

Disease Briefing on the 2009 H1N1 (Swine-) Flu Outbreak in Humans

No 1: April 25, 2009 - by Gunnar J Kuepper

"Could this be THE ONE ?"

On April 25, 2009, at 21:10 BST the World Health Organization (WHO) agreed that the “*current situation constitutes a public health emergency of international concern.*”

The U.S. Centers for Disease Control and the World Health Organization are concerned that this outbreak may become a pandemic, because:

- ✍ The virus is a new strain of influenza, from which human populations have not been vaccinated or naturally immunized.
- ✍ The virus has produced severe disease in Mexico, and some deaths. Furthermore, the illness has primarily struck young, healthy adults, much like the deadly Spanish Flu of 1918, unlike most influenza strains which produce the worst symptoms in young children, elderly adults, and others with weaker immune systems.
- ✍ The virus appears to infect by human-to-human transmission, and has spread to multiple regions within Mexico and multiple areas in the United States. Investigations of infected patients indicate no direct contact with swine, such as at a farm or agricultural fair.
In contrast, for example, disease transmission in the last severe human outbreak of influenza, the bird flu that peaked in 2006, was determined to be entirely or almost entirely from direct contact between humans and birds.

Many other government health authorities around the world, including the UK Health Protection Agency, ECDC and the Public Health Agency of Canada, have expressed concerns over the outbreak and state they are monitoring the situation very closely.

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Situation in Mexico

On the evening of Saturday, April 25, 2009 Mexico's Health Secretary Jose Angel Cordova announced that 20 deaths have been confirmed to be from the swine flu outbreak and another 1,324 have likely been sick from the virus since April 13.

He added that the virus may have killed at least 81 people in Mexico, but not all the deaths have been confirmed to be from the A H1N1 virus, known as A H1N1.

At least 12 of the confirmed cases are genetically identical to the Swine Influenza A/H1N1 viruses from California.

The majority of these cases have occurred in otherwise healthy young adults. Influenza normally affects the very young and the very old, but these age groups have not been heavily affected in Mexico.

As of April 24, 2009, 16 of the deaths have been confirmed to have been caused by the new strain, through testing at government laboratories. Samples from 44 other people who died were still being tested.

On April 24, 2009 the Mexican health department put the total number of people sickened at around 943 nationwide.

On April 24, 2009, schools (from pre-school to university level) as well as libraries, museums, concerts, and any public gathering place, were shut down by the government in Mexico City and the neighboring State of Mexico to prevent the disease from spreading further.

Mexico City's mayor, has also asked all night-life operators to shut down their places for ten days to prevent further infections. The federal Secretary of Health, announced on Friday, April 24 that schools will probably be suspended for at least the following week.

On April 25, Mexico's President Felipe Calderón declared an emergency which granted him the power to suspend public events and order quarantines.

Up to April 24, 2009 the Government of Mexico had reported three separate events.

Federal District of Mexico

In the Federal District of Mexico, population about 20 million, surveillance began picking up cases of Influenza-like Illness (ILI) starting 18 March. The number of

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cases has risen steadily through April and as of 23 April there are now more than 854 cases of pneumonia from the capital. Of those, 59 have died.

On Friday, April 24, the Mexican government closed the schools across the Mexico City area and kept 6.1 million students home from day care centers, high schools, colleges and universities.

San Luis Potosi

In San Luis Potosi, located in central Mexico with a population of about 1 million, 24 cases of ILI, with three deaths, have been reported.

Mexicali

From Mexicali, population around 1 million, near the border with the United States, four cases of ILI, with no deaths, have been reported.

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Situation in the United States

Human cases of swine influenza A (H1N1) virus infection have been identified in the U.S. in San Diego County and Imperial County, California (6 cases), in San Antonio, Texas (3 cases) as well as in Kansas (2 cases).

Seven of the confirmed cases had mild Influenza-Like Illness (ILI), with only one requiring brief hospitalization. No deaths have been reported. All seven U.S. victims recovered from a strain of the flu that combines pig, bird and human viruses in a way that researchers have not seen before. The virus was first detected in two children in southern California -- a 10-year-old boy in San Diego County and a 9-year-old girl in neighboring Imperial County.

All became ill between late March and mid-April. None of the U.S. patients traveled to Mexico within 7 days of the onset of their illness.

