PANDEMIC INFLUENZA
&
AVIAN FLU
FACT SHEETS

FROM THE CDC

NEW MEXICO DEPARTMENT OF HEALTH

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OFFICE OF HEALTH EMERGENCY MANAGEMENT

NEW MEXICO DEPARTMENT OF HEALTH

Contents

Pandemic Flu: Key Facts

Introduction

An influenza pandemic is a global outbreak of disease that occurs when a new influenza A virus appears or “emerges” in the human population, causes serious illness, and then spreads easily from person to person worldwide. Pandemics are different from seasonal outbreaks or “epidemics” of influenza. Seasonal outbreaks are caused by subtypes of influenza viruses that already circulate among people, whereas pandemic outbreaks are caused by new subtypes, by subtypes that have never circulated among people, or by subtypes that have not circulated among people for a long time. Past influenza pandemics have led to high levels of illness, death, social disruption, and economic loss.

Appearance (Emergence) of Pandemic Influenza Viruses

There are many different subtypes of influenza or “flu” viruses. The subtypes differ based upon certain proteins on the surface of the virus (the hemagglutinin or “HA” protein and the neuraminidase or the “NA” protein).

Pandemic viruses emerge as a result of a process called "antigenic shift,” which causes an abrupt or sudden, major change in influenza A viruses. These changes are caused by new combinations of the HA and/or NA proteins on the surface of the virus. Such changes result in a new influenza A virus subtype. The appearance of a new influenza A virus subtype is the first step toward a pandemic; however, to cause a pandemic, the new virus subtype also must have the capacity to spread easily from person to person. Once a new pandemic influenza virus emerges and spreads, it usually becomes established among people and moves around or “circulates” for many years as seasonal epidemics of influenza. The U.S. Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO) have large surveillance programs to monitor and detect influenza activity around the world, including the emergence of possible pandemic strains of influenza virus.

Influenza Pandemics during the 20th Century

During the 20th century, the emergence of several new influenza A virus subtypes caused three pandemics, all of which spread around the world within a year of being detected.

- 1918-19, "Spanish flu," [A (H1N1)], caused the highest number of known influenza deaths. (However, the actual influenza virus subtype was not detected in the 1918-19 pandemic). More than 500,000 people died in the United States, and up to 50 million people may have died worldwide. Many people died within the first few days after infection, and others died of secondary complications. Nearly half of those who died were young, healthy adults. Influenza A (H1N1) viruses still circulate today after being introduced again into the human population in 1977.

- 1957-58, "Asian flu," [A (H2N2)], caused about 70,000 deaths in the United States. First identified in China in late February 1957, the Asian flu spread to the United States by June 1957.

- 1968-69, "Hong Kong flu," [A (H3N2)], caused about 34,000 deaths in the United States. This virus was first detected in Hong Kong in early 1968 and spread to the United States later that year. Influenza A (H3N2) viruses still circulate today.

Both the 1957-58 and 1968-69 pandemics were caused by viruses containing a combination of genes from a human influenza virus and an avian influenza virus. The 1918-19 pandemic virus appears to have an avian origin.

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Vaccines to Protect Against Pandemic Influenza Viruses

A vaccine probably would not be available in the early stages of a pandemic. Scientists around the world work together when developing a new vaccine against influenza to select the virus strain that will offer the best protection against that virus. Manufacturers then use the selected strain to develop a vaccine. Once a potential pandemic strain of influenza virus is identified, it takes several months before a vaccine will be widely available. If a pandemic occurs, the U.S. government will work with many partner groups to make recommendations guiding the early use of available vaccine.

