

Enfermedades Infecciosas y Microbiología Clínica

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Original article

Pandemic A/H1N1 influenza: Transmission of the first cases in Spain

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ARTICLE INFO

Article history:

Received 6 May 2011

Accepted 30 June 2011

Available online 13 September 2011

Keywords:

Flu

Pandemic A/H1N1 influenza

Transmission

Air-travel

Attack rate

Secondary-attack rate

ABSTRACT

Introduction: Pandemic A/H1N1 influenza emerged in Mexico at the end of March 2009. Since then, it is still important to provide evidences that contributed to the international spread of the virus and to ascertain the attack rate of this new strain of influenza among the first cases in Spain that led to identify the first transmission in Europe.

Methods: Three pandemic A/H1N1 influenza groups related to an overseas flight were studied: 71 student group, 94 remaining passengers, and 68 contacts of confirmed cases. The attack rate with their 95% confidence interval (CI) among the student group and contacts was calculated. On April 26th, when the first cases were notified, strong preventive measures were implemented among the student group and the contacts of the confirmed cases.

Results: On 27th April, the first pandemic A/H1N1 influenza cases confirmed in Spain were three students that came back from Mexico by airplane. A student generated the first native case in Spain and one of the first cases in Europe. Similar attack rates were found between the student group (14.1%; CI: 12.1–16.1) and their contacts (13.2%; CI: 4.4–22.0), but no cases among remaining passengers were detected, suggesting low transmission risk during air travel.

Conclusion: The first cases of pandemic A/H1N1 influenza in Spain were imported by airplane from Mexico. Preventive efforts to reduce the impact of the influenza influenced that primary and secondary rates were lower than first estimations by WHO.

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Transmisión de los primeros casos en España de influenza pandémica A/H1N1

RESUMEN

Introducción: El virus de la influenza pandémica A/H1N1 surgió en México a finales de marzo del 2009. Desde entonces, es todavía importante aportar las evidencias que contribuyeron a la rápida propagación internacional del virus y determinar la tasa de ataque de esta nueva cepa de influenza entre los primeros casos que llegaron a España y llevaron a identificar la primera transmisión en Europa.

Métodos: Se estudiaron tres grupos de personas con sospecha de casos de virus de la gripe pandémica A/H1N1 relacionados con un vuelo internacional: 71 estudiantes que viajaban juntos, 94 pasajeros que viajaban en el mismo avión que el grupo de estudiantes, y 68 contactos de casos confirmados. Se calculó la tasa de ataque entre los estudiantes y los contactos con su intervalo de confianza del 95% (IC). El 26 de abril, cuando los primeros casos fueron notificados, se llevaron a cabo medidas de prevención exhaustivas entre el grupo de alumnos y de los contactos de los casos confirmados.

Palabras clave:

Gripe

Influenza pandémica A/H1N1

Transmisión

Vuelos internacionales

Tasa de ataque

Tasa de ataque secundario

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Resultados: El 27 de abril, los primeros casos de influenza pandémica A/H1N1 confirmados en España fueron tres estudiantes que regresaban de México en avión. Un estudiante dio lugar al primer caso autóctono en España y a uno de los primeros casos en Europa. Se encontraron tasas de ataque similares entre el grupo de estudiantes (14,1%; IC: 12.1–16.1) y sus contactos (13,2%; IC: 4.4–22.0), pero no se detectó ningún caso entre el resto de pasajeros del vuelo, lo que sugiere que el riesgo de transmisión durante el vuelo fue bajo.

Conclusión: Los primeros casos de gripe A/H1N1 en España fueron importados por vía aérea desde México. Los esfuerzos de prevención para reducir el impacto de la nueva cepa de influenza influyeron en que tanto la tasa de ataque primaria como la secundaria fueran menores a las primeras tasas estimadas por la OMS para esta nueva cepa de influenza.

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Introduction

The pandemic-A/H1N1-influenza, which emerged in Mexico at the end of March 2009,¹ was spread essentially worldwide in more than 214 countries by international air-travel.^{2,3} At end of April 2009, before the WHO raised the global pandemic alert level to Phase 6, intense active influenza surveillance started in Spain to detect and isolate suspected cases.⁴

Pandemic-A/H1N1-influenza cases were confirmed in passengers on a flight departing from Mexico City on April 23rd and arriving at Barcelona on April 24th 2009. This study describes the transmission of pandemic-A/H1N1-influenza among the passengers and their contacts, which were the first cases diagnosed in Spain⁵ and led to the first transmission identified in Europe.⁶

Methods

A retrospective cohort study was designed. The cohort was composed of three suspicious pandemic-A/H1N1-influenza groups associated with an international flight: a group of 71 students, the 94 remaining-passengers, and 68 contacts of confirmed cases (defining contact as: household or community exposure ≥ 6 h/day).