The virus found in the U.S. cases was resistant to amantadine and rimantadine, but susceptible to oseltamivir (Tamiflu) and zanamivir (Relenza).

The most recent reports on Saturday April 25 afternoon were of two confirmed cases of the virus in Kansas -- bringing the number of confirmed U.S. cases to 11.

California

San Diego County, California. On April 9, an adolescent girl aged 16 years and her father aged 54 years went to a San Diego County clinic with acute respiratory illness. The youth had onset of illness on April 5. Her symptoms included fever, cough, headache, and rhinorrhea. The father had onset of illness on April 6 with symptoms that included fever, cough, and rhinorrhea. Both had self-limited illnesses and have recovered. The father had received seasonal influenza vaccine in October 2008; the daughter was unvaccinated. Respiratory specimens were obtained from both, tested in the San Diego County Health Department Laboratory, and found to be positive for influenza A using reverse transcription-polymerase chain reaction (RT-PCR), but could not be further subtyped. Two household contacts of the patients have reported recent mild acute respiratory illnesses; specimens have been collected from these household members for testing. One additional case, in a child residing in San Diego County, was identified on April 24; epidemiologic details regarding this case are pending (case report CDC in MMWR April 24, 2009 / 58).

Imperial County, California. A woman aged 41 years with an autoimmune illness who resided in Imperial County developed fever, headache, sore throat, diarrhea,

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vomiting, and myalgias on April 12. She was hospitalized on April 15. She recovered and was discharged on April 22. A respiratory specimen obtained April 16 was found to be influenza A positive by RT-PCR at the San Diego County Health Department Laboratory, but could not be further subtyped. The woman had not been vaccinated against seasonal influenza viruses during the 2008-09 season. Three household contacts of the woman reported no recent respiratory illness. (case report CDC in MMWR April 24, 2009 / 58)

On April 24, CDC deployed 7 epidemiologists to San Diego County, California and Imperial County, California.

The state of California activated the Joint Emergency Operations Center of the Department of Public Health, and is coordinating with the California Emergency Management Agency, the CDC, and the Mexican government.

Texas (3 cases)

Guadalupe County, Texas. Two adolescent boys aged 16 years who resided in Guadalupe County near San Antonio were tested for influenza and found to be positive for influenza A on April 15. The youths had become ill with acute respiratory symptoms on April 10 and April 14, respectively, and both had gone to an outpatient clinic for evaluation on April 15. Identification and tracking of the youths' contacts is under way. (case report CDC in MMWR April 24, 2009 / 58)

Another teenage boy, a classmate of the first two victims at Steele High School, has also become ill with the swine flu virus. The family, residing in Schertz, was asked by health authorities on Friday, April 24 to stay inside and avoid the public.

On Saturday, April 25 the Texas Department of State Health Services announced that they will be temporarily closing Steele High School in Cibolo due to the recent outbreak of the swine influenza. Health officials are also urging students to not be around each other while school is out. The school's extracurricular activities also will be canceled.

Kansas (2 cases)

The people sickened in Kansas are a man who traveled to Mexico on business and his wife, according to Dr. Jason Eberhart-Phillips, director of the Kansas Department of Health and Environment. The man had flu-like symptoms when he returned and went to his doctor, and his wife got sick about three days later. Neither of them was hospitalized, and one is still sick.

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New York (8 suspected cases)

New York City health officials announced on Saturday evening, April 25, 2009 that eight high school students in the city have likely contacted the virus after visiting Mexico. The results of tests won't be known until Sunday.

Travel Situation

Each year there are approximately 400 million crossing at the border between United States and Mexico.

At the press briefing on April 24, 2009, Richard Besser, Acting Director of the CDC stated: "I think that the best approach is really encourage people who are sick not to travel. So if you have the flu you shouldn't be getting on the bus or getting on the airplane and traveling."

Transmission and Incubation

The CDC believes the new strain can spread human-to-human, which is unusual for a swine flu virus. The CDC is checking people who have been in contact with the confirmed U.S. cases, who all became ill between late March and mid-April.

The U.S. cases are a growing medical mystery because it's unclear how they caught the virus. The CDC said none of the people were in contact with pigs, which is how people usually catch swine flu. And only a few were in contact with each other.