Antiviral Medications to Prevent and Treat Pandemic Influenza

Four different influenza antiviral medications (amantadine, rimantadine, oseltamivir, and zanamivir) are approved by the U.S. Food and Drug Administration (FDA) for the treatment and/or prevention of influenza. All four usually work against influenza A viruses. However, the drugs may not always work, because influenza virus strains can become resistant to one or more of these medications. For example, analyses have shown that some of the 2004 H5N1 viruses isolated from poultry and humans in Southeast Asia are resistant to two of the medications for influenza (amantadine and rimantadine). More recently, testing of seasonal influenza A (H3N2) isolates from people in the United States during the current influenza season (2005-06) has shown that a high percentage of circulating viruses are resistant to amantadine and rimantadine. As a result, on January 14, 2006 CDC issued a Health Alert Notice (HAN), recommending that neither amantadine nor rimantadine be used for the treatment or prevention (prophylaxis) of influenza A in the United States for the remainder of the 2005-06 influenza season. CDC and other public health agencies will continue to monitor both seasonal and avian influenza viruses for resistance to influenza antiviral medications.

Preparing for the Next Pandemic

Many scientists believe it is only a matter of time until the next influenza pandemic occurs. The severity of the next pandemic cannot be predicted, but modeling studies suggest that the impact of a pandemic on the United States could be substantial. In the absence of any control measures (vaccination or drugs), it has been estimated that in the United States a “medium–level” pandemic could cause 89,000 to 207,000 deaths, 314,000 and 734,000 hospitalizations, 18 to 42 million outpatient visits, and another 20 to 47 million people being sick. Between 15% and 35% of the U.S. population could be affected by an influenza pandemic, and the economic impact could range between $71.3 and $166.5 billion.

Influenza pandemics are different from many of the threats for which public health and health-care systems are currently planning:

- A pandemic will last much longer than most public health emergencies and may include “waves” of influenza activity separated by months (in 20th century pandemics, a second wave of influenza activity occurred 3 to 12 months after the first wave).
- The numbers of health-care workers and first responders available to work can be expected to be reduced. They will be at high risk of illness through exposure in the community and in health-care settings, and some may have to miss work to care for ill family members.
- Resources in many locations could be limited, depending on the severity and spread of an influenza pandemic.

Because of these differences and the expected size of an influenza pandemic, it is important to plan preparedness activities that will permit a prompt and effective public health response. The U.S. Department of Health and Human Services (HHS) supports pandemic influenza activities in the areas of surveillance (detection), vaccine development and production, strategic stockpiling of antiviral medications, research, and risk communications. In May 2005, the U.S. Secretary of HHS created a multi-agency National Influenza Pandemic Preparedness and Response Task Group.

This unified initiative involves CDC and many other agencies (international, national, state, local and private) in planning for a potential pandemic. HHS has worked with organizations and professional associations at international, federal, state, and local levels to develop a comprehensive Pandemic Influenza Plan in conjunction with the President's National Strategy for Pandemic Influenza.

For more information, visit www.cdc.gov/flu/pandemic,
or call CDC at 800-CDC-INFO (English and Spanish) or 888-232-6348 (TTY).

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Pandemic Flu Questions and Answers

What is an influenza pandemic?

An influenza pandemic is a global outbreak of disease that occurs when a new influenza A virus appears or “emerges” in the human population, causes serious illness in people, and then spreads easily from person to person worldwide. Pandemics are different from seasonal outbreaks or “epidemics” of influenza. Seasonal outbreaks are caused by subtypes of influenza viruses that already circulate among people (for example, influenza A (H3N2) and A (H1N1) viruses have circulated among people since 1977). In contrast, pandemic outbreaks are caused by new subtypes, by subtypes that have never circulated among people, or by subtypes that have not circulated among people for a long time. Past influenza pandemics have led to high levels of illness, death, social disruption, and economic loss.

How does pandemic influenza differ from avian (bird) influenza and seasonal influenza?

For pandemic influenza to occur, three conditions must be met: a new influenza A virus appears or “emerges” in the human population, it causes serious illness in people, and it spreads easily from person to person worldwide. There is currently no pandemic influenza in the world.

Avian influenza is an infection caused by avian (bird) influenza (flu) viruses. These flu viruses occur naturally among birds worldwide.

Seasonal influenza (often called "the flu") is a contagious respiratory illness caused by influenza viruses. Seasonal flu occurs every year and can cause mild to severe illness in people. The best protection against seasonal flu is vaccination.

When did the last influenza pandemic occur?

The last influenza pandemic occurred in 1968-69. During the 20th century, the emergence of several new influenza A virus subtypes caused three pandemics, all of which spread around the world within a year of being detected.