On April 26th 2009, the first three suspicious pandemic-A/H1N1-influenza cases in Spain, who were part of the student-group, were notified to the Public Health Agency of Barcelona (PHAB). The PHAB performed an epidemiological investigation among all the passengers, except the flight crew (this information was not provided by the airline company). Catalonia public health agencies and healthcare facilities collaborated in case detection, ensuring the early diagnosis and treatment of the cases. Following the recommendations at that time for case confirmation,⁷ Catalonia and National reference laboratories analysed naso-pharyngeal swab specimens of all symptomatic suspected cases with influenza-like syndrome (i.e. fever, cough, myalgia) and history of a recent travel to Mexico or contact with someone who travelled to a country with confirmed cases of pandemic A/H1N1 influenza (at the beginning this was only Mexico), by reverse-transcriptase-polymerase-chain-reaction (rtRT-PCR).

All students on the flight were actively contacted and personally interviewed to find out whether they had developed symptoms (except the three first students who were passively reported). Those who had influenza-like symptoms were tested for pandemic influenza infection, conducting a contact study among confirmed cases. As recommended at that time, prevention interventions (i.e. antiviral therapy, hygiene promotion such as to cover their coughs and sneezes and wash their hands frequently) were implemented among students and their contacts. Furthermore, based on an estimated incubation period of 1–7 days for pandemic A/H1N1 influenza,⁸ confirmed cases with mild pandemic A/H1N1 influenza symptoms (uncomplicated, non-hospitalized cases) were advised to stay home for 7 days after symptom onset or 24–48 h after symptom resolution, whichever was longer.

By the end of May, pandemic A/H1N1 influenza databases of the six Catalonia epidemiological surveillance units were reviewed to identify new confirmed or negative cases among the remaining 94 passengers.

Information about the cases was collected: sex, age, airplane seat, clinical data, and number of contacts and their diagnosis (new case of pandemic A/H1N1 influenza or not). A descriptive analysis of the primary cases and their contacts was conducted. Qualitative variables were expressed as percentage (95% confidence interval, CI) and quantitative variables as mean (standard deviation, SD).

Results

The direct flight (Mexico City-Barcelona) lasted 11 h and 165 passengers were aboard. Among the passengers, there were 71 students who had travelled together through Mexico as a group visiting Cancún city, Xixinitza, Coba, Tulum, and Carmen beach from April 15th to the 22nd. The remaining 94 passengers were not related to this group.

At the flight departure, three individuals of the student-group had an influenza-like syndrome (cough and headache, and two of them had fever) since April 22nd. During the flight, three more students became ill, and four more students were diagnosed with pandemic-A/H1N1-influenza within four days of returning to Barcelona. On 26th April, epidemiological and laboratory investigations on the three students returning from Mexico were initiated. On April 27th the three first cases in Spain were laboratory confirmed. The first confirmed cases were seated in seats 33A, 33F and 23F. The students confirmed that they had changed their seats on the airplane during the flight and were sitting next to one another. From April 27th to May 2nd, a total of 10 of the 71 students were confirmed as pandemic-A/H1N1-influenza cases.

The student-group attack rate was 14.1% (10/71) [95% CI: 12.1–16.1]. No cases were confirmed among the 94 remaining passengers. Of the 10 primary cases, the mean age was 22.6 years (range: 21–29 years) and four were women. Most of them (60%) had mild symptoms.

An average of 6.8 (range: 2–15) contacts were studied per primary case. Of these, 63.2% took prophylactic antiviral treatment. Nine secondary cases were detected: 33.3% (3/9) had mild symptoms, and two had already started the prophylactic antiviral treatment. The mean age of the nine secondary cases was 27.3 years (range: 16–55 years) and five were women (Table 1). The average incubation period of the secondary cases was 3.2 days (SD 1.3) (Fig. 1). The overall secondary-attack rate was 13.2% (9/68) [95% CI: 4.4–22.0], with no significant difference between households, 13.3% (4/30) [95% CI: 3.8–30.7], and community contacts, 13.1% (5/38) [95% CI: 4.4–28.1].

