

Key Facts about Human Infections with Variant Viruses (Swine Origin Influenza Viruses in Humans)

Questions & Answers

This page contains background information about swine influenza virus infections in humans, now called “variant virus infections in humans.”

What is Swine Influenza?

Swine influenza (swine flu) is a respiratory disease of pigs caused by type A influenza viruses that regularly cause outbreaks of influenza in pigs. Swine flu viruses can cause high levels of illness in swine herds, but usually cause few deaths. Common signs in sick pigs include fever, depression, coughing (barking), discharge from the nose or eyes, sneezing, breathing difficulties, eye redness or inflammation, and going off feed. However, influenza-infected pigs also may not appear ill or be only mildly ill. Swine influenza viruses may circulate among swine throughout the year, but most outbreaks occur during the late fall and winter months similar to outbreaks of seasonal influenza in humans.

What is a variant influenza virus?

When an influenza virus that normally circulates in swine (but not people) is detected in a person, it is called a “variant influenza virus.” For example, if a swine origin influenza A H₃N₂ virus is detected in a person, that virus will be called an “H₃N₂ variant” virus or “H₃N₂v” virus. This naming convention was first announced in a January 6, 2012 Morbidity and Mortality Weekly Report entitled [Update: Influenza A \(H₃N₂\)v Transmission and Guidelines – Five States, 2011](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6051a4.htm) (<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6051a4.htm>). (See **Box** (<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6051a4.htm#box>))

Can humans be infected with swine influenza viruses?

Yes. Swine flu viruses do not normally infect humans, however, sporadic human infections with influenza viruses that normally infect swine have occurred. When this happens, these viruses are called “variant viruses.” Most commonly, human infections with variant viruses have occurred in persons exposed to infected pigs (e.g. children near pigs at a fair or workers in the swine industry). In addition, there have been documented cases of multiple persons becoming sick after exposure to one or more sick pigs. Also cases of limited person-to-person spread of variant viruses have occurred.

How common is it for humans to be infected with influenza viruses that normally spread in swine?

In the past, CDC received reports of approximately one human infected with influenza viruses that normally spread in swine every one to two years, but more recently, these cases have been detected more frequently. (See [Case Count: Detected U.S. Human Infections with Variant Influenza Viruses by State since December 2005](http://www.cdc.gov/flu/swineflu/variant-cases-us.htm#table-infections) (/flu/swineflu/variant-cases-us.htm#table-infections).) The increased detection and reporting of these cases could be occurring for a number of reasons, including one or more of the following factors: First, pandemic preparedness efforts have improved state level surveillance and laboratory capacity to detect novel viruses in the United

States. Second, in 2007, novel influenza virus infections were made domestically and internationally reportable. And three, it's also possible that there is a true increase in the number of these cases, possibly occurring from exposure to infected swine or through subsequent, limited human-to-human transmission.

Why are human infections with variant viruses of concern?

Influenza viruses that infect pigs are different from human influenza viruses. Thus, influenza vaccines made against human influenza viruses are generally not expected to protect people from influenza viruses that normally circulate in pigs. In addition, because pigs are susceptible to avian, human and swine influenza viruses, they potentially may be infected with influenza viruses from different species (e.g., ducks and humans) at the same time. If this happens, it is possible for the genes of these viruses to mix and create a new virus that could spread easily from person-to-person. This type of major change in the influenza A viruses is known as antigenic shift. Antigenic shift results when a new influenza A virus to which most people have little or no immune protection infects humans. If this new virus causes illness in people and can be transmitted easily from person-to-person, an influenza pandemic can occur. This is what happened in 2009 when an influenza A H1N1 virus with swine, avian and human genes emerged in the spring of 2009 and caused the first pandemic in more than 40 years.

What symptoms do people have when they are infected with variant viruses?

People who have been infected with variant viruses have had symptoms similar to the symptoms of regular human seasonal influenza. These include fever, lethargy, lack of appetite and coughing. Some people also have reported runny nose, sore throat, eye irritation, nausea, vomiting and diarrhea.

Can people catch swine flu/variant flu from eating pork?