The last influenza pandemic in 1968-69, called the "Hong Kong flu" [A (H3N2)], caused about 34,000 deaths in the United States. This virus was first detected in Hong Kong in early 1968 and spread to the United States later that year. Influenza A (H3N2) viruses still circulate today.

The 1957-58 "Asian flu" [A (H2N2)] caused about 70,000 deaths in the United States. First identified in China in late February 1957, the Asian flu spread to the United States by June 1957.

The highest number of known influenza deaths from pandemic influenza occurred in 1918-19 with the "Spanish flu" [A (H1N1)]. More than 500,000 people died in the United States, and as many as 50 million people may have died worldwide. Many people died within the first few days after infection, and others died of secondary complications. Nearly half of those who died were young, healthy adults. Influenza A (H1N1) viruses still circulate today after being introduced again into the human population in 1977.

Both the 1957-58 and 1968-69 pandemics were caused by viruses containing a combination of genes from a human influenza virus and an avian influenza virus. The 1918-19 pandemic virus appears to have an avian origin.

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When will the next influenza pandemic occur and how severe will it be?

Many scientists believe it is only a matter of time until the next influenza pandemic occurs. The severity of the next pandemic cannot be predicted, but modeling studies suggest that the impact of a pandemic on the United States could be substantial. In the absence of any control measures (vaccination or drugs), it has been estimated that in the United States a "medium–level" pandemic could cause 89,000 – 207,000 deaths, 314,000 – 734,000 hospitalizations, 18 – 42 million outpatient visits, and another 20 – 47 million people to be sick. Between 15% and 35% of the U.S. population could be affected by an influenza pandemic, and the economic impact could range between $71.3 and $166.5 billion.

Are there medicines to treat or prevent pandemic influenza?

Four different influenza antiviral medicines (amantadine, rimantadine, oseltamivir, and zanamivir) are approved by the U.S. Food and Drug Administration for the treatment and/or prevention of influenza. All four usually work against influenza A viruses. However, the drugs may not always work, because influenza virus strains can become resistant to one or more of these medicines. For example, analyses have shown that some of the 2004 H5N1 viruses isolated from poultry and humans in Asia are resistant to two of the medications (amantadine and rimantadine).

More recently, testing of seasonal influenza A (H3N2) isolates from people in the United States during the current influenza season (2005-06) has shown that a high percentage of circulating viruses are resistant to amantadine and rimantadine. As a result, on January 14, 2006 CDC issued a Health Alert Notice (HAN), recommending that neither amantadine nor rimantadine be used for the treatment or prevention (prophylaxis) of influenza A in the United States for the remainder of the 2005-06 influenza season. CDC and other public health agencies will continue to monitor both seasonal and avian influenza viruses for resistance to influenza antiviral medications.

Is there a vaccine to protect people from pandemic influenza?

Currently, there is no vaccine to protect people from pandemic influenza. A vaccine probably would not be available in the early stages of a pandemic. When a new vaccine against an influenza virus is being developed, scientists work together to select the virus strain that will offer the best protection against that virus. Manufacturers then use the selected strain to develop a vaccine. Once a potential pandemic strain of influenza virus is identified, it will take several months before a vaccine will be widely available. If a pandemic occurs, the U.S. government will work with many partner groups to make recommendations guiding the early use of available vaccine.

Preparing for Pandemic Influenza

What changes are needed for H5N1 or another avian influenza virus to cause a pandemic?

Three conditions must be met for a pandemic to start: 1) a new influenza virus subtype must emerge; 2) it must infect humans and causes serious illness; and 3) it must spread easily and sustainedly (continue without interruption) among humans. The H5N1 virus in Asia and Europe meets the first two conditions: it is a new virus for humans (H5N1 viruses have never circulated widely among people), and it has infected more than 100 humans, killing over half of them.

However, the third condition, the establishment of efficient and sustained human-to-human transmission of the virus, has not occurred. For this to take place, the H5N1 virus would have to change in such a way that it could spread more easily among humans. This could occur either by "reassortment" or adaptive mutation.

