.6%) were positive for RSV and 24 (3.1%) were positive for hMPV. There were no positive detections of adenovirus or parainfluenza viruses from sentinel GP sources during the 2014/2015 season.

Positive detections of RSV and hMPV from sentinel and non-sentinel sources were at higher levels than previously reported by the NVRL.

### Outbreaks, GP OOHs & sentinel hospital data

Ninety influenza general outbreaks were reported during the 2014/2015 influenza season (table 1), which is the highest number of influenza outbreaks reported with the exception of the 2009 pandemic. The majority of these outbreaks were associated with influenza A(H3), in community hospitals/residential care facilities mainly affecting the elderly. Seventeen outbreaks were reported from acute hospitals, which is the highest number of confirmed influenza outbreaks in acute hospital settings ever reported. Over 74% of these outbreaks were associated with influenza A(H3). Seventy-four outbreaks were associated with influenza A (65 A(H3), 5 A(H1)pdm09, 2 associated with both A(H3) and A(H1)pdm09 and 2 A - not subtyped) and 14 with influenza B. No influenza type/subtype was reported for two outbreaks. In total 27 deaths were recorded associated with these 90 outbreaks. It is probable that the actual number of deaths linked with these outbreaks exceeds this number. Vaccination status was reported for patients from 24 healthcare facilities/residential care facilities, with over 92% (953/1,039) of patients

vaccinated prior to these outbreaks. Vaccination status was reported for staff from only 13 healthcare facilities/residential care facilities, with only 22% (153/691) of staff reported as vaccinated prior to these outbreaks. Use of antiviral chemoprophylaxis was reported from 47 outbreaks in healthcare settings (of 53 outbreaks with reported data on antiviral use).

A further 27 acute respiratory infection (ARI) general outbreaks were reported during the 2014/2015 influenza season, four were associated with RSV, four with hMPV and 19 associated with unidentified pathogens.

The percentage of influenza-related calls to GP out-of-hours services in Ireland, peaked during week 7 2015 at 4.6% (coinciding with 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 reported from a network of sentinel hospitals during the 2014/2015 season, peaked twice and reached the highest peak level reported since 2010. The first and largest peak in respiratory admissions reported (n=464) occurred during week 51 2014, coinciding with high RSV activity. The second peak in respiratory admissions (n=382) occurred during week 8 2015; coinciding with elevated influenza activity. Total emergency admissions reported from sentinel hospitals were also elevated during the periods of peak RSV and influenza activity, peaking at 2,945 during week 51 2015 and again during week 8 2015 at 2,999.

### Influenza and RSV notifications

A total of **2,530** influenza notifications were reported on CIDR during the 2014/2015 influenza season; the highest number of influenza notifications reported with the exception of the 2009 pandemic. Of the 2,530 notified cases, 2,484 were confirmed, 13 were probable and 33 were possible. Of the 2,484 confirmed influenza cases, 1,260 (50.7%) were influenza A(H3), 200 (8.1%) were influenza A(H1)pdm09, 376 (15.1%) were influenza A (not subtyped) and 648 (26.1%) were influenza B. A total of 1,890 RSV notifications were reported to HPSC during the 2014/2015 season; the highest number of notifications reported since RSV was made notifiable in 2012.

Table 1: Number of influenza outbreaks by HSE-Area for the 2014/2015 influenza season (n=90). It is known that the number of hospitalised cases associated with these outbreaks was under-reported.