Swine influenza has not been shown to be transmissible to people through eating properly handled and prepared pork (pig meat) or other products derived from pigs. For more information about the proper handling and preparation of pork, visit the USDA website fact sheet [Fresh Pork from Farm to Table](http://www.fsis.usda.gov/factsheets/Pork_From_Farm_to_Table/index.asp) ([http://www.fsis.usda.gov/factsheets/Pork From Farm to Table/index.asp](http://www.fsis.usda.gov/factsheets/Pork_From_Farm_to_Table/index.asp))  (<http://www.cdc.gov/Other/disclaimer.html>).

How are variant influenza viruses spread?

Influenza viruses can be directly transmitted from pigs to people and from people to pigs. When a human is infected with a flu virus that normally circulates in pigs, this virus is called a "variant virus" because it is different from seasonal influenza viruses. These infections have been most likely to occur when people are in close proximity to infected pigs, such as in pig barns and livestock exhibits housing pigs at fairs. This is thought to happen mainly when an infected pig coughs or sneezes and droplets with influenza virus in them spread through the air. If these droplets land in your nose or mouth, or are inhaled, you can be infected. There also is some evidence that you might get infected by touching something that has virus on it and then touching your own mouth or nose. A third way to possibly get infected is to inhale dust containing influenza virus. Scientists aren't really sure which of these ways of spread is the most common.

Human-to-human transmission of variant flu viruses also has occurred, though this method of spread has been limited. This kind of transmission is thought to occur in the same way that seasonal flu transmits in people, which is mainly through coughing or sneezing by people who are infected. People also may become infected by touching something with flu viruses on it and then

touching their mouth or nose. It's important to note that in most cases, variant flu viruses have not shown the ability to spread easily and sustainably from person to person.

How can human infections with variant influenza viruses be diagnosed?

To diagnose variant influenza A virus infection, a respiratory specimen would generally need to be collected within the first 4 to 5 days of illness (when an infected person is most likely to be shedding virus). However, some persons, especially children, may shed virus for 10 days or longer. Since the 2009 H1N1 pandemic, state health departments have the ability to test for novel (non-human) influenza viruses. However, if a variant influenza virus is suspected, it is sent to CDC for further testing.

What medications are available to treat variant flu infections in humans?

There are four different antiviral drugs that are licensed for use in the United States for the treatment of influenza: amantadine, rimantadine, oseltamivir and zanamivir. In the past, most variant influenza viruses had been susceptible to all four drugs, however the most recent variant influenza viruses isolated from 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 these variant influenza viruses.

What other examples of outbreaks with influenza viruses that normally circulate in swine are there?

Probably the most well-known is an outbreak of "swine flu" among soldiers in Fort Dix, New Jersey in 1976. The virus caused disease with x-ray evidence of pneumonia in at least four soldiers with one 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 then 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 variant influenza A virus collected from a Fort Dix soldier was named A/New Jersey/76 (Hsw1N1). In July 2012, outbreaks of an H3N2v virus were detected in the United States. For more information, visit the [CDC H3N2v landing page \(/flu/swineflu/h3n2v-cases.htm\)](http://flu/swineflu/h3n2v-cases.htm).

Was the "2009 H1N1" pandemic virus the same as previously circulating human H1N1 viruses?

No. The 2009 H1N1 viruses were antigenically and genetically very different from previously circulating human H1N1 viruses and, therefore, vaccines for human seasonal flu available at that time did not provide protection against 2009 H1N1 viruses. However, these 2009 H1N1 viruses are now commonly spread in people and the current seasonal flu vaccines do provide protection against these viruses.

For information about 2009 H1N1 influenza (initially referred to as "swine flu" when it was first detected), visit the archived website.

For information about seasonal influenza, visit the CDC [Seasonal Influenza \(Flu\) \(/flu/index.htm\)](http://flu/index.htm) website.

For information about H3N2v, visit the [CDC H3N2v landing page \(/flu/swineflu/h3n2v-cases.htm\)](http://flu/swineflu/h3n2v-cases.htm).

For more information on human infections, visit [Past Reports of Human Infections with Variant Viruses \(/flu/swineflu/related-links.htm\)](http://flu/swineflu/related-links.htm).

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