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New Strain of the H1N1 Virus

The CDC described the virus as having a unique combination of gene segments not seen in people or pigs before. The virus seems to contain human virus, avian virus from North America and pig viruses from North America, Europe and Asia. Mixes of bird, pig and human virus have been seen before, but such an intercontinental combination with more than one pig virus in the mix is highly unusual.

The Swine Influenza A/H1N1 viruses characterized in this outbreak have not been previously detected in pigs or humans.

The new strain is a classic "re-assortment" - a combination feared most by those watching for the flu pandemic.

The United States cases were made up of genetic elements from four different flu viruses: North American swine influenza, North American avian influenza, human influenza A virus subtype H1N1, and swine influenza virus typically found in Asia and Europe.

The new strain appears to be a recombinant between two older strains. Preliminary genetic characterization found that the hemagglutinin (HA) gene was similar to that of swine flu viruses present in U.S. pigs since 1999, but the neuraminidase (NA) and matrix protein (M) genes resembled versions present in European swine flu isolates. Viruses with this genetic makeup had not previously been found to be circulating in humans or pigs, but there is no formal national surveillance system to determine what viruses are circulating in pigs in the U.S.

Background on Swine Flu

H1N1 swine flu viruses are very different from human H1N1 viruses and, therefore, vaccines for human seasonal flu would not provide protection from H1N1 swine flu viruses.

Swine influenza (Swine flu) refers to influenza cases that are caused by Orthomyxoviruses endemic to populations of pigs. The viruses are referred to as Swine influenza viruses (SIV). SIV strains isolated to date have been classified either as Influenzavirus C or one of the various subtypes of the genus Influenzavirus A.

Influenza A virus subtypes H1N1, H1N2, H3N1, H3N2 and most recently H2N3 are known to cause SIV infections.

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Swine flu viruses do not normally infect humans. Sporadic human infections with swine flu have occurred. Most commonly, these cases occur in persons with direct exposure to pigs (e.g. children near pigs at a fair or workers in the swine industry).

In addition, there have been documented cases of one person spreading swine flu to others. For example, an outbreak of apparent swine flu infection in pigs in Wisconsin in 1988 resulted in multiple human infections, and, although no community outbreak resulted, there was antibody evidence of virus transmission from the patient to health care workers who had close contact with the patient.

In the past, CDC received reports of approximately one human swine influenza virus infection every one to two years in the U.S., but from December 2005 through February 2009, 12 cases of human infection with swine influenza have been reported.

Symptoms

in humans generally appear within a few days following exposure and include

- ? fever
- ? cough
- ? chills
- ? headache
- ? weakness
- ? rhinorrhea
- ? diarrhea
- ? sore throat

Treatment

There are four different antiviral drugs that are licensed for use in the US for the treatment of influenza: amantadine, rimantadine, oseltamivir and zanamivir.

While most swine influenza viruses have been susceptible to all four drugs, these swine influenza viruses isolated from infected humans are resistant to amantadine and rimantadine. At this time, CDC recommends the use of oseltamivir or zanamivir for the treatment and/or prevention of infection with swine influenza viruses.

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Precautionary Measures

As with any infectious disease, the CDC is recommending the following precautionary measures for people residing in the effected areas, particularly Southern California and Texas:

- *Cover your nose and mouth with a tissue when you cough or sneeze. Throw the tissue in the trash after you use it.*
- *Wash your hands often with soap and water, especially after you cough or sneeze. Alcohol-based hands cleaners are also effective.*
- *Try to avoid close contact with sick people.*
- *If you get sick, CDC recommends that you stay home from work or school and limit contact with others to keep from infecting them.*
- *Avoid touching your eyes, nose or mouth. Germs spread that way.*

There is no vaccine available at this time, so it is important for people living in these areas to take steps to prevent spreading the virus to others. If people are ill, they should attempt to stay at home and limit contact with others. Healthy residents living in these areas should take everyday preventive actions.

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RESPONSE

WHO Emergency Committee Meeting on Saturday April 25, 2009

In response to cases of swine influenza A(H1N1), reported in Mexico and the United States of America, the Director-General convened a meeting of the Emergency Committee to assess the situation and advise her on appropriate responses.

The establishment of the Committee, which is composed of international experts in a variety of disciplines, is in compliance with the International Health Regulations (2005). The first meeting of the Emergency Committee was held on Saturday 25 April 2009.

After reviewing available data on the current situation, Committee members identified a number of gaps in knowledge about the clinical features, epidemiology, and virology of reported cases and the appropriate responses.