Reassortment occurs when genetic material is exchanged between human and avian viruses during co-infection (infection with both viruses at the same time) of a human or pig. The result could be a fully transmissible pandemic virus—that is, a virus that can spread easily and directly to humans. A more gradual process is adaptive mutation, where the capability of a virus to bind to human cells increases during infections of humans.

What is CDC doing to prepare for a possible H5N1 influenza pandemic?

CDC is taking part in a number of pandemic prevention and preparedness activities, including the following:

- Providing leadership to the National Pandemic Influenza Preparedness and Response Task Force, created in May 2005 by the Secretary of the U.S. Department of Health and Human Services.
- Working with the Association of Public Health Laboratories on training workshops for state laboratories on the use of special laboratory (molecular) techniques to identify H5 viruses.
- Working with the Council of State and Territorial Epidemiologists and others to help states with their pandemic planning efforts.
- Working with other agencies, such as the Department of Defense and the Veterans Administration, on antiviral stockpile issues.
- Working with the World Health Organization (WHO) to investigate influenza H5N1 among people (e.g., in Vietnam) and to provide help in laboratory diagnostics and training to local authorities.
- Performing laboratory testing of H5N1 viruses.
- Starting a $5.5 million initiative to improve influenza surveillance in Asia.
- Holding or taking part in training sessions to improve local capacities to conduct surveillance for possible human cases of H5N1 and to detect influenza A H5 viruses by using laboratory techniques.
- Developing and distributing reagent kits to detect the currently circulating influenza A H5N1 viruses.

CDC also is working closely with the World Health Organization and the National Institutes of Health on safety testing of vaccine candidates and development of additional vaccine virus seed candidates for influenza A (H5N1) and other subtypes of influenza A viruses.

What can my family do to prepare for a possible influenza pandemic?

One of the most important protective steps against a possible influenza pandemic is avoiding infection. For the most part, ordinary measures, such as hand hygiene and remaining several feet away from people who show symptoms of respiratory illness (e.g., coughing, sneezing), could be useful protection strategies.

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What can businesses do to prepare for a possible influenza pandemic?

Businesses should stay informed about the potential for an influenza pandemic. They should develop or update emergency plans and consider in advance the challenges they could face if an influenza pandemic occurred. Businesses should identify essential functions and personnel needed to keep the business operating and should work with medical advisors on ways to protect employees.

What can communities do to prepare for a possible influenza pandemic?

Communities should carefully review the resources they have in place. They may need to build upon existing emergency plans in preparation for a possible influenza pandemic. For instance, communities can identify possible communication barriers (e.g., diverse languages) and other possible barriers to effective medical care. They also can develop a list of resources and plan for groups that might be hardest hit during an influenza pandemic.

Communities should coordinate their plans with state and federal influenza pandemic plans. They should test their plans regularly and change them as needed to improve response in case of an influenza pandemic.

For more information, visit www.cdc.gov/flu/pandemic,
or call CDC at 800-CDC-INFO (English and Spanish) or 888-232-6348 (TTY).

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Influenza Viruses**Types, Subtypes, and Strains**

There are three types of influenza viruses: A, B, and C. Only influenza A viruses are further classified by subtype on the basis of the two main surface glycoproteins hemagglutinin (HA) and neuraminidase (NA). Influenza A subtypes and B viruses are further classified by strains.

Human Influenza Viruses and Avian Influenza A Viruses

Humans can be infected with influenza types A, B, and C viruses. Subtypes of influenza A that are currently circulating among people worldwide include H1N1, H1N2, and H3N2 viruses.

Wild birds are the natural host for all known subtypes of influenza A viruses. Typically, wild birds do not become sick when they are infected with avian influenza A viruses. However, domestic poultry, such as turkeys and chickens, can become very sick and die from avian influenza, and some avian influenza A viruses also can cause serious disease and death in wild birds.

