



Outbreak of Swine-Origin Influenza A (H1N1) Virus Infection – Mexico, March–April 2009

In March and early April 2009, Mexico experienced outbreaks of respiratory illness and increased reports of patients with influenza-like illness (ILI) in several areas of the country. On April 12, the General Directorate of Epidemiology (DGE) reported an outbreak of ILI in a small community in the state of Veracruz to the Pan American Health Organization (PAHO) in accordance with International Health Regulations. On April 17, a case of atypical pneumonia in Oaxaca State prompted enhanced surveillance throughout Mexico. On April 23, several cases of severe respiratory illness laboratory confirmed as swine-origin influenza A (H1N1) virus (S-OIV) infection were communicated to the PAHO. Sequence analysis revealed that the patients were infected with the same S-OIV strain detected in two children residing in California (1). This report describes the initial and ongoing investigation of the S-OIV outbreak in Mexico.

Enhanced Surveillance

On April 17, in response to the increase in reports of respiratory illness, DGE issued a national epidemiologic alert to all influenza-monitoring units and hospitals (Table 1). The alert asked hospitals to report all patients with severe respiratory illness and recommended collection of diagnostic respiratory specimens from these patients within 72 hours of illness onset. On April 18, DGE staff visited 21 hospitals throughout the country to confirm the apparent increase in illness incidence.

After laboratory confirmation of S-OIV infection on April 23, DGE developed case definitions. A suspected case was defined as severe respiratory illness with fever, cough, and difficulty breathing. A probable case was defined as a suspected case in a patient from whom a specimen had been collected and tested positive for influenza A. A confirmed case was defined as a probable case that tested positive for S-OIV by real-time reverse-transcription polymerase chain reaction (RT-PCR). Health-care officials were contacted and asked to provide retrospective and ongoing data for persons having

illness consistent with these case definitions and seeking care on or after March 1.

During March 1–April 30, a total of 1,918 suspected* cases were reported, including 286 probable and 97 confirmed cases (Figure). A total of 84 deaths were reported. A majority of case-reports were for hospitalized patients, reflecting the concentration of surveillance efforts within hospitals. However, DGE also received reports from sites conducting routine seasonal influenza surveillance of patients with ILI. Of 1,069 patients with suspected and probable cases for whom information was available, 755 were hospitalized, and the remaining 314 were examined in outpatient settings or emergency departments. Suspected or probable cases were reported from all 31 states and from the Federal District of Mexico. The four areas with the most cases were Federal District (213 cases), Guanajuato (141), Aguascalientes (93), and Durango (77). In other states, the number of suspected or probable cases ranged from two to 46. Suspected and probable cases were identified in all age groups. Mexico routinely monitors seasonal influenza in a network of outpatient facilities throughout the country. Fifty-one influenza A positive specimens from six states were collected during January 4–March 11 in this surveillance network. All of these specimens tested negative for S-OIV at CDC.