The Committee advised that answers to several specific questions were needed to facilitate its work. The Committee nevertheless agreed that the current situation constitutes a public health emergency of international concern.

Based on this advice, the Director-General has determined that the current events constitute a public health emergency of international concern, under the Regulations.

Concerning public health measures, in line with the Regulations the Director-General is recommending, on the advice of the Committee, that all countries intensify surveillance for unusual outbreaks of influenza-like illness and severe pneumonia.

The Committee further agreed that more information is needed before a decision could be made concerning the appropriateness of the current phase 3.

The world is presently in pandemic alert phase 3: **“a new influenza virus subtype is causing disease in humans, but is not yet spreading efficiently and sustainably among humans.”**

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Pandemic Alert Phases

The pandemic alert phases are outlined in the WHO's 2005 global influenza preparedness plan, which makes recommendations for international and national measures to be taken during phases 1 to 6 of pandemic alert. The phases scale up or down according to the WHO's assessment of the public health risk of a pandemic at that time.

According to the WHO's global influenza preparedness plan, the decision to move between phases 3, 4, and 5 is to be based on "an assessment of the risk of a pandemic" which may include consideration of "rate of transmission, geographical location and spread, severity of illness, presence of genes from human strains (if derived from an animal strain), and/or other scientific parameters."

Phase 3 [CURRENT PHASE] of the pandemic alert period is when there are human infections with a new sub-type, but there is no human-to-human spread (or at least very rare instances of spread to a close contact). At this point, the new virus subtype must be characterized rapidly to ensure early detection, notification and response of additional cases.

Phase 4 may occur when there are small clusters (e.g., <25 human cases lasting <2 weeks) with limited human-to-human transmission, but spread is highly localized (which suggests the virus does not adapt well to humans). During this phase, WHO describes a variety of measures (such as targeted use of antiviral medications) aimed at containing the virus within a limited area or to delay spread to buy time to implement preparedness measures, such as vaccine development.

Phase 5 may occur when there are large clusters (e.g., 25-50 cases lasting 2 to 4 weeks), but human-to-human spread is still localized. The virus may not yet be fully transmissible. At this point, it is imperative to continue efforts to contain or delay spread of the virus, to both avert a pandemic and to implement pandemic response measures.

Phase 6 is when transmission to the general population has increased and is sustained, meaning there is a pandemic. All efforts to minimize the impacts of the pandemic are necessary at this time.

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Mexico

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Mexico City's mayor, has also asked all night-life operators to shut down their places for ten days to prevent further infections. The federal Secretary of Health announced on Friday, April 24 that schools will probably be suspended for at least the following week.

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Past Flu Outbreaks

1976 Fort Dix, New Jersey: outbreak of swine flu among soldiers caused disease with x-ray evidence of pneumonia in at least 4 soldiers and 1 death; all of these patients had previously been healthy. The virus was transmitted to close contacts in a basic training environment, with limited transmission outside the basic training group. The virus is thought to have circulated for a month and disappeared. The source of the virus, the exact time of its introduction into Fort Dix, and factors limiting its spread and duration are unknown. The Fort Dix outbreak may have been caused by introduction of an animal virus into a stressed human population in close contact in crowded facilities during the winter. The swine influenza A virus collected from a Fort Dix soldier was named A/New Jersey/76 (Hsw1N1).

1968 – 1969 global flu pandemic (also known as the "Hong Kong Flu") caused by an H3N2 virus. This virus was first detected in Hong Kong in early 1968, and spread to the United States later that year where 34,000 people died. Influenza A (H3N2) viruses still circulate today.

1957 - 1958 global flu pandemic (also known as The "Asian Flu") caused by an H2N2 virus was first identified in China in late February 1957 and reached the United States by June 1957. 70,000 deaths in the U.S. alone.

March 1918 – June 1920 global flu pandemic (commonly referred to as the Spanish flu) spread to nearly every part of the world. It was caused by an unusually severe and deadly Influenza A virus strain of subtype H1N1. Historical and epidemiologic data are inadequate to identify the geographic origin of the virus. Most of its victims were healthy young adults, in contrast to most influenza outbreaks which predominantly affect juvenile, elderly, or otherwise weakened patients. The pandemic lasted from March 1918 to June 1920, spreading even to the Arctic and remote Pacific islands. The disease was first observed at Fort Riley, Kansas, United States, on March 4, 1918, and Queens, New York, on March 11, 1918.