Low Pathogenic versus Highly Pathogenic Avian Influenza A Viruses

Avian influenza A virus strains are further classified as low pathogenic (LPAI) or highly pathogenic (HPAI) on the basis of specific molecular genetic and pathogenesis criteria that require specific testing. Most avian influenza A viruses are LPAI viruses that are usually associated with mild disease in poultry. In contrast, HPAI viruses can cause severe illness and high mortality in poultry. More recently, some HPAI viruses (e.g., H5N1) have been found to cause no illness in some poultry, such as ducks. LPAI viruses have the potential to evolve into HPAI viruses and this has been documented in some poultry outbreaks. Avian influenza A viruses of the subtypes H5 and H7,including H5N1, H7N7, and H7N3 viruses, have been associated with HPAI, and human infection with these viruses have ranged from mild (H7N3, H7N7) to severe and fatal disease (H7N7, H5N1). Human illness due to infection with LPAI viruses has been documented, including very mild symptoms (e.g., conjunctivitis) to influenza-like illness. Examples of LPAI viruses that have infected humans include H7N7, H9N2, and H7N2.

In general, direct human infection with avian influenza viruses occurs very infrequently, and has been associated with direct contact (e.g., touching) infected sick or dead infected birds (domestic poultry).

How Influenza Viruses Change: Drift and Shift

Influenza viruses are dynamic and are continuously evolving. Influenza viruses can change in two different ways: antigenic drift and antigenic shift. Influenza viruses are changing by antigenic drift all the time, but antigenic shift happens only occasionally. Influenza type A viruses undergo both kinds of changes; influenza type B viruses change only by the more gradual process of antigenic drift.

Antigenic drift refers to small, gradual changes that occur through point mutations in the two genes that contain the genetic material to produce the main surface proteins, hemagglutinin, and neuraminidase. These point mutations occur unpredictably and result in minor changes to these surface proteins. Antigenic drift produces new virus strains that may not be recognized by antibodies to earlier influenza strains. This process works as follows: a person infected with a particular influenza virus strain develops antibody against that strain. As newer virus strains appear, the antibodies against the older strains might not recognize the "newer" virus, and infection with a new strain can occur. This is one of the main reasons why people can become infected with influenza viruses more than one time and why global surveillance is critical in order to monitor the evolution of human influenza virus stains for selection of which strains should be included in the annual production of influenza vaccine. In most years, one or two of the three virus strains in the influenza vaccine are updated to keep up with the changes in the circulating influenza viruses. For this reason, people who want to be immunized against influenza need to be vaccinated every year.

Antigenic shift refers to an abrupt, major change to produce a novel influenza A virus subtype in humans that was not currently circulating among people (see more information below under Influenza Type A and Its Subtypes). Antigenic shift can occur either through direct animal (poultry)-to-human transmission or through mixing of human influenza A and animal influenza A virus genes to create a new human influenza A subtype virus through a process called genetic reassortment. Antigenic shift results in a new human influenza A subtype [redacted]

- A new subtype of influenza A virus is introduced into the human population.
- The virus causes serious illness in humans.
- The virus can spread easily from person to person in a sustained manner.

Types, Subtypes, and Strains

Influenza Type A and Its Subtypes

Influenza type A viruses can infect people, birds, pigs, horses, and other animals, but wild birds are the natural hosts for these viruses. Influenza type A viruses are divided into subtypes and named on the basis of two proteins on the surface of the virus: hemagglutinin (HA) and neuraminidase (NA). For example, an “H7N2 virus” designates an influenza A subtype that has an HA 7 protein and an NA 2 protein. Similarly an “H5N1” virus has an HA 5 protein and an NA 1 protein. There are 16 known HA subtypes and 9 known NA subtypes. Many different combinations of HA and NA proteins are possible. Only some influenza A subtypes (i.e., H1N1, H1N2, and H3N2) are currently in general circulation among people. Other subtypes are found most commonly in other animal species. For example, H7N7 and H3N8 viruses cause illness in horses, and H3N8 also has recently been shown to cause illness in dogs.

Only influenza A viruses infect birds, and all known subtypes of influenza A viruses can infect birds. However, there are substantial genetic differences between the influenza A subtypes that typically infect birds and those that infect both people and birds. Three prominent subtypes of the avian influenza A viruses that are known to infect both birds and people are:

Influenza A H5

Nine potential subtypes of H5 are known. H5 infections, such as HPAI H5N1 viruses currently circulating in Asia and Europe, have been documented among humans and sometimes cause severe illness or death.

