

INFLUENZA A(H1N1)v IN GERMANY: THE FIRST 10,000 CASES

A Gilsdorf (GilsdorfA@rki.de)¹, G Poggensee¹, on behalf of the working group pandemic influenza A(H1N1)v^{1,2}

1. Department for Infectious Disease Epidemiology, Robert Koch Institute, Berlin, Germany

2. The members of the group are listed at the end of this article

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The analysis of the first 10,000 cases of influenza A(H1N1)v in Germany confirms findings from other sources that the virus is currently mainly causing mild diseases, affecting mostly adolescents and young adults. Overall hospitalisation rate for influenza A(H1N1)v was low (7%). Only 3% of the cases had underlying conditions and pneumonia was rare (0.4%). Both reporting and testing requirements have been adapted recently, taking into consideration the additional information available on influenza A(H1N1)v infections.

Introduction

After the first cases of influenza A(H1N1)v in the United States and Mexico became public, the Robert Koch Institute (RKI) established a case-based reporting of cases of influenza A(H1N1)v [1]. In the first weeks of the pandemic, data were reported to the national level by fax, phone and email in parallel with the routine electronic reporting system SurvNet [2]. Thereafter, this changed to exclusive electronic data reporting, including additional information relevant for the assessment of the epidemiological situation.

After the detailed examination of the first 100 cases in the early phase of the pandemic [1], we analyse here data of the first 9,950 cases in Germany, with a focus on information regarding the risk groups, hospitalisation frequency and other factors contributing to the impact this pandemic has on the healthcare system, in order to guide further public health measures.

Methods

As of 30 April 2009 the following information was collected through SurvNet with standardised free-text: classification of cases (possible, probable, confirmed, discarded case), in-country transmission, number of contacts (close as well as wider contacts), antiviral drug used. From 22 June 2009 onwards, the variables were changed in order to collect more detailed data on treatment (start of therapy, antiviral drug), risk groups, presence of pneumonia, hospitalisation and source of infection.

In order to take the age structure of the population into consideration, we calculated the incidence per 100,000 population per age group. From our data, we also calculated the time interval between date of symptom onset and diagnosis and start of therapy, respectively.

Categorical variables were presented as percentages with interquartile ranges when appropriate. Odds ratios were calculated including 95% confidence intervals where appropriate.

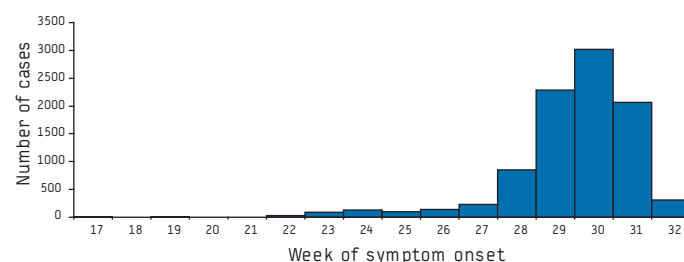
Results

As of 25 August 2009, 14,940 cases of influenza A(H1N1)v have been reported in Germany. For the detailed report below we analysed the first 9,950 cases that were reported to the RKI until 10 August 2009.

The date of symptoms onset of the first German case was 20 April 2009. The person had travelled to Mexico and had already become symptomatic while staying in Mexico. Until the end of May, only sporadic cases were notified, usually associated with travel to North America. Most secondary infections with influenza A(H1N1)v which occurred in this period could be traced back to returning travellers. In June, the number of new cases rose to approximately 10 to 50 cases per day. Since mid-July we saw a considerable increase in cases in Germany (Figure 1) with a peak of up to 500 cases per day and 3,000 cases per week at the end of July. Since then, the number of new cases per day has decreased.

From the 9,950 cases, 54% were male. The median age was 19 years (range: 0-89 years). The majority of cases (77%) were from 10 to 29 years old. Two per cent of the cases were younger than five years, 3% were between five and nine years old, 17% were between 30 to 59 years old and less than 1% of the reported cases were 60 years old and older.

FIGURE 1
Notified cases of influenza A(H1N1)v by week of symptom onset, Germany, April-August 2009, (n=9,275 cases with available information on symptom onset)



Looking at the incidence (Figure 2), the 15 to 19 year-olds were most affected, with 90 cases per 100,000 population, followed by the 20 to 24 year-olds (43/100,000). In children up to two years old, there were 5.5 cases per 100,000 population. Persons 60 years old and older had less than one case per 100,000 population. The proportion of incidence by age group over the weeks 28 to 32 showed a stable age distribution over this time period (Figure 3).