HSE-Area	No. of outbreaks	Total number ill	Total number hospitalised	Total number dead	Total number lab confirmed
HSE-E	25	544	74	10	259
HSE-M	5	58	2	1	24
HSE-MW	7	78	24	3	39
HSE-NE	7	96	2	4	31
HSE-NW	15	189	11	3	52
HSE-SE	10	126	9	4	34
HSE-S	17	283	22	1	45
HSE-W	4	46	14	1	25
<b>Total</b>	<b>90</b>	<b>1420</b>	<b>158</b>	<b>27</b>	<b>509</b>

### Confirmed influenza cases hospitalised

One thousand and nine cases (22/100,000 population) with confirmed influenza were reported as hospitalised during the 2014/2015 influenza season; over 40% of all confirmed influenza notified cases. The highest age specific rate in hospitalised cases for the 2014/2015 season was in those aged 65 years and older (81.4/100,000 population) the highest ever reported in this age group, followed by those aged less than one year (74.6/100,000). The age specific rates in those less than one year of age were only higher during the 2009 pandemic. Of the 1,009 hospitalised cases, 780 (77.3%) were confirmed influenza A cases and 229 (22.7%) were influenza B cases. Of the 578 subtyped influenza A cases: 490 (84.8%) were influenza A(H3) and 88 (15.2%) were influenza A(H1)pdm09. Further data on confirmed influenza hospitalised cases are detailed in tables 1-4.

### Enhanced surveillance hospital data on 0-14 year age group

A total of 351 confirmed influenza cases aged between 0 and 14 years were notified on CIDR for the 2014/2015 influenza season, 213 (60.7%) of these cases were hospitalised. One hundred and sixty-two cases (76.1%) were positive for influenza A [89 A(H3), 40 A(H1)pdm09 and 33 A (not subtyped)] and 51 (23.9%) were positive for influenza B. The median age of cases were 3 years. Over 63% of cases were aged between 0 and 4 years, with one quarter of cases aged less than one year. The most frequently reported symptoms included: fever (73.6%), cough (65.3%), fatigue (35.2%) and gastroenteric manifestations (29.6%). Complications were reported for 45 (21.1%) cases; of these cases more than one complication was reported for 29.2% 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 2 days (ranging from 1 - 25 days). Approximately, 33% of hospitalised cases in this age group were reported as having an underlying medical condition, with chronic respiratory disease (including asthma), chronic neurological disease, immunosuppression, conditions that can compromise respiratory function and other medical conditions being the most frequently reported. Four cases were reported as being premature. Of the 52

cases with reported underlying medical conditions and known vaccination status, 90% were not vaccinated. Approximately, 27% of cases (44/162) commenced antiviral treatment and 73% (118/162) did not. Nine cases were reported as being admitted to critical care units (for further details, see below).

### Confirmed influenza cases admitted to ICU

Of the 1,009 hospitalised confirmed influenza cases, 69 (6.8%) were admitted to critical care (60 adults and 9 paediatric cases). Of the 69 critical care cases, 33 (47.8%) were infected with influenza A(H3), 11 (15.9%) with influenza A(H1)pdm09, 11 (15.9%) influenza A (not subtyped) and 14 (20.3%) with influenza B. Age specific rates for patients admitted to critical care units were highest in those aged 65 years and over (6.2 per 100,000 population) followed by those aged less than one year (4.1 per 100,000 population) (table 2). The median age in years for paediatric cases was 2, and 67 for adult cases. Fifty-three (53/60, 88.3%) adults and six (6/9, 66.7%) paediatric cases had pre-existing medical conditions. The most frequently reported underlying medical conditions for adults were chronic respiratory disease (36/60, 60%), followed by chronic heart disease (30/60, 50%), and immunosuppression (11/60, 18.3%). One adult case was pregnant. Twenty-four (40.0%) adult cases were reported as current/former smokers and four (6.7%) adult cases were reported to have alcohol related disease. The most frequently reported underlying medical conditions for paediatric cases were respiratory disease (3/9; 33.3%) and neurological/neuromuscular conditions (2/9, 22.2%). Fifty-two (52/60, 86.7%) adults were ventilated during their stay in critical care units. Ventilation status was only reported for one of nine paediatric cases; this case was ventilated. The median length of stay in critical care for adult cases was 9 days (ranging from 1 - 44 days) and for paediatric cases was 3 days (ranging from 1 - 26 days). Of the 34 cases with underlying medical conditions and known vaccination status, 55% were vaccinated. Vaccination status was only known for four paediatric cases with underlying medical conditions, none of these cases were vaccinated. Twenty-three (23/69, 33.3%) confirmed influenza cases reported from critical care units died.