Of note, one of the students generated the first native case in Spain, and one of the first cases in Europe, and had started symptoms on April 26th (Table 1). This first secondary case had never been to Mexico and was the girlfriend of one of the first cases

Table 1

Characteristics of pandemic-A/H1N1-influenza confirmed patients and the number of secondary cases. Catalonia, April 2009.

ID	Sex ^a	Age	Fever/ [°] C	Cough	Other	Symptoms onset ^b	Seat	Contacts outside plane	Secondary cases
1	M	29	No/37.0	Yes	Headache	22/04	23 F	8	1 ^c
2	M	22	Yes/39.7	Yes	Headache	22/04	34 F	4	0
3	F	22	Yes/–	Yes	Diarrhea	22/04	33 A	9	0
4	F	22	No	Yes	Sore throat	23/04	12 E	8	0
5	M	22	Yes/37.5	Yes	–	24/04	20 B	2	0
6	M	21	Yes/–	Yes	Diarrhea	24/04	21 B	4	4
7	M	22	Yes/38.0	Yes	–	25/04	32 H	5	1
8	F	22	No	Yes	–	25/04	22 F	15	1
9	M	22	Yes/38.0	Yes	Asthenia	26/04	36 A	9	2
10	F	22	Yes/38.0	Yes	Headache	28/04	16 F	4	0
Total								68	9

^a Sex: female (F); male (M).^b Symptom onset was registered when confirmed patients were interviewed.^c A student generated the first native case in Spain and one of the first cases in Europe, who started symptoms on April 26th.

in Spain. Furthermore, a primary case of the pandemic A/H1N1 influenza gave rise to four secondary cases (Table 1). After arriving from Mexico, this case went to an overnight party with some friends who had not been to Mexico, sharing drinks and having close contact.

Seven of the 71 students and three of the 94 remaining passengers had an influenza-like-symptom, but rRT-PCR was negative for pandemic-A/H1N1-influenza.

Discussion

This study describes the first cases of pandemic A/H1N1 influenza detected in Spain imported by a flight from Mexico and led to the identification of the first transmission in Europe. Our outcomes found similar attack rates among a group of students and their contacts, but did not find cases among other passengers, indicating that the risk of pandemic-A/H1N1-influenza transmission during air-travel was low. Furthermore, the estimated attack rate of our cohort for both primary (14.1%) and secondary cases (13.2%) was lower than the first outbreak detected in Mexico (28.5%).³ This lower rate could be due to the prompt implementation of preventive interventions to limit the spread of the virus among the students and the contacts of confirmed cases, when the first cases were notified to the PHAB. Some of these interventions were an active search of cases, the isolation of confirmed cases and their contacts, the administration of antiviral treatment and the promotion of the hygiene (i.e. frequent hand washing, covering the mouth and nose).

The overall and secondary attack rates may be underestimated. This could be due to mild symptoms or asymptomatic cases, false negatives and the extensive use of antiviral prophylaxis among the entire student group, and only symptomatic household and community contacts of confirmed cases. Furthermore, the massive antiviral administration among the student group, and changes in hospitalization and antiviral prophylaxis protocols during the pandemic could partially explain the higher rate of mild symptoms among primary cases as compared to their contacts. Follow-up and screening of exposed passengers was slow and difficult once they had left the airport; a solution to this handicap could be influenza surveillance and control registers.

On May 2009 WHO estimated that Pandemic-A/H1N1-influenza seemed to be more contagious than the seasonal flu, with a secondary-attack rate 22–33% versus 5–15%, respectively.⁹ The primary and secondary attack rates of this study were lower than that estimated by WHO. These lower rates could be due to the exhaustive preventive measures that took place in both the student group (primary attack rate) and the contacts of the confirmed cases (secondary attack rate). Despite the interventions performed, the attack rates among both groups were similar. Thus, if preventive interventions had been carried out immediately from the time the plane landed in Spain, both rates could have been even lower than estimated in this study. Published studies have found different pandemic-A/H1N1-influenza secondary-attack rates (8–27.3%).^{10–12} Compared to our outcomes, two of the mentioned studies conducted in USA¹⁰ and Germany¹¹