Influenza A H7

Nine potential subtypes of H7 are known. H7 infection in humans is rare but can occur among persons who have direct contact with infected birds. Symptoms may include conjunctivitis and/or upper respiratory symptoms. H7 viruses have been associated with both LPAI (e.g., H7N2, H7N7) and HPAI (e.g., H7N3, H7N7), and have caused mild to severe and fatal illness in humans.

Influenza A H9

Nine potential subtypes of H9 are known; influenza A H9 has rarely been reported to infect humans. However, this subtype has been documented only in a low pathogenic form.

Influenza Type B

Influenza B viruses are usually found only in humans. Unlike influenza A viruses, these viruses are not classified according to subtype. Influenza B viruses can cause morbidity and mortality among humans, but in general are associated with less severe epidemics than influenza A viruses. Although influenza type B viruses can cause human epidemics, they have not caused pandemics.

Influenza Type C

Influenza type C viruses cause mild illness in humans and do not cause epidemics or pandemics. These viruses are not classified according to subtype.

Strains

Influenza B viruses and subtypes of influenza A virus are further characterized into strains. There are many different strains of influenza B viruses and of influenza A subtypes. New strains of influenza viruses appear and replace older strains. This process occurs through antigenic drift. When a new strain of human influenza virus emerges, antibody protection that may have developed after infection or vaccination with an older strain may not provide protection against the new strain. Therefore, the influenza vaccine is updated on a yearly basis to keep up with the changes in influenza viruses.

Page last modified November 18, 2005

Page found at http://www.cdc.gov/flu/avian/gen-info/flu-viruses.htm

Avian Influenza: Current Situation

Summary

Influenza A (H5N1) is an influenza A virus subtype that occurs mainly in birds, is highly contagious among birds, and can be deadly to them. Outbreaks of H5N1 among poultry are ongoing in a number of countries. While H5N1 does not usually infect people, human cases of H5N1 infection associated with these outbreaks have been reported Most of these cases have occurred from direct or close contact with infected poultry or contaminated surfaces; however, a few rare cases of human-to-human spread of H5N1 virus have occurred, though transmission has not continued beyond one person.

Nonetheless, because all influenza viruses have the ability to change, scientists are concerned that H5N1 virus one day could be able to infect humans and spread easily from one person to another. Because these viruses do not commonly infect humans, there is little or no immune protection against them in the human population and an influenza pandemic (worldwide outbreak of disease) could begin. Experts from around the world are watching the H5N1 situation in Asia and Europe very closely and are preparing for the possibility that the virus may begin to spread more easily from person to person.

Human H5N1 Cases

Human Cases: Summary of Current Situation

Since January, 2004 WHO has reported human cases of avian influenza A (H5N1) in the following countries:

- East Asia and the Pacific:
  - Cambodia
  - China
  - Indonesia
  - Thailand
  - Vietnam
- Europe & Eurasia:
  - Turkey
- Near East:
  - Iraq
    (see preliminary report)

Updated February 8, 2006

During August to October 2004, sporadic human cases of avian influenza A (H5N1) were reported in Vietnam and Thailand. Beginning in December 2004, a resurgence of poultry outbreaks and human cases were reported in Vietnam.

On February 2, 2005, the first of four human cases of H5N1 infection from Cambodia were reported. And on July 21, 2005, the first human case of H5N1 in Indonesia was reported. Indonesia continued to report human cases from August 2005 into February 2006. Thailand reported new human cases of H5N1 in October, November, and December 2005, and Vietnam reported new human cases in November 2005. China reported

the country's first confirmed human cases in November 2005 and continued to report human cases in December 2005 and into 2006. Turkey reported the country's first confirmed human cases on January 5, 2006 and has continued to report human cases. The first confirmed human infection with avian influenza A (H5N1) in Iraq was reported on February 2, 2006.

