

# ENHANCED SURVEILLANCE OF INITIAL CASES OF PANDEMIC H1N1 2009 INFLUENZA IN IRELAND, APRIL - JULY 2009

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From 28 April to 18 July 2009 there were 156 cases of pandemic H1N1 2009 influenza confirmed in Ireland. During this time, Ireland was in containment phase, and detailed case-based epidemiological information was gathered on all cases presenting in the community and acute health care setting. Active case finding was performed among contacts of cases. Eighty percent of cases were in people under the age of 35 years, and 86% were imported. The most frequent symptoms were fever, sore throat, myalgia and dry cough. Nine people were hospitalised, no fatalities occurred.

### Background

In late April 2009, a novel influenza virus led to human infection in Mexico. A public health emergency of international concern was declared by the World Health Organization (WHO) on 25 April 2009 [1]. Over the following weeks the virus spread rapidly to all regions of the world. Consequently WHO declared a phase 6 pandemic on 11 June 2009 due to evidence of community-level transmission in multiple countries globally [2].

In Ireland the National Pandemic Plan was implemented from 25 April; existing surveillance systems were augmented and pandemic H1N1 2009 influenza and enhanced surveillance commenced. On 28 April 2009, the first case of pandemic H1N1 2009 influenza was confirmed in Ireland.

Prior to April 2009, a number of surveillance systems were in place in Ireland to monitor influenza and clusters of influenza-like illness (ILI). These systems included year round surveillance by sentinel general practitioners (GPs), virological surveillance (sentinel and non-sentinel), hospital sentinel surveillance and statutory reporting of outbreaks of ILI and influenza under the Infectious Diseases Regulations [3].

Baseline seasonal ILI rate thresholds were set for the Irish population in 2008 based on surveillance of ILI between 2001 and 2008 [4]. New systems implemented in April 2009 included:

- enhanced case-based reporting of all cases of pandemic H1N1 2009 influenza using the national electronic reporting system, (Computerised Infectious Diseases Reporting system, CIDR);
- increased virological surveillance by the GP sentinel influenza surveillance scheme (number of samples to be taken by GPs increased from two to five per week);
- recruitment of additional sentinel GPs;

- expanded hospital sentinel surveillance;
- augmented mortality surveillance to identify excess all-cause deaths, excess pneumonia and influenza deaths; and
- surveillance of influenza-related calls to out-of-hours GP services.

We report on the enhanced case based surveillance of the first 156 confirmed cases of pandemic H1N1 2009 influenza up to 18 July 2009, when the strategy changed from containment to mitigation, and detailed case based surveillance of all cases ceased.

### Methods

GPs and hospital clinicians reported all suspect cases of pandemic H1N1 2009 influenza to local departments of public health who in turn contacted and interviewed them. Public health staff completed case-based enhanced surveillance forms with information from these interviews. In order to facilitate active case finding for enhanced surveillance, the European Union case definition of 30 April 2009 was adopted [5]. As evidence emerged internationally in individual countries that they were experiencing community transmission (either by reporting of large numbers of cases, or by the country itself stating that community transmission was occurring), they were added to the list of countries where a travel history would be relevant for the clinical assessment. Staff from departments of public health contacted all persons who fit the criteria of the EU case definition for a case under investigation. They had a swab (nose and throat) that was submitted to the National Virus Reference Laboratory (NVRL) for testing. Samples from all cases under investigation for pandemic H1N1 2009 virus tested at the NVRL were confirmed with reverse-transcript PCR (RT-PCR).

Contact tracing of cases was undertaken and some additional cases were identified through this mechanism. Health authorities collated information on any clusters/outbreaks identified including the number of people involved and the type of outbreak. An outbreak of ILI was defined as three or more cases of ILI arising within a 72 hour period which met the case definition above and where an epidemiological link was established.

Enhanced surveillance data and laboratory results were entered into the CIDR to allow real-time exchange of information between the NVRL, regional departments of public health and the Health Protection Surveillance Centre (HPSC).

HPSC analysed the enhanced surveillance data to describe pandemic H1N1 2009 influenza in terms of age, sex, pre-existing

medical conditions of infected cases, presenting features and complications associated with the infection, as well as source, timing and clusters/outbreaks of disease.

## Results

During the period 28 April to 18 July 2009, 156 confirmed cases of pandemic H1N1 2009 influenza were reported; 80 female (50.9%) and 76 male (49.1%). The median age of cases was 25.0 years (range: 0-73 years). Eighty percent of cases were in people under 35 years of age. Table 1 shows the number of confirmed cases by sex, five-year age group and age-specific incidence rate per 100,000 population.

After the first case of pandemic H1N1 2009 influenza on 28 April 2009, sporadic cases occurred until the middle of June, after which case numbers began to increase, with more than six new cases per day by early July (Figure). One hundred and thirty four (86%) cases were imported, 14 (9%) were infected in Ireland by an imported case and two (1%) were infected in Ireland without any identifiable travel association, information was missing for six (4%) cases.