For 2,141 cases (22%), Germany was indicated as the most likely country of infection. In the first weeks of the pandemic (May and June), most travel-associated cases had been returning travellers from North America. Since the first week in July, the proportion of infections associated with travel to European countries has risen sharply. In July, 80% of travel-associated infections were seen in travellers returning from Spain, followed by the United Kingdom (6%), Bulgaria (3%) and North America (2%). From week

FIGURE 2

Incidence of notified cases of influenza A(H1N1)v, by age group, Germany, April-August 2009, (n=9,950)

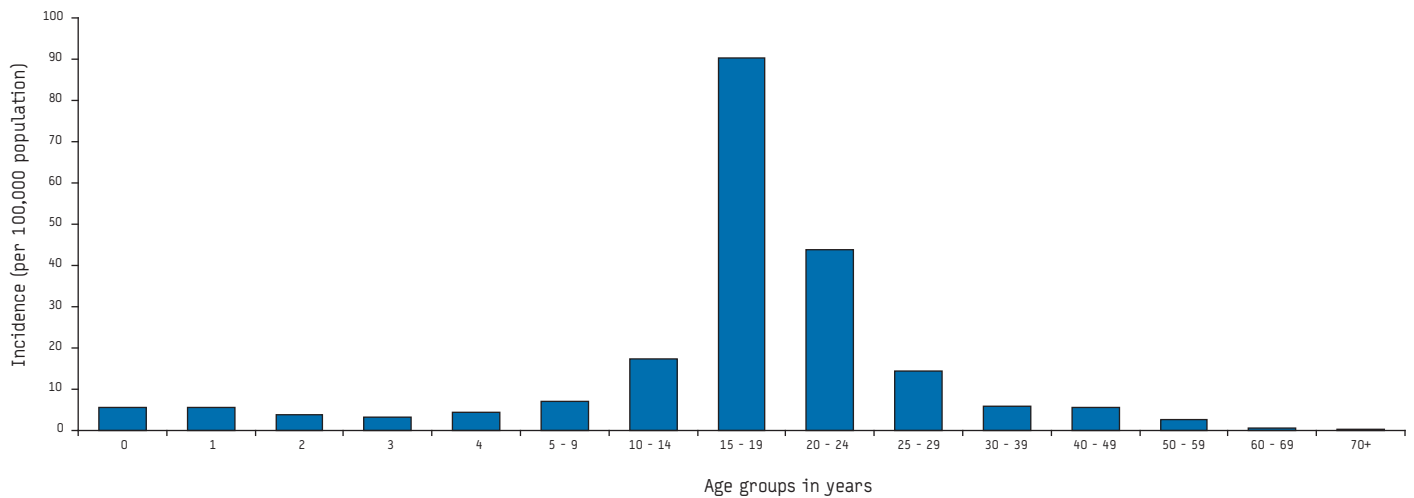
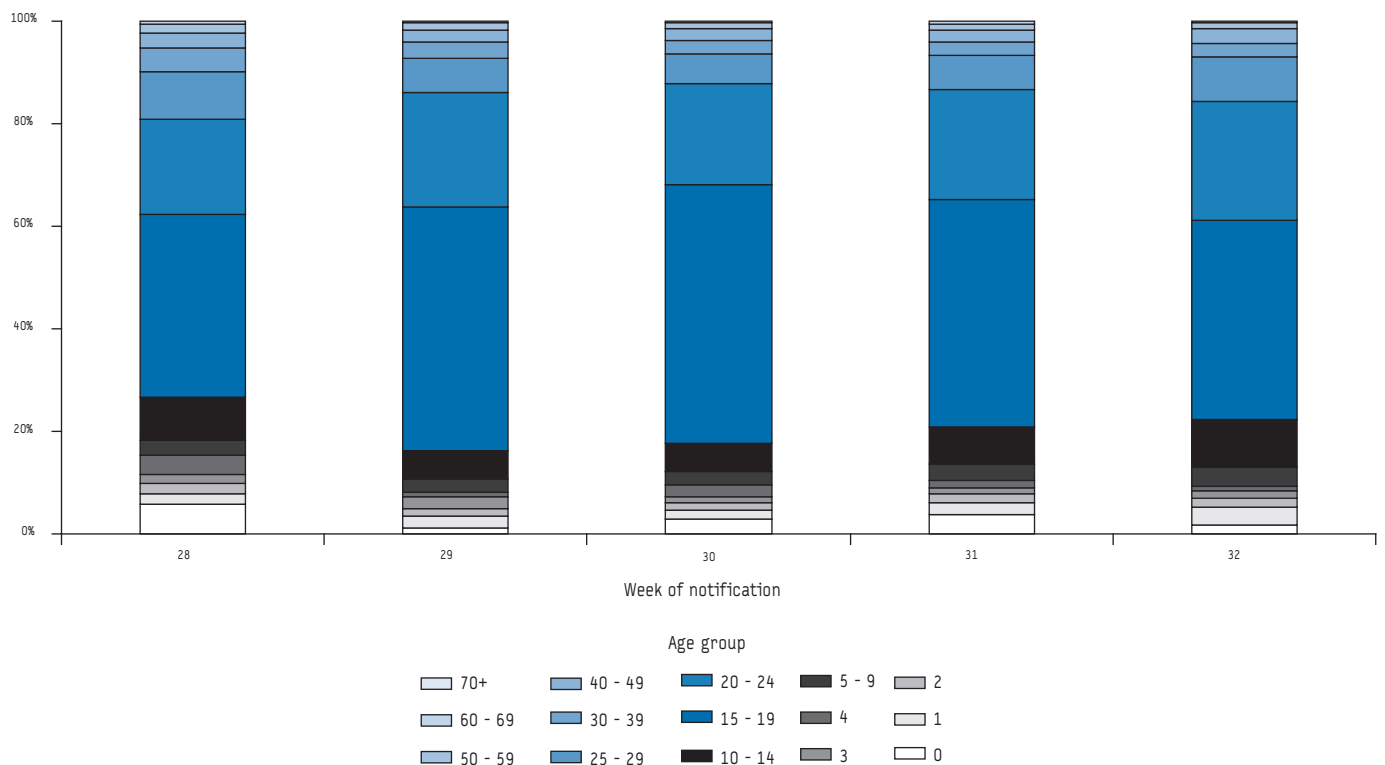