In August 1918, a more virulent strain appeared simultaneously in Brest, France, in Freetown, Sierra Leone, and in the U.S. at Boston, Massachusetts. The Allies of World War I came to call it the Spanish flu, primarily because the pandemic received greater press attention after it moved from France to Spain in November 1918. Spain was not involved in the war and had not imposed wartime censorship.

It is estimated that anywhere from 20 to 100 million people were killed worldwide. This extraordinary toll resulted from the extremely high illness rate of up to 50% and the extreme severity of the symptoms, suspected to

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be caused by cytokine storms. The pandemic is estimated to have infected up to one billion people - half the world's population at the time.

Internet Resources

- www.who.org World Health Organization
- www.cdc.gov Centers for Disease Control and Prevention
- www.cdc.gov/flu/swine
- twitter.com/veratect
- twitter.com/cdcemergency

Organizations

- ✍ World Health Organization (WHO)
The WHO, also known as Organisation mondiale de la Santé (French), Organización Mundial de la Salud (Spanish), acts as a coordinating authority on international public health. WHO, headquartered in Geneva, Switzerland, is an agency of the United Nations, and was established on 7 April 1948.
The WHO's constitution states that its objective *"is the attainment by all peoples of the highest possible level of health."* Its major task is to combat disease, especially key infectious diseases, and to promote the general health of the people of the world.
- ✍ Centers for Disease Control and Prevention (CDC)
The CDC is an agency of the U.S. Department of Health and Human Services operating with a budget of \$ 8.8 billion and a staff of nearly 15,000. The CDC, headquartered in Atlanta, Georgia is tasked with protecting public health and safety by providing information to enhance health decisions, and promoting health through partnerships with state health departments and other organizations. The CDC focuses national attention on developing and applying disease prevention and control (especially infectious diseases), environmental health, occupational safety

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and health, health promotion, prevention and education activities designed to improve the health of the people of the United States.

Persons of Interest

- ✍ Margaret Chan, Director-General, World Health Organization (WHO)
- ✍ José Ángel Córdoba, federal Secretary of Health, United Mexican States (Mexico)
- ✍ Dr. Richard Besser, Acting Director, CDC
- ✍ Anne Schuchat, Director National Center for Immunization and Respiratory Diseases, CDC

Quotes

“The current events constitute a public health emergency of international concern”

Margaret Chan, Director-General, World Health Organization, April 25, 2009

“This situation has been developing quickly...This is something we are worried about”

Dr. Richard Besser, Acting Director, CDC, April 24, 2009

“We need to look in our own backyard for where the next pandemic may appear”

Christopher Olsen in Science 299; March 7, 2003

“The rule for dealing with new and emerging microorganism is simple: We don't know what we don't know because we don't know”

Gunnar J Kuepper, Chief of Operations, EDM, August 2007

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About the Author:

Gunnar J Kuepper is Chief of Operations with Emergency & Disaster Management in Los Angeles, California. This independent firm advises private, non-profit, and governmental institutions throughout the world in emergency management programs and conducts comprehensive vulnerability studies. Gunnar is a frequent lecturer and has analyzed risk related policies and emergency management activities prior to and during a variety of catastrophic incidents, ranging from aviation accidents, to fires and natural disasters, to acts of terrorism and ultraviolence, to the effects of biological agents.

Since 2000 Gunnar J Kuepper serves as the IAEM-USA Region 9 President. He is the elected representative for 500+ Emergency Management Professionals from the public, private, and non-profit sectors in Arizona, California, Hawaii, Nevada, and the Pacific Trust Territories. The International Association of Emergency Managers (IAEM) is a non-profit educational organization dedicated to promoting the goals of saving lives and protecting property during emergencies and disasters.

In 1999 Gunnar J Kuepper was appointed as a Principal (voting member) to the NFPA Standard Committee 1600 on Emergency / Disaster Management and Business Continuity Programs. The committee has the responsibility for developing and maintaining standard documents relating to preparedness for, response to, and recovery from disasters resulting from natural, human, or technological events. The purpose of the NFPA 1600 Standard is to provide the criteria to assess current programs or to develop, implement, and maintain comprehensive programs that apply to public, non-profit, and private entities.

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