Animal H5N1 Cases

Animal Cases: Summary of Current Situation

As of January 30, 2006, avian influenza A (H5N1) infections in poultry or wild birds have occurred in the following countries:

- Africa:
  - Nigeria (see website)
- East Asia & the Pacific:
  - Cambodia
  - China
  - Hong Kong (SARPRC)
  - Indonesia
  - Japan
  - Laos
  - Malaysia
  - Mongolia
  - Thailand
  - Vietnam
- Europe & Eurasia:
  - Croatia
  - Romania
  - Russia
  - Turkey
  - Ukraine
- Near East:
  - Iraq (H5) (see website)
- South Asia:
  - Kazakhstan

Updated February 8, 2006

Beginning in late June 2004, new outbreaks of lethal avian influenza A (H5N1) infection among poultry were reported by several countries in Asia: Cambodia, China, Indonesia, Malaysia, Thailand, and Vietnam. Since May 2005, outbreaks of H5N1 disease have been reported among poultry in China, Kazakhstan, Romania, Russia, Turkey, and Ukraine. China, Croatia, Mongolia, and Romania also have reported outbreaks of H5N1 in wild, migratory birds since May 2005. Hong Kong (SARPRC) reported one dead wild bird in January 2006. On February 2, 2006 Iraq reported an outbreak of avian influenza A (H5) among backyard poultry flocks. Testing to determine the neuraminidase subtype of the virus is underway. On February 8, 2006, Nigeria reported an outbreak of highly pathogenic avian influenza A (H5N1) among commercial poultry (egg layers). Tests to determine the similarity of these viruses with those responsible for ongoing H5N1 outbreaks associated with human cases in other regions of the world are underway. For additional information about H5N1 and other avian influenza outbreaks among animals, visit the World Organization for Animal Health Web site.

Assessment of Current Situation

The avian influenza A (H5N1) epizootic (animal outbreak) in Asia and parts of Europe is not expected to diminish significantly in the short term. It is likely that H5N1 infection among birds has become endemic in certain areas and that human infections resulting from direct contact with infected poultry will continue to occur. So far, the spread of H5N1 virus from person-to-person has been rare and has not continued beyond one person. No evidence for genetic reassortment between human and avian influenza A virus genes has been found; however, the epizootic in Asia continues to pose an important public health threat.

There is little pre-existing natural immunity to H5N1 infection in the human population. If these H5N1 viruses gain the ability for efficient and sustained transmission among humans, an influenza pandemic could result, with potentially high rates of illness and death. In addition, genetic sequencing of influenza A (H5N1) viruses from human cases in Vietnam and Thailand shows resistance to the antiviral medications amantadine and rimantadine, two of the medications commonly used for treatment of influenza. This would leave two remaining antiviral medications (oseltamivir and zanamivir) that should still be effective against currently circulating strains of H5N1 virus. Efforts to produce vaccine candidates that would be effective against avian influenza A (H5N1) viruses are under way. However, it will likely require many months before such vaccines could be mass produced and made widely available.

Research suggests that currently circulating strains of H5N1 viruses are becoming more capable of causing disease (pathogenic) in mammals than were earlier H5N1 viruses. One study found that ducks infected with H5N1 virus are now shedding more virus for longer periods without showing symptoms of illness. This finding has implications for the role of ducks in transmitting disease to other birds and possibly to humans as well. Additionally, other findings have documented H5N1 infection among pigs in China and H5N1 infection in felines (experimental infection in housecats in the Netherlands and isolation of H5N1 viruses in tigers and leopards in Thailand).

Notable findings of epidemiologic investigations of human H5N1 cases in Vietnam during 2005 have suggested transmission of H5N1 viruses to at least two persons through consumption of uncooked duck blood. One possible instance of limited person-to-person transmission of H5N1 virus in Thailand has been reported. This possibility is being further investigated in other clusters of cases in Vietnam and Indonesia.

The majority of known human H5N1 cases have begun with respiratory symptoms. However, one atypical fatal case of encephalitis in a child in southern Vietnam in 2004 was identified retrospectively as H5N1 influenza through testing of cerebrospinal fluid, fecal matter, and throat and serum samples. Further research is needed to ascertain the implications of such findings.