FIGURE 3

Proportion of incidences by age group and week of notification for notified cases of influenza A(H1N1)v, Germany, July-August 2009, (n=9,341)



29 to 32, the number of cases most likely infected in Germany rose steadily from 16% to 24%. For the cases without travel history, the proportion of infections without a known source increased between weeks 29 and 32 from 38% to 43% (n=1,039).

Symptoms were reported for all 9,950 cases. Cough was the most common symptom, present in 82% of the cases, followed by fever (78%).

Data were also collected on underlying health conditions and risk factors. The results are presented in the table.

The average time interval between date of symptom onset and diagnosis (n=7,955 cases for whom this information was available) was 3.6 days with an increasing trend from week 26 (2.4 days) to week 31 (3.8 days). The average time between date of symptom onset and start of therapy (n=1,810 cases for whom this information was available) was 2.2 days with a decreasing trend from week 28 (4.0 days) to week 32 (2.0 days). Cases with underlying conditions were more likely to receive treatment (72/134: 54%) than cases without underlying conditions (1,679/3,805: 45%; OR=1.44 [1.01; 2.07]). Information on presence of pneumonia at the time of notification was available for 6,460 cases. Pneumonia was reported for 26 cases (0.4%), out of which four belonged to a risk group (two had respiratory, two had unspecified risk factors) and eight were hospitalised.

From 3,630 cases for whom hospitalisation status was available, 263 (7%) persons were admitted to a hospital because of influenza, 122 cases (3%) were in hospital for other reasons, and for 42 cases (1%) the reason of hospitalisation was not known. The influenza hospitalisation rate changed from 11% in week 29 to 5% in week 31. We also looked for cases with information on their risk factors and their hospitalisation status (n=3,270). The proportion of people with risk factors who were hospitalised for influenza was 19% (20/108), while the proportion of people without risk factors that were hospitalised for influenza was 7% (220/3,162; OR = 3.04 [1.78; 5.16]). The median age was 19 years for both groups.

