

Pandemic H1N1 (2009) in California



Swine influenza background

- Prior to 2005, CDC received approximately one report of human swine influenza virus infection every 1–2 years in the United States
- During December 2005–January 2009, 12 cases of human infection with swine influenza were reported; five cases occurred in patients who had direct exposure to pigs, six in patients who reported being near pigs, and the exposure in one case was unknown



How it began...Wednesday, April 15, 2009

- Case 1: previously healthy 10 year old San Diego County boy – mild illness, recovered
 - March 30: onset of fever to 102°F, cough, vomiting
 - April 1: seen in clinic, NP swab collected
 - April 3: flew to Texas while febrile
 - April 15: CDC identified swine influenza A (H1) and notified CDPH
- No exposure to animals (pigs) was reported; brother visited petting zoo where there were pot bellied pigs, but denied touching any animals
- No history of travel
- Mother and brother had prior respiratory illness

Friday, April 17, 2009

- A conference call with CDC was held early in the afternoon to discuss Case 1; at that time there was not a great deal of concern that this would be anything different from the swine influenza cases reported in the U.S. over the last few years
- CDC called a second time late in the afternoon to report another case of swine influenza A (H1) that was genetically very similar to Case 1's strain

Case 2

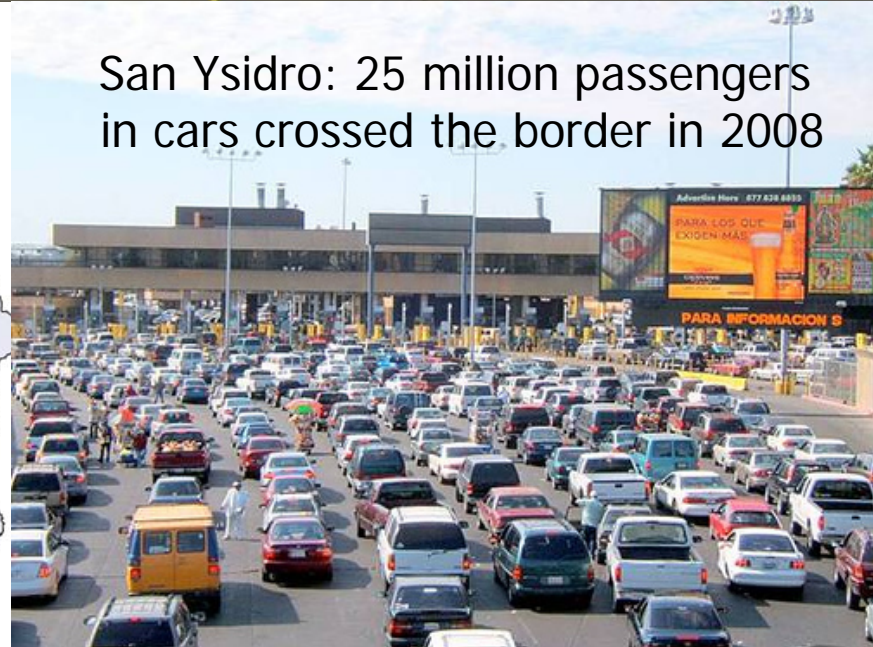
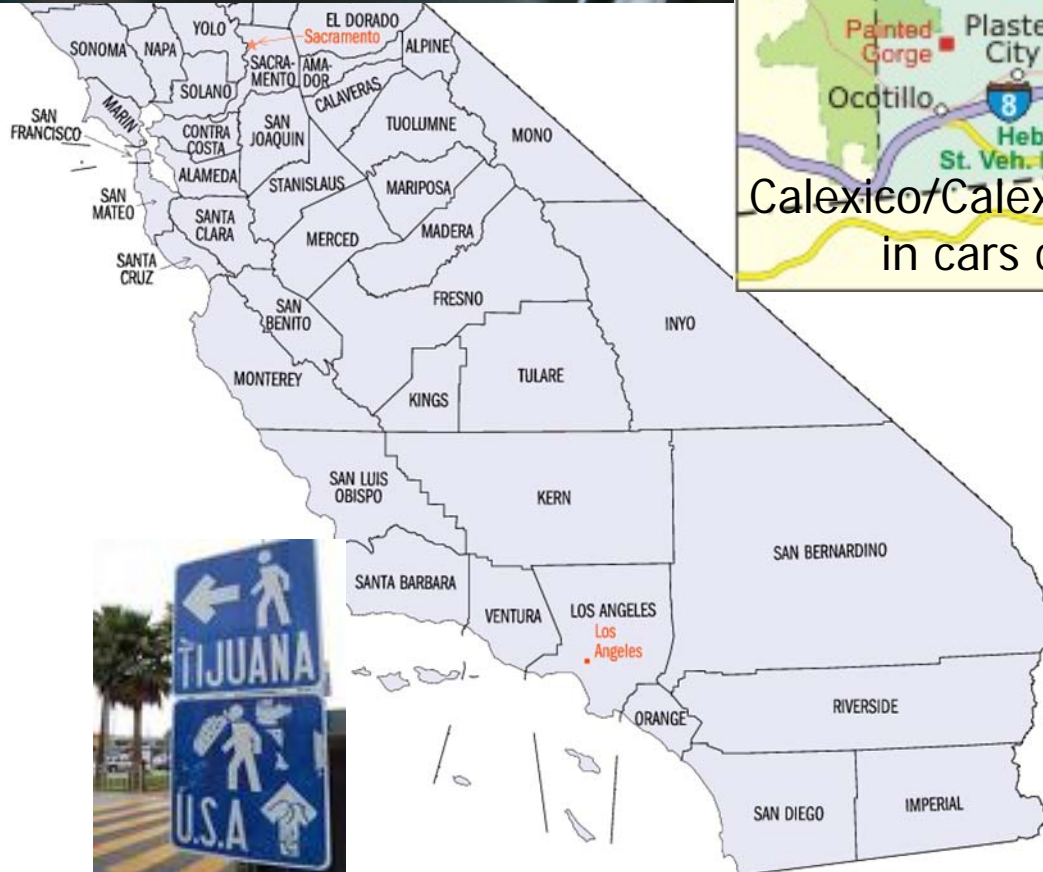
- Case 2: previously healthy 9 year old Imperial County girl – mild illness, recovered
 - March 28: onset of fever to 104°F and cough
 - March 30: NP swab collected
 - April 17: CDC identified swine influenza A (H1) that was genetically very similar to Case 1's strain
 - No direct exposure to pigs reported
 - Attended county fair where pigs were exhibited early in March but never saw pigs
 - Traveled to Mexicali, Mexico 2 weeks prior to illness
 - 13 year old cousin staying in household had onset of respiratory illness March 25