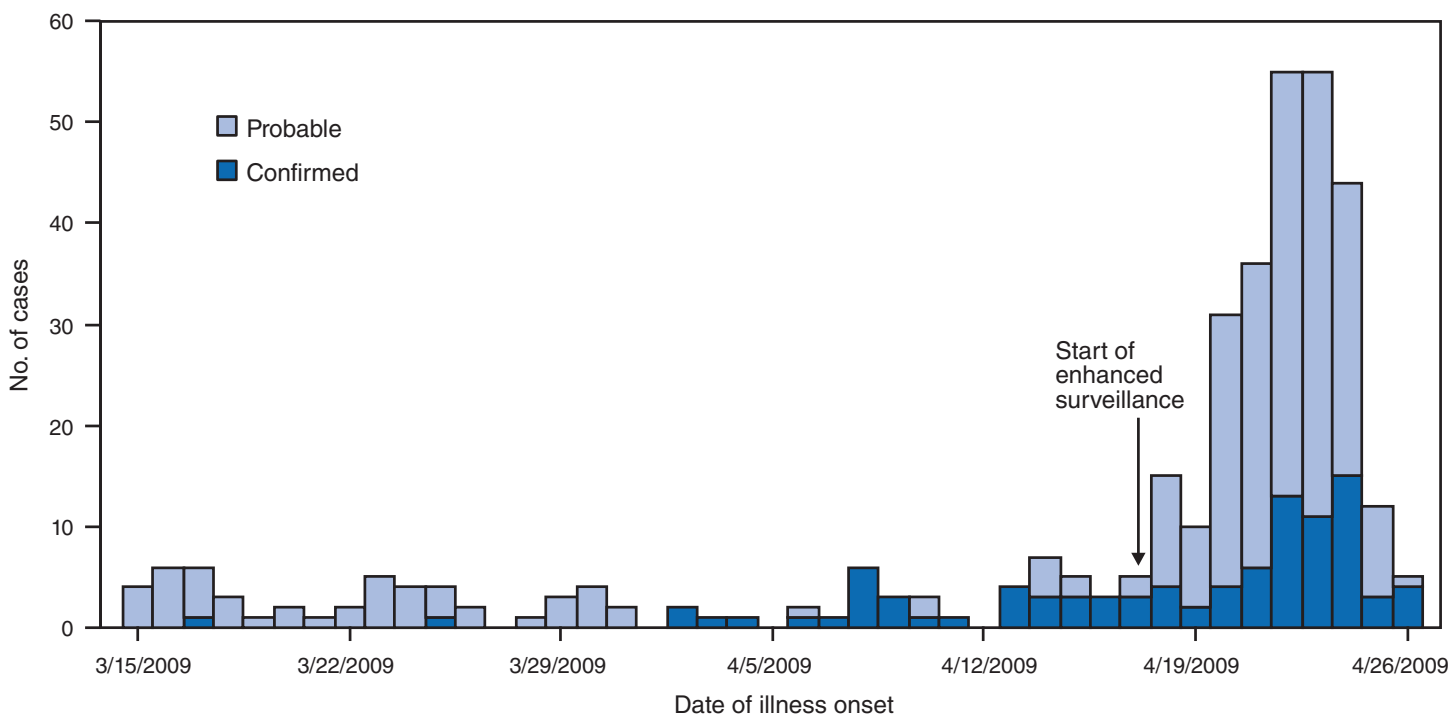
Confirmed Cases of S-OIV Infection

As of April 30, DGE surveillance activities, focusing on patients with severe respiratory disease, had identified 97 patients with laboratory-confirmed S-OIV infection, including seven persons who had died. The first of the 97 patients reported onset of illness (any symptom) on March 17, and the most recent patients reported onset on April 26. Laboratory confirmation of S-OIV infection for the most recent 73 of these 97 cases was reported on the evening of April 29. Collection

*The number of suspected cases includes the 286 probable and 97 laboratory-confirmed cases. After the alert on April 17, reports of patients with ILI from the seasonal influenza surveillance network also were classified as suspected cases.

TABLE 1. Timeline of key events in detection and response to outbreak of swine-origin influenza A (H1N1) virus (S-OIV) infection — Mexico, April 12–30, 2009

Date	Event
April 12	Respiratory illness outbreak reported to the Pan American Health Organization (PAHO).
April 17	A case of atypical pneumonia leads to an alert to enhance surveillance.
April 17–22	Field investigation of respiratory illness undertaken.
April 23	Public Health Agency Canada confirms cases of S-OIV infection.
April 23	Cluster of S-OIV illness reported to PAHO.
April 24	Health authorities implement public health measures for all airport passengers and vaccination of health-care workers with seasonal influenza vaccine.
April 25	National decree allows for house isolation of persons with suspected cases.
April 26	National laboratory capacity to diagnose S-OIV infection established in Mexico.
April 27	School closure is mandated throughout the country.
April 30	Status: 97 laboratory-confirmed cases of S-OIV infection in Mexico.

FIGURE. Number of confirmed (N = 97) and probable (N = 260)* cases of swine-origin influenza A (H1N1) virus (S-OIV) infection, by date of illness onset — Mexico, March 15–April 26, 2009

* Probable cases for which dates of illness onset are known.

of additional information on these 73 cases is ongoing. Of the 24 patients for whom demographic and clinical information is available, 20 (83%) were hospitalized, three were examined in outpatient settings, and one had illness that was not medically attended. Patients ranged in age from <1 to 59 years, with 79% aged 5 to 59 years (Table 2); 15 (62%) patients were female. Patients with confirmed S-OIV infection were identified in four states: Federal District (15 cases), Mexico State (seven),

Veracruz (one), Oaxaca (one). Of the seven deaths, six occurred in Federal District, and one occurred in Oaxaca.