Table 2: Age specific rate for confirmed influenza cases hospitalised and admitted to critical care during the 2014/2015 influenza season. Age specific rates are based on the 2011 CSO census

Age (years)	Hospitalised		Admitted to ICU	
	Number	Age specific rate per 100,000 pop.	Number	Age specific rate per 100,000 pop.
<1	54	74.6	3	4.1
1-4	80	28.2	4	1.4
5-14	79	12.7	1	0.2
15-24	44	7.6	1	0.2
25-34	82	10.9	2	0.3
35-44	78	10.3	9	1.3
45-54	52	9.0	6	1.0
55-64	104	22.4	10	2.2
≥65	436	81.4	33	6.2
<b>Total</b>	<b>1009</b>	<b>22.0</b>	<b>69</b>	<b>1.5</b>

### Mortality data

During the 2014/2015 influenza season, of the 2,530 influenza cases notified, 66 (2.6%) cases were reported as having died. The case classification of influenza was confirmed for 62 of these cases, probable for one and possible for three cases. Influenza was reported as a cause of death (either on the death certificate or by the physician) for 48 cases. Of the 62 cases with known virology, 36 were associated with influenza A(H3), 10 with influenza A(H1)pdm09, eight influenza A (not subtyped) and eight with influenza B. The median age of cases who died during the 2014/2015 influenza season was 77 years, ranging from 1-95 years. Cumulative excess all-cause mortality was reported in those aged 65 years and older, for nine consecutive weeks between weeks 2 and 10 2015. The estimated number of excess deaths during the 2014/2015 season for those aged 65 years and older was 726.

Summary tables of confirmed influenza hospitalised and critical care cases and influenza-associated deaths for all ages are detailed in tables 3, 4 and 5.

### Overview of the 2014/2015 season

In Ireland, the 2014/2015 influenza season was more severe than recent seasons. Influenza A (H3) viruses predominated, with an increase in the predominance of influenza B viruses later in the season. The impact of influenza during the 2014/2015 season predominantly affected those aged 65 years and older, with high numbers of outbreaks in residential care facilities, high hospitalisation rates, an increase in deaths reported in notified influenza cases and excess mortality

significantly higher than recent seasons. Over 1,000 confirmed influenza hospitalised cases were reported during the 2014/2015 season, a similar number to the 2009 pandemic. There was a significant increase in the overall hospitalisation rate for those aged 65 years and older compared to previous seasons, reaching the highest rate (81.4/100,000 population) ever reported for this age group (hospitalisation data available from 2009).

In Ireland and most Northern Hemisphere countries, the emergence of A(H3N2) viruses antigenically and genetically drifted from the 2014/2015 Northern Hemisphere vaccine strain, resulted in reduced vaccine effectiveness (VE).<sup>1, 2, 3</sup> The Irish overall adjusted VE in preventing influenza confirmed infection in primary care was very low, likely reflecting this mismatch between circulating A(H3) viruses and the 2014/2015 vaccine strain. Despite some antigenic drift among B/Yamagata viruses, the B/Yamagata and A(H1N1)pdm09 components in the 2014/2015 vaccine were thought likely to protect against circulating viruses.<sup>1, 4</sup> Excess all-cause mortality among people aged 65 years and older, concomitant with increased influenza activity and the predominance of drifted A(H3N2) viruses was observed in Ireland and across Europe. It is likely that influenza contributed significantly to these excess deaths, although adverse winter weather conditions and other respiratory infections may also have contributed.<sup>4, 5, 6</sup>

Sentinel GP ILI consultation rates in Ireland were above baseline levels for 11 consecutive weeks during the 2014/2015 season, a longer period than for the

Table 3: Summary table of confirmed influenza cases hospitalised for all ages by influenza season: 2009-2015. Rates are based on the 2011 CSO census.