April 17, 2009, continued

- Neither child had contact with each other or with pigs
 - Lab contamination?
 - Human-to-human transmission?!
- Case and contact investigations, including collection of blood and NP swabs from case household members, were initiated in San Diego and Imperial Counties
- Public health staff interacting with ill case contacts were advised to use respirators



Calexico/Calexico East: 16 million passengers in cars crossed the border in 2008



San Ysidro: 25 million passengers in cars crossed the border in 2008

April 18-19, 2009

- Case contact activities continued throughout the weekend in San Diego and Imperial Counties
- Cases occurred 130 miles apart; no known contact or epi-links
- Mexico was reported to be having a “late influenza season,” but no problems were identified
- Lab contamination was quickly ruled out; specimens were collected by different people at different clinics and did not go through the same lab
- A Health Alert was written to request enhanced surveillance in San Diego and Imperial Counties; collection of blood and NP swabs from close contacts of cases continued

April 20-21, 2009

- Monday, April 20
 - Enhanced surveillance/testing was begun for hospitalized patients, ER patients, and influenza sentinel provider patients with influenza-like illness in San Diego and Imperial Counties
 - Epi-X notification posted
 - CD Brief alert sent
 - CDPH Emergency Operations Center was activated
- Tuesday, April 21
 - An MMWR report describing the first two cases was published



Swine Influenza A (H1N1) Infection in Two Children --- Southern California, March--April 2009

On April 21, this report was posted as an MMWR Early Release on the MMWR website (<http://www.cdc.gov/mmwr>).