During the first phase of the pandemic, all contacts of cases in Germany were traced back by the local public health authorities

TABLE

Frequency of underlying health conditions for cases of influenza A(H1N1)v, Germany, April-August 2009, (n=5,885 cases for whom this information was available)

Underlying conditions*	Number of cases (%)	Proportion of all underlying conditions
No	5,690 (96.7%)	-
Yes	195 (3.3%)	-
Respiratory disease	87 (1.5%)	45%
Cardio-vascular disease	29 (0.5%)	15%
Diabetes	17 (0.3%)	9%
Obesity	11 (0.2%)	6%
Pregnancy	9 (0.2%)	5%
Immunsuppression	5 (0.1%)	3%
Others	34 (0.6%)	17%
Not specified	9 (0.2%)	5%

*Multiple answers were possible.

and the number of contacts was reported to the national level. The trace back was done for 2,635 cases. On average, three contact persons per case were identified (upper and lower quartile: 2 to 6 contacts, range 0 to 330 contacts).

Discussion

The analysis of the first approximately 10,000 cases of influenza A(H1N1)v in Germany showed that after some sporadic cases and a slow increase in June 2009, a significant increase of newly reported cases was seen starting with July. This trend was also reported from other countries in Europe [3]. There seems to be a downward trend now in Germany, even taking into account a reporting delay of approximately one week. Whether this decrease is a true decline in incidence is not yet clear. A change in health-seeking behaviour might also play a role. The first anxiety about the new infection might have made more people with respiratory symptoms seek medical advice and therefore might have brought the cases to the attention of the public health authorities. However, other European countries, like the UK, also report signs that the potential first wave of the pandemic might be coming to an end [4].

The cumulative number of cases by age group clearly shows that there is a peak in the age group 15 to 19 years. Many of these cases were high-school graduates who travelled to Spain in large groups at the end of the school year. The incidence in the under two year old children is relatively low (5/100,000). Data from the United States showed a much higher incidence (22.9/100,000) in children up to five years old [5]. The very low incidence in people over 60 years of age is consistent with other investigations [4-7]. It is still unclear if this is due to a partial immunity from former infections with H1N1 influenza viruses or if this is because the virus has not yet been sufficiently introduced in this subpopulation. Looking at the proportion of affected age groups over weeks, no shift to the older (>60 years) or younger (<5 years) age groups can be seen yet.

The high proportion of cases imported from Spain does not necessarily indicate a relevant epidemic activity there, but probably rather reflects the travel patterns of German holiday makers during summer. The German Federal Office for Statistics reported that from June to August 2008 approximately 1.1 million people travelled every month from Germany to Spain by air [8]. Additionally, there are many organised bus tours to Spain that are especially favoured by high-school students. Closer physical contact, sharing of drinks and special party settings were discussed as possible risk factors, but they need to be validated by further research. Besides the high number of cases in travellers, we could see an increasing proportion of cases that had no travel history and no known source of infection in the last weeks.

Most cases of influenza A(H1N1)v currently seem to have uncomplicated influenza-like illnesses. Our data show that the most common symptoms were cough and fever, similarly to reports from other countries [6-9]. This was one of the reasons why we specified the list of symptoms for the physicians to notify a patient to the local health authorities.

A particular interest for the public health authorities is the protection of the vulnerable groups. These are people with underlying conditions, such as chronic diseases, but also pregnancy, who have a higher risk of developing complications during an influenza infection. From all notified cases in Germany for whom the information was available, only 3% had underlying

conditions. Nearly half of them had chronic respiratory tract diseases. Pregnancy was not often reported among the confirmed cases. Pneumonia at the time of notification was also very rarely reported.

With increasing numbers of cases and laboratory diagnoses, the time interval between date of onset of symptoms and date of diagnosis has increased considerably. In the beginning, both transport of specimens and laboratory testing were done very fast. Now diagnostics have become more routine work and the high number of samples has caused a backlog of samples to be tested. The time interval between onset of symptoms and start of therapy decreased from four to two days. That means physicians start therapy as recommended before the laboratory confirmation of the influenza infection. Treatment is started on average within 48 hours from symptom onset, when the antiviral drugs are supposed to be most effective.

The hospitalisation rate changed considerably over the weeks. During the first weeks, the majority of cases were hospitalised due to infection control measures. Even though that might still be the case for some patients, hospitalisation is now considered as a proxy for the severity of the disease in patients. In the last couple of weeks, the hospitalisation rate due to influenza in the notified cases halved to 5% in week 32. This is a relatively low proportion and does not constitute a high burden for the hospitals at this stage of the pandemic. When we looked closer at those cases with reported underlying conditions we could see that they had a hospitalisation rate more than two times higher than in cases without underlying conditions. Here precaution could have contributed to the referral to a hospital, but it still shows that these known groups with underlying conditions will present an important group when dealing with the pandemic.