Among the 16 patients with complete clinical records, 15 reported fever, 13 reported cough, 10 reported tachypnea, and nine reported dyspnea. In addition, seven of 16 patients reported either vomiting or diarrhea. Of these seven patients, two reported vomiting only, two reported diarrhea only, and three reported both. Eight of 16 patients were admitted to intensive-care units; of these, seven required mechanical venti-

TABLE 2. Number of patients and deaths from laboratory-confirmed infection with swine-origin influenza A (H1N1) virus (S-OIV), by age group — Mexico, April 1–27, 2009*

Age group (yrs)	No.	Deaths
<5	5	0
5–19	4	2
20–39	9	3
40–59	6	2
≥60	0	0
Total	24	7

* Does not include 73 laboratory-confirmed cases of S-OIV infection (reported on April 29) for which no demographic data are available.

lation, and six subsequently died after developing acute respiratory distress syndrome. Twelve of 15 patients with radiography records available had confirmed pneumonia. Three of the 16 patients had underlying health conditions. Information on the duration of hospitalization before death was available for six patients and ranged from 1 to 18 days (median: 9 days).

Prevention and Control Measures

On April 24, the Council for General Hygiene convened with the President of the Mexican Republic and decreed the closure of all schools in the Federal District and metropolitan area of Mexico City. Incoming and outgoing airport passengers were informed of the outbreak and advised to seek care immediately should they experience symptoms of ILI. Other measures included 1) disseminating educational messages regarding respiratory hygiene through mass media; 2) distributing masks and alcohol hand-sanitizer to the public; and 3) discouraging large public gatherings, including church services, theater events, and soccer games. On April 25, a national decree allowed for house-isolation of any person with a suspected case, and on April 27, school closures were mandated throughout the country.

Reported by: General Directorate of Epidemiology, Ministry of Health, Mexico; Pan American Health Organization; World Health Organization; Public Health Agency of Canada; CDC (United States).

Editorial Note: Understanding the epidemiology and clinical profiles of recent cases of S-OIV infection in Mexico can help inform regional, national, and global control measures in response to the emergence of S-OIV infection. Important areas for investigation worldwide include evidence of person-to-person transmission, the geographic distribution of disease, the clinical spectrum of disease, and the effectiveness of mitigation strategies.

Previous instances of human-to-human transmission of other swine viruses have been reported to result in small clusters of disease and limited generations of disease transmission (2,3). Several findings indicate that transmission in Mexico involves

person-to-person spread with multiple generations of transmission. Patients with probable and laboratory-confirmed disease have presented over a period of 4 weeks. Limited contact tracing of patients with laboratory-confirmed disease also has identified secondary cases of ILI.

The clinical spectrum of S-OIV illness is not yet well characterized in Mexico. However, evidence suggests that S-OIV transmission is widespread and that less severe (uncomplicated) illness is common. Patients with confirmed disease have been identified in several states, and suspected cases have been identified in all states, which suggests that S-OIV transmission is widespread. In addition, several countries are reporting S-OIV infection among persons who have travel histories involving different parts of Mexico in the 7 days before illness onset. To date, case-finding in Mexico has focused on patients seeking care in hospitals, and the selection of cases for laboratory testing has focused on patients with more severe disease. Therefore, a large number of undetected cases of illness might exist in persons seeking care in primary-care settings or not seeking care at all. Additional investigations are needed urgently to evaluate the full clinical spectrum of disease in Mexico, the proportion of patients who have severe illness, and the extent of disease transmission.

To expedite confirmation of disease in additional patients, the World Health Organization (WHO) Influenza Collaborating Center in Atlanta, Georgia, has placed the genetic sequence of S-OIV from California in GenBank.[†] Specific primers for S-OIV have been developed and will be distributed through the WHO Global Influenza Surveillance Network to reference laboratories throughout the world. As of April 26, the National Laboratory for Public Health in Mexico has capacity to perform PCR for S-OIV.

The epidemiologic characteristics of this outbreak underscore the importance of monitoring the effectiveness of community mitigation efforts, nonpharmaceutical interventions, and clinical management practices in anticipation of a possible pandemic.

[†] Available at <http://www.ncbi.nlm.nih.gov/genomes/FLU/SwineFlu.html>.

References

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