On April 17, 2009, CDC determined that two cases of febrile respiratory illness occurring in children who resided in adjacent counties in southern California were caused by infection with a swine influenza A (H1N1) virus. The viruses from the two cases are closely related genetically, resistant to amantadine and rimantadine, and contain a unique combination of gene segments that previously has not been reported among swine or human influenza viruses in the United States or elsewhere. Neither child had contact with pigs; the source of the infection is unknown. Investigations to identify the source of infection and to determine whether additional persons have been ill from infection with similar swine influenza viruses are ongoing. This report briefly describes the two cases and the investigations currently under way. Although this is not a new subtype of influenza A in humans, concern exists that this new strain of swine influenza A (H1N1) is substantially different from human influenza A (H1N1) viruses, that a large proportion of the population might be susceptible to infection, and that the seasonal influenza vaccine H1N1 strain might not provide protection. The lack of known exposure to pigs in the two cases increases the possibility that human-to-human transmission of this new influenza virus has occurred. Clinicians should consider animal as well as seasonal influenza virus infections in their differential diagnosis of patients who have febrile respiratory illness and who 1) live in San Diego and Imperial counties or 2) traveled to these counties or were in contact with ill persons from these counties in the 7 days preceding their illness onset, or 3) had recent

April 22-24, 2009

- 4/22: Additional presumptive cases were identified in Imperial and San Diego Counties and in Texas; CDC activated their EOC
- 4/23: CDPH teams arrived in San Diego and Imperial Counties; the first hospitalized patient was identified (Imperial County resident hospitalized in San Diego County); statewide enhanced surveillance and testing of hospitalized patients, ER patients, and sentinel provider patients was begun
- 4/24: CDC EIS teams arrived in San Diego and Imperial Counties; news of widespread, severe influenza activity in Mexico was reported and swine influenza cases and deaths mainly in young adults were confirmed; Canada reported suspect cases among travelers to Mexico



Update: Swine Influenza A (H1N1) Infections --- California and Texas, April 2009

[MMWR on Español](#)

On April 24, this report was posted as an MMWR Dispatch on the MMWR website (<http://www.cdc.gov/mmwr>).

On April 21, 2009, CDC reported that two recent cases of febrile respiratory illness in children in southern California had been caused by infection with genetically similar swine influenza A (H1N1) viruses. The viruses contained a unique combination of gene segments that had not been reported previously among swine or human influenza viruses in the United States or elsewhere (*1*). Neither child had known contact with pigs, resulting in concern that human-to-human transmission might have occurred. The seasonal influenza vaccine H1N1 strain is thought to be unlikely to provide protection. This report updates the status of the ongoing investigation and provides preliminary details about six additional persons infected by the same strain of swine influenza A (H1N1) virus identified in the previous cases, as of April 24. The six additional cases were reported in San Diego County, California (three cases), Imperial County, California (one case), and Guadalupe County, Texas (two cases). CDC, the California Department of Public Health, and the Texas Department of Health and Human Services are conducting case investigations, monitoring for illness in contacts of the eight patients, and enhancing surveillance to determine the extent

April 25-30, 2009

- 4/25-26: School clusters in Sacramento, and in a large group of school children in New York City – school dismissal issues
- April 27: Testing recommended for hospitalized patients, case contacts, people in high-risk settings and clusters, and people who had returned from Mexico <7 days
- 4/29: 91 U.S. cases and the first death was reported



May 1 and beyond: rapid spread

- Cases identified nationally and throughout California
- Widespread and intense H1N1 activity
- CDPH testing and case investigation recommendations became more limited