Conclusion

As of August 2009, the majority of influenza A(H1N1)v cases reported in Germany are mainly imported from other European countries. However, the proportion of cases with in-country transmission is increasing.

Several factors might influence the characteristics of notified cases in the near future. Firstly, as of 18 August 2009, physicians have to notify possible cases only if the patient presents with cough and fever, therefore it is assumed that the number of cases reported to the national level will decrease. Since 17 August 2009, the costs of the laboratory confirmation have been paid by the statutory health insurances only for cases with severe disease or cases with the risk to develop severe disease. Therefore, the percentage of laboratory-confirmed cases among the notified cases will decrease. However, as long as the sentinel surveillance in Germany does not give a signal, the assessment of the epidemiological situation must rely on routine surveillance.

The public health strategy has changed in Germany from containment (follow-up of all contact persons) to the protection of vulnerable groups. Now, only contact persons who have occupational contacts to persons with a high risk to develop severe disease are followed up (e.g.: healthcare workers).

Until now, no fatalities due to influenza A(H1N1)v have been reported in Germany, which may be partly due to these strategies.

Germany wants to continue the current reporting system until the number of respiratory infections increases significantly, as can be expected in autumn again. Then it is planned to stop the case-

based reporting by physicians and get the necessary information from the laboratory-based reporting of confirmed cases as it is done for seasonal influenza viruses and the sentinel surveillance.

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Members of the working group pandemic influenza A(H1N1)v:

Alpers, Katharina; Altmann, Doris; An der Heiden, Matthias; Bartels, Cornelius; Bätzing-Feigenbaum, Jörg; Becker, Anne; Behnke, Susanne; Bergholz, Andreas; Bernard, Helen; Bielecke, Jessica; Biere, Barbara; Böhmer, Merle; Brodhun, Bonita; Buchholz, Udo; Buda, Silke; Cai, Wie; Claus, Hermann; Dehnert, Manuel; Déleré, Yvonne; Dettmann, Marleen; Eckelmann, Fabian; Eckmanns, Tim; Faber, Mirko; Faensen, Daniel; Fahle, Caroline; Feig, Marcel; Frank, Christina; Gencaslan, Özlem; Ghassem, Parvin; Gilsdorf, Andreas; Gohlke-Micknis, Silvia; Gunzenheimer-Bartmeyer, Barbara; Haar, Karin; Haas, Walter; Hamouda, Osamah; Hellenbrand, Wiebke; Hermes, Julia; Herzhoff, Michael; Houareau, Claudia; Jansen, Andreas; Kalbhenn, Andrea; Kamga-Wambo, Oscar; Kappelmayr, Lutz; Kermer, Antje; Kirchner, Göran; Kleinkauf, Niels; Koch, Judith; Kollan, Christian; Köpke, Karla; Krause, Gérard; Kühne, Andrea; Laude, Gabi; Leuber, Michael; Lindemann, Christina; Liss, Ilka; Lohmann, Katrin; Maidhof, Heinrich; Männel, Andrea; Marcus, Uli; Matysiak-Klose, Dorle; Meyer, Birgit; Mohr, Oliver; Mücke, Inge; Neugebauer, Denise; Nielsen, Stine; Noll, Ines; Offergeld, Ruth; Pape, Ebi; Poggensee, Gabriele; Poorbiazar, Mona; Radun, Doris; Reinhardt, Bernd; Reiter, Sabine; Reuß, Annicka; Riedmann, Klaus; Ritter, Sabine; Riva, Alessandra; Rosner, Bettina; Sagebiel, Daniel; Säiler, Andrea; Sasse, Julia; Schenkel, Karl; Schirmack, Jaska; Schmidt, Axel; Schupelius, Daniel; Schwarz, Franziska; Schweickert, Brigitta; Schweiger, Brunhilde; Siedler, Anette; Spackova, Michaela; Spielmann, Nadine; Stark, Klaus; Stegemann, Verena; Stöcker, Petra; Strobel, Hartmut; Süß, Thorsten; Trull, Heidi; Velasco, Edward; Voß, Lieselotte; Wadl, Maria; Walter, Dietmar; Weiß, Bettina; Werber, Dirk; Wessels, Guido; Wetzel, Sarah; Wiese-Posselt, Miriam; Zbinovcova-Dennis, Martina; Zimmermann, Ruth

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