Complete information on clinical symptoms was available for 106 (68%) cases (Table 2). For these, fever or history of fever ( $\geq 38^\circ$ ) was reported in 95%. Sore throat, dry cough, myalgia and headache were frequently reported symptoms. Most cases reported mild to moderate illness similar to seasonal influenza. Sixteen percent reported diarrhoea. Six cases (4%) were reported as having developed pneumonia due to pandemic H1N1 2009 influenza, all of whom recovered.

Nine people were hospitalised with pandemic H1N1 2009 influenza (hospitalisation rate 5%). Of these cases, four were children under 5 years of age, four were in the age group between five and 64 years and one aged 65 years. Data on pre-existing medical conditions and pregnancy was collected on all hospitalised

cases. Two of the five adults had pre-existing medical conditions such as chronic respiratory disease, chronic heart disease, immunosuppression and diabetes mellitus. There were no pre-existing medical conditions reported in the paediatric cases. All hospitalised cases recovered, no fatalities occurred.

Twelve outbreaks of pandemic H1N1 2009 influenza were identified, involving a total of 38 people. One outbreak was in travelling companions while other outbreaks occurred within families and extended families. The number of people affected per outbreak ranged from two to six. All contacts of cases were offered chemoprophylaxis.

For three outbreaks information was available on attack rates which were 20%, 33% and 74% respectively. Surveillance of influenza-like illness (ILI) and respiratory illness in general showed little change from the baseline threshold for winter seasonal influenza activity.

GP sentinel surveillance over the eleven week period studied showed a small increase in ILI consultation rates, with a rate of 13.1 per 100,000 population being reported in the week ending 13 July, which was an increase in comparison to the rate of 8.8 per 100,000 population reported during the week ending 6 July. Six (4%) of cases of pandemic H1N1 2009 influenza were identified through this sentinel system. Sentinel hospital influenza surveillance found no increases in respiratory admissions up to 18 July. Analysis of all cause, and influenza- and pneumonia- related deaths showed no excess mortality compared with the same period in previous years and no outbreaks of non-pandemic influenza were notified up to 18 July.

## Discussion

The epidemiology of the initial cases of pandemic H1N1 2009 influenza in Ireland was similar to that seen in other countries [6-13]. The majority of cases were children and adults under 35 years. Similar numbers of males and females were affected.

TABLE 1

Pandemic H1N1 2009 influenza cases by sex, age and age-specific incidence rates per 100,000 population, Ireland, 28 April - 18 July 2009 (n=156)

Age group [years]	Male cases (age-specific incidence rate)	Female cases (age-specific incidence rate)	Total cases (age-specific incidence rate)
0-4	11 (7.1)	6 (4.1)	17 (5.6)
5-9	3 (2)	3 (2.1)	6 (2.1)
10-14	2 (1.4)	3 (2.2)	5 (1.8)
15-19	9 (6.1)	11 (7.7)	20 (6.9)
20-24	15 (8.7)	14 (8.2)	29 (8.5)
25-29	7 (3.7)	16 (8.7)	23 (6.2)
30-34	5 (2.3)	5 (2.9)	10 (2.9)
35-39	6 (3.7)	5 (3.2)	11 (3.4)
40-44	6 (4)	3 (2)	9 (3)
45-49	2 (1.4)	3 (2.2)	5 (1.8)
50-54	2 (1.6)	4 (3.3)	6 (2.4)
55-59	5 (4.4)	2 (1.8)	7 (3.1)
60-64	1 (1.1)	2 (2.2)	3 (1.7)
65+	2 (1)	3 (1.2)	5 (1.1)
<b>Total</b>	<b>76 (3.6)</b>	<b>80 (3.8)</b>	<b>156 (3.7)</b>

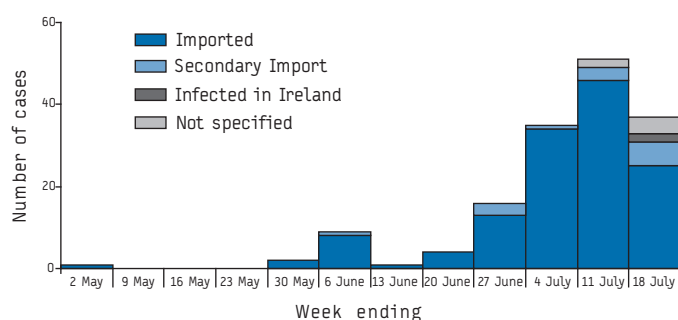
The majority of infected experienced a mild self-limiting illness with fever, cough, sore throat and myalgia being the predominant symptoms. As with seasonal influenza, some people experienced more severe disease requiring hospitalisation. However, in contrast to seasonal influenza there was an under-representation of infection in older people.