Current situation - 7/30/2009

- 699 cumulative hospitalized cases (including fatal cases)
 - median age 28 years
 - 117 new cases reported last week
 - 30% (213/699) of hospitalized cases were admitted to the ICU; median age 33 years
- 80 cumulative fatal cases (includes 9 non-hospitalized cases)
 - median age 49 years
 - 19 new deaths reported last week
 - median number of days from illness onset to death is 10
- 8% (58/708) of hospitalized/fatal cases were pregnant (vs. ~2% in CA general population); 34% (58/169) of female cases of childbearing age (15-44 years) were pregnant
- 78% of hospitalized/fatal cases for whom treatment information was known were treated with antivirals
- 100% of influenza A was unsubtypeable last week
- 251 specimens had been tested for the antiviral resistance mutation and all were negative

CDPH H1N1 surveillance priorities

- Surveillance goals shifted as the questions to be answered changed over time; surveillance should be designed to answer questions of interest and must be balanced with feasibility and available resources
- Original surveillance questions were to identify possible pig exposures or epi-links between cases; once human-to-human transmission and community transmission was identified the focus shifted to other questions; e.g., secondary attack rate, case demographics, disease severity, risk factors for severe disease, healthcare transmission, etc.

Early on there was intense interest in healthcare worker illness because reports from Mexico indicated that H1N1 was causing severe disease in younger people; no one wanted another SARS



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MMWR

Weekly

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Novel Influenza A (H1N1) Virus Infections Among Health-Care Personnel --- United States, April--May 2009

Soon after identification of novel influenza A (H1N1) virus infections in the United States in mid-April 2009, CDC provided interim recommendations to reduce the risk for transmission in health-care settings. These included recommendations on use of personal protective equipment (PPE), management of health-care personnel (HCP) after unprotected exposures, and instruction of ill HCP not to report to work (*1*). To better understand the risk for acquiring infection with the virus among HCP and the impact of infection-control recommendations, CDC solicited reports of infected HCP from state health departments. As of May 13, CDC had received 48 reports of confirmed or probable infections with novel influenza A (H1N1) virus* (*2*); of these, 26 reports included detailed case reports with information regarding risk factors that might have led to infection. Of the 26 cases, 13 (50%) HCP were deemed to have acquired infection in a health-care setting, including one instance of probable HCP to HCP transmission and 12 instances of probable or possible patient to HCP transmission. Eleven HCP had probable or possible acquisition in the community, and two had no reported exposures in either health-care or community settings. Among 11 HCP with probable or possible patient to HCP acquisition and available information on PPE use, only three reported always using either a surgical mask or an N95 respirator. These findings suggest that transmission of novel influenza A (H1N1) virus to HCP is occurring in both health-care and community settings and that additional messages aimed at reinforcing current infection-control recommendations are needed.

Hospitalized and fatal cases were and continue to be of great interest to characterize disease severity and risk factors for severe disease



Hospitalized Patients with Novel Influenza A (H1N1) Virus Infection --- California, April--May, 2009

On May 18, this report was posted as an MMWR Early Release on the MMWR website (<http://www.cdc.gov/mmwr>).

Since April 15 and 17, 2009, when the first two cases of novel influenza A (H1N1) infection were identified from two southern California counties, novel influenza A (H1N1) cases have been documented throughout the world, with most cases occurring in the United States and Mexico (1--3). In the United States, early reports of illnesses associated with novel influenza A (H1N1) infection indicated the disease might be similar in severity to seasonal influenza, with the majority of patients not requiring hospitalization and only rare deaths reported, generally in persons with underlying medical conditions (2,3). As of May 17, 2009, 553 novel influenza A (H1N1) cases, including 333 confirmed and 220 probable cases, had been reported in 32 of 61 local health jurisdictions in California. Of the 553 patients, 30 have been hospitalized. No fatal cases associated with novel influenza A (H1N1) infection had been reported in California. This report summarizes the 30 hospitalized cases as of May 17, including a detailed description of four cases that illustrate the spectrum of illness severity and underlying risk factors. This preliminary overview indicates that, although the majority of hospitalized persons infected with novel influenza A (H1N1) recovered without complications, certain patients had severe and prolonged disease. All hospitalized patients with novel influenza A (H1N1) infection should be monitored carefully and treated with antiviral therapy, including patients who seek care >48 hours after illness onset (4,5).