	Hospitalised					
	Pandemic period	2010/11	2011/12	2012/13	2013/14	2014/15
<b>Total cases</b>	1059	968	147	469	693	1009
<b>Crude rate /100,000</b>	23.1	21.1	3.2	10.2	15.1	22.0
<b>Median age (years)</b>	17	29	27	32	51	59
<b>Females</b>	50%	55%	56%	57%	57%	53%
<b>Case fatality rate</b>	2%	4%	4%	5%	5%	5%

Table 4: Summary table of confirmed influenza cases admitted to critical care units for all ages by influenza season: 2009-2015. Rates are based on the 2011 CSO census.

	Admitted to ICU					
	Pandemic period	2010/11	2011/12	2012/13	2013/14	2014/15
<b>Total cases</b>	100	121	15	39	83	69
<b>Crude rate /100,000</b>	2.2	2.6	0.3	0.8	1.8	1.5
<b>Median age (years)</b>	34	49	60	39	50	63
<b>Females</b>	50%	53%	80%	49%	41%	41%
<b>Cases with risk factor</b>	82%	74%	93%	90%	85%	86%
<b>% Vaccinated</b>	NA	17%	-	-	32%	47%
<b>Hospital:ICU ratio</b>	9%	13%	10%	8%	12%	7%
<b>ICU Median LOS - Adult</b>	12	14	5	9	9	9
<b>ICU Median LOS - Paediatric</b>	8	7	3	5	8	3
<b>Case fatality rate</b>	18%	29%	33%	28%	33%	33%

previous season. The NVRL reported the highest number of influenza A(H3) viruses ever detected since surveillance began in 2000. Positive detections of RSV and hMPV were also at higher levels than previously reported.

The number of acute respiratory infection/influenza outbreaks reported during the 2014/2015 season was at the highest level reported in Ireland since the 2009 pandemic. The majority of these outbreaks were caused by influenza A(H3) and mainly affected the elderly in residential care facilities. Reported influenza vaccination status of patients/clients in these outbreaks was high, whilst vaccination status of staff was low, highlighting the need to improve influenza vaccine uptake amongst healthcare 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 [HPSC Annual Epidemiological Report, 2014](#).

For the 2015/2016 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/Switzerland/9715293/2013 (H3N2)-like virus; and a B/Phuket/3073/2013-like virus.<sup>7</sup> This represents a change in the influenza A(H3) and influenza B(Yamagata lineage) components compared with the composition of the 2014/2015 influenza vaccine. The vast majority of influenza viruses genetically tested during the 2014/2015 season in Ireland, belonged to genetic groups antigenically similar to the influenza virus strains selected for the 2015/2016 Northern Hemisphere influenza vaccines.

In Ireland, for the 2015/2016 season, existing surveillance systems are being further strengthened. HPSC are currently evaluating the critical care influenza surveillance system, with a view to improving the efficiency of the system and overall reporting of cases for future seasons. HPSC are also focusing on improving influenza vaccine uptake and antiviral data on severe influenza cases, outbreaks, health care workers and those in risk groups for influenza. HPSC, ICGP and the NVRL are continuing to work on the European influenza vaccine effectiveness study (I-MOVE). Data from all of these surveillance projects will assist in guiding the management and control of influenza and of any future epidemics or pandemics. [www.hpsc.ie](http://www.hpsc.ie)

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Table 5: Summary table of notified influenza cases that died from all causes and were reported on Ireland's Computerised Infectious Disease Reporting System (CIDR) by influenza season: 2009-2015. Rates are based on the 2011 CSO census.

	Influenza notifications - Deaths from all causes					
	Pandemic period	2010/11	2011/12	2012/13	2013/14	2014/15
<b>Total deaths</b>	32	43	12	38	58	66
<b>Crude rate /100,000</b>	0.7	0.9	0.3	0.8	1.3	1.4