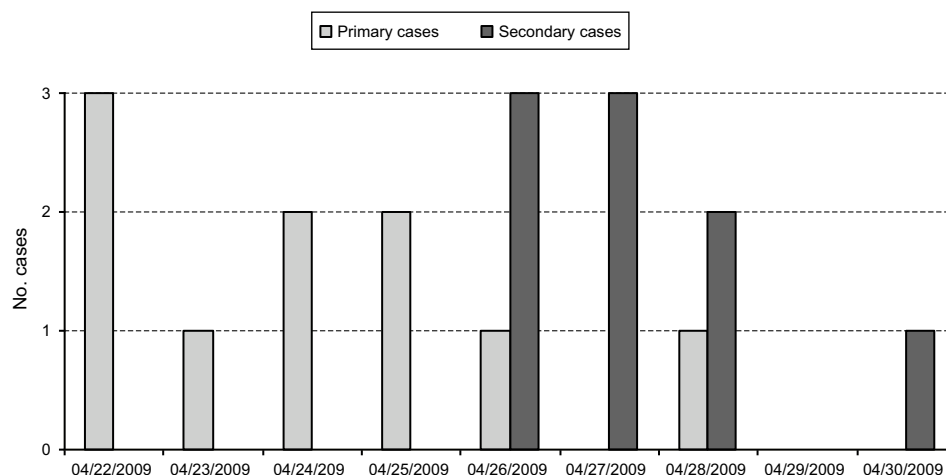


Fig. 1. Epidemiological curve. Day of symptom onset among primary and secondary pandemic-H1N1-influenza confirmed cases. Flight from Mexico City to Barcelona, on April 23rd/24th. Catalonia, April 2009.

found higher secondary attack rates: 27.3% and 26%, respectively. The study performed in Hong Kong¹² concluded, as we did, that the pandemic A/H1N1 influenza had a similar secondary attack rate (8%; 95% CI 3–14) to the seasonal flu attack rate (9%; 95% CI 5–15). The variability of the estimations in the mentioned studies could be due to the different measures taken as regards the pandemic in each country. For example, in another study in which there was no pharmaceutical intervention; just early isolation as a preventive measure in households of students who attended a school affected by Pandemic-A/H1N1-influenza confirmed cases, the overall household secondary attack rate was only 3.7%.¹³ On the other hand, as in our population, the European Centres for Diseases Control at end of 2009 reported that the proportion of secondary cases with mild symptoms and a positive-test, was high.¹⁴

Recently, a report concluded that a low but measurable risk of transmission of Pandemic A/H1N1 exists during overseas air travel, this risk being concentrated when close to infected passengers with symptoms.¹⁵ Despite the limitation of not being able to actively contact all passengers, we can consider that there were no other cases. At the beginning of pandemic, all cases with symptoms were studied due to an intense surveillance and a high risk perception of the general population. Thus, among passengers on the plane who did not belong to the group of students, three cases showed symptoms consistent with influenza-like illness, but were PCR negative. The absence of cases among the non-student group may indicate that transmission during the flight was limited, probably due to the lack of airborne transmission as reported in an outbreak among a tour group in China.¹⁶ Droplet and fomites could have caused the transmission within the student-group, and their contacts. Empirical evidence for the possible role of airline-travel in the spreading of influenza has been published.^{2,17} Nevertheless, studies on ventilation systems in airplanes suggest that the spread of pathogens rarely occurs. When it does occur, it requires close exposure to an infected individual, which would probably occur regardless of the mode of transportation.¹⁸ World Health Organization recently published an air-transport management guideline, emphasising the importance of close contact for the transmission of the pandemic-A/H1N1-influenza.¹⁹

Influenza transmission to other flight passengers was not detected, despite the length of the flight. The secondary-attack rate was similar to the primary attack rate of this study and the estimated seasonal influenza rate, probably due to preventive interventions that took place. Future prevention efforts for influenza pandemics should be particularly aimed at reducing transmission by droplets and fomites and minimising their impact among the population, and through early implementation of preventive interventions.^{20,21}

Conflict of interests

The authors have no conflict of interest to declare.

Ethical considerations

All of the data are part of normal public health practice. Therefore, ethical approval and informed consent was not required. All of the data were handled in a strictly confidential manner according to the principles of the Declaration of Helsinki, 1964, reviewed and updated by the World Medical Organization (Edinburgh, 2000). The Spanish Statute 15/1999 on data protection was followed at all times.

Acknowledgements

This study did not receive financial support and there are no conflicts of interest.

We would like to express special gratitude to all the doctors who collaborated in the systematic notification of all the diagnosed pandemic-A/H1N1-influenza cases and to all the healthcare and administrative personnel of the Epidemiological Surveillance Services of Catalonia, whose work has made this study possible.

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