Current CDPH surveillance priorities

- Prior to July 15, 2009, CDPH requested that all H1N1 cases be reported; on July 15th, we requested that only hospitalized and fatal cases be reported and that outpatient cases no longer be reported
- Rationale for the change: outpatient testing was not being performed systematically and the results were not representative + huge resources
- Ascertainment of hospitalized and fatal cases will serve to monitor the circulation of pandemic (H1N1), characterize disease severity and populations at risk for complications

Planning assumptions for influenza surveillance for the 2009-2010 respiratory season

- Pandemic (H1N1) virus will continue to circulate and possibly increase in activity (and severity)
- Seasonal influenza A (H3 and H1) and B will also circulate at high levels (this may or may not be the case as evidenced in the Southern Hemisphere)
- Non-influenza respiratory viruses (e.g., RSV, adenovirus) will also circulate and cause substantial morbidity and mortality (as happens every respiratory season)
- In addition to groups known to be at higher risk for seasonal influenza complications, new risk groups that may be at increased risk for pandemic (H1N1) complications will also need to be monitored:
 - Adolescents, young and middle-aged adults
 - Persons with BMI >35

Planning assumptions, continued

- Seasonal influenza vaccine will be available
- Pandemic (H1N1) vaccine will not be available until the middle or later parts of the season
- Antivirals (oseltamivir) will be in supply at least through the early and middle stages of the season
- Personnel will be the main limitation in resources; these resources must be strategically used and stretched to last for the ~40 weeks of the respiratory season

Existing seasonal influenza surveillance activities

1. Northern and Southern California Kaiser Permanente pneumonia and influenza hospitalization data
2. Northern and Southern California Kaiser Permanente ILI outpatient data
3. Northern and Southern California Kaiser Permanente antiviral pharmacy data
4. CDC influenza sentinel provider ILI and laboratory surveillance
5. Laboratory–confirmed severe pediatric influenza and pediatric influenza–associated deaths

Existing seasonal influenza surveillance activities, continued

7. California Respiratory Project (viral testing of children at sentinel pediatric ICUs)
8. Sentinel Influenza Laboratories Laboratory Data (14 labs that report detection of influenza and other respiratory viruses)
9. Respiratory Laboratory Network Data (25 public health labs that can perform testing for seven respiratory viruses)
10. Viral & Rickettsial Disease Laboratory (tests over 1000 specimens annually, 5000 since April 2009); virologic characterization of pandemic (H1N1) virus to identify emergence of antiviral resistance or other changes

Additional proposed surveillance activities, 2009-2010

- Continue reporting of hospitalized and fatal cases to through May 2010 (if the volume becomes overwhelming, surveillance may be limited to ICU and fatal cases)
- Work with CCLHO to expand the current severe pediatric influenza surveillance to include all ICU/fatal cases <65 years of age with laboratory confirmed influenza (seasonal or pandemic)
- Outbreak reporting in settings of interest
- ILI/absenteeism surveillance in sentinel schools
- ER ILI surveillance
- Death certificate monitoring

How surveillance data can be used

- Monitoring of severe cases may identify additional persons at risk for severe disease and help target treatment and prophylaxis
- Early detection of increased activity of severe influenza cases will allow local communities to alert citizens, particularly persons at high risk for severe influenza, to get vaccinated and to exercise prevention and control measures (e.g., hand hygiene, cover your cough, etc.)
- Identification of the predominant circulating type(s) of influenza virus that may be causing severe influenza cases locally may assist in informing recommendations about which antiviral therapies to recommend
- Determining whether more previously healthy patients <65 years of age are being admitted to ICUs with severe influenza, suggesting a more virulent virus, may result in enhanced public health monitoring for respiratory illness in the general community (e.g., schools, workplace, events) and more targeted public health messages (e.g., home isolation and social distancing measures)
- School ILI/absenteeism surveillance may serve to identify increased influenza activity in the community

Questions?