The surveillance activities undertaken in the initial weeks of the pandemic had several strengths and weaknesses that should be borne in mind. The case definition adopted for pandemic H1N1 2009 influenza in the first few months of the pandemic was very specific with strict clinical and epidemiological criteria, particularly the epidemiological requirement to have travelled to an affected area, to have had contact with a confirmed case or to work in a laboratory testing cases. This was important when the numbers

of cases were very small and anxiety in relation to the disease was very high, but it resulted in the vast majority of presentations for suspected pandemic H1N1 2009 influenza being due to other viruses or no virus being detected. The use of a highly specific case definition ensured that public health and laboratory resources and public health control activities were targeted at people likely to have the disease and that those unlikely to have the disease were not treated and isolated, or their contacts quarantined unnecessarily. However, the disadvantage of this specific case definition was that a number of people with the disease may have been missed. For example, several samples that tested positive for pandemic H1N1 2009 influenza virus in Greece, where clinicians were allowed more discretion in testing people for influenza, were from people who did not fit the EU case definition [12]. However, because of the statutory system under which all outbreaks of disease, including ILL, are notifiable [3,14] it is unlikely that clusters of indigenous pandemic H1N1 2009 influenza were missed in Ireland.

**FIGURE**

**Confirmed cases of pandemic H1N1 2009 influenza by source of infection and week of laboratory confirmation, Ireland, 28 April - 18 July 2009 (n=156)**



A challenge with the epidemiological criteria of the case definition was the speed at which countries were becoming affected. In the first few weeks of the pandemic, spread of disease to different countries was rapid and revision of the case definition to include countries where community transmission was occurring proved difficult. This in turn resulted in a lag time between an area being classified as an affected area and people with travel to that area being investigated which may have led to under-identification of cases. A challenge with the clinical criteria of the case definition was that fever was required and subsequent reports from other countries presently indicate that fever is present in a smaller proportion of cases than previously believed and this could further have reduced case identification [11,12].

Our hospitalisation rate of 5% must be interpreted with caution for two reasons. Firstly, in the early phase of the pandemic, in

**TABLE 2**

**Clinical symptoms in confirmed cases of pandemic H1N1 2009 influenza for whom information is available, Ireland, 28 April - 18 July 2009 (n=106)**

Symptoms	Number of cases	%
Fever or history of fever	101	95
Sore Throat	64	60
Dry cough	58	55
Myalgia	56	53
Headache	48	45
Rhinorrhoea	36	34
Sneezing	20	19
Diarrhoea	17	16
Arthralgia	16	15
Nausea	15	14
Dyspnoea	14	13
Productive cough	14	13
Vomiting	14	13
Pneumonia	5	5
Altered consciousness	3	3
Conjunctivitis	3	3
Nose bleed	1	1
Seizures	0	0

Ireland, as in other countries [12,15,16], there may initially have been a low threshold for admitting patients with pandemic H1N1 2009 influenza. Reasons for this included concerns as to how the clinical course of patients with a novel disease would progress and for the administration of antivirals to young children, however no patient was admitted purely for infection control. As the pandemic has progressed in other countries there has been a move to hospitalising patients with severe disease only and this has led to much lower hospitalisation rates in those countries [17-19]. Even though there was active follow-up of known cases and their contacts, it is likely that some people with pandemic H1N1 2009 influenza only experienced mild symptoms and thus did not seek medical care which lead to an under-representation of mild cases and hence an over-estimation of hospitalisation rates.

The CIDR surveillance system is the principal infectious disease surveillance system in Ireland and combines clinical and laboratory surveillance data [20]. It was developed to provide high quality timely data and to be flexible to deal with new information and diseases. Once the public health emergency of international concern was declared the system was quickly adapted to include case based and cluster reporting of pandemic H1N1 2009 influenza which was implemented nationally. This was possible because the CIDR system was already functioning well for surveillance of other notifiable diseases. All regions in the country but one had implemented CIDR and surveillance experts in these regions were competent in its use. The CIDR allowed for real-time collection and sharing of data between laboratories, departments of public health and HPSC and enabled real-time analysis of the spread of pandemic H1N1 2009 influenza in the community.

Regional departments of public health undertook contact tracing and collected enhanced surveillance information on all cases under investigation, tasks for which their staff were well experienced as these are often part of processes required to control infectious diseases in the community. This meant that the public health system could respond very quickly to this outbreak. However, the public health workforce is small in Ireland and capacity was stretched to its maximum in responding to the containment phase of the pandemic H1N1 2009 influenza. Ireland moved from containment to mitigation phase on 16 July following advice from the WHO [21]. Once the mitigation phase started, this relieved public health authorities from the burden of intensive contact tracing, and allowed them to focus efforts on case-based surveillance of more severe i.e hospitalised cases and investigation of clusters of disease. At this time there was also a continued focus on increasing public awareness of pandemic H1N1 2009 influenza and encouraging activities to prevent spread of influenza.

While it is impossible to predict how pandemic H1N1 2009 influenza will progress in Ireland, based on other countries' experience and the continuing rise in case numbers in Ireland, it is possible that we will experience a large increase, corresponding to the first wave of a pandemic, in the autumn.

Experience to date internationally has shown that prolonged stays in intensive care units (ICU), for the small proportion of persons needing specialised treatment, have been then main cause of pressure on health services. Currently, enhanced surveillance is being carried out on all hospitalised cases and an ICU enhanced surveillance system is being developed, to monitor those most at risk of developing severe disease. High quality data on hospitalised cases and cases requiring ICU admission is essential to guide

health service planning and response to pandemic H1N1 2009 influenza.

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