Bird Import Ban

There is currently a ban on the importation of birds and bird products from H5N1-affected countries. The regulationstates that no person may import or attempt to import any birds (Class Aves), whether dead or alive, or any products derived from birds (including hatching eggs), from the following countries: Cambodia, Indonesia, Japan, Laos, Kazakhstan, Malaysia, Peoples' Republic of China, Romania, Russia, South Korea, Thailand, Turkey, Ukraine, and Vietnam (current as of December 29, 2005).

Travel

Updated Information for Travelers about Avian Influenza A(H5N1) is available at the CDC Travelers' Health Web site. Also see Guidelines and Recommendations - Interim Guidance about Avian Influenza A (H5N1) for U.S. Citizens Living Abroad.

CDC Response

Domestic Activities

- In May 2005, CDC joined a new, inter-agency National Influenza Pandemic Preparedness Task Force organized by the U.S. Secretary of Health and Human Services. This task force is developing and refining preparedness efforts with international, state, local, and private organizational partners to help ensure the most effective response possible when the next influenza pandemic occurs. For more information about the Pandemic Influenza Preparedness Plan of the U.S. Health and Human Services Department and other aspects of this coordinated federal initiative, please visit www.pandemicflu.gov.
- In February 2004, CDC issued recommendations for enhanced domestic surveillance of avian influenza A (H5N1). Following the reports of human deaths in Vietnam in August 2004 and additional human cases in the following months, CDC issued follow-up Health Alert Network (HAN) notices on August 12 and February 4, 2005, reiterating criteria for domestic surveillance, diagnostic evaluation, and infection control precautions for avian influenza A (H5N1). The HAN notice also detailed laboratory testing procedures for H5N1.
- CDC has collaborated with the Association of Public Health Laboratories to conduct training workshops for state laboratories on the use of molecular techniques to rapidly identify H5 viruses.
- CDC is working collaboratively with the Council of State and Territorial Epidemiologists and other partners to assist states with pandemic planning efforts.
- CDC is working with other agencies, such as the Department of Defense and the Department of Veterans Affairs, on antiviral stockpile issues.

International Activities

- CDC is one of four WHO Collaborating Centers and in this capacity provides ongoing support for the global WHO surveillance network, laboratory testing, training, and other actions.
- CDC has worked collaboratively with WHO to conduct investigations of human H5N1 infections in China, Indonesia, Thailand, Vietnam, and Turkey and to provide laboratory diagnostic and training assistance.
- CDC has performed laboratory testing of H5N1 viruses from Vietnam, Thailand, and Indonesia.
- CDC is implementing a multi-million dollar initiative to improve influenza surveillance in Asia.
- CDC has led or taken part in 9 training sessions to enhance local capacities in Asia to conduct surveillance for possible human cases of H5 and to detect avian influenza A H5 viruses using laboratory techniques.
- CDC has developed and distributed a reagent kit for the detection of the currently circulating influenza A H5 viruses.
- CDC has worked with other international and national agencies in Asia to develop a training course for rapid response teams that will be used to help prepare the region to respond to outbreaks when they occur.

CDC is monitoring the situation closely, along with WHO and other international partners. In addition, CDC continues to work collaboratively with WHO and the National Institutes of Health (NIH) on the development and testing of vaccine seed candidates for influenza A (H5N1).

NOTE: The World Health Organization (WHO) maintains situation updates and cumulative reports of human cases of avian influenza A (H5N1).

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Avian Influenza (Bird Flu)

Questions and Answers About Avian Influenza (Bird Flu) and Avian Influenza A (H5N1) Virus

Avian Influenza

What is avian influenza (bird flu)?
Avian influenza is an infection caused by avian (bird) influenza (flu) viruses. These flu viruses occur naturally among birds. Wild birds worldwide carry the viruses in their intestines, but usually do not get sick from them. However, avian influenza is very contagious among birds and can make some domesticated birds, including chickens, ducks, and turkeys, very sick and kill them.

Infection with avian influenza viruses in domestic poultry causes two main forms of disease that are distinguished by low and high extremes of virulence. The ?low pathogenic? form may go undetected and usually causes only mild symptoms (such as ruffled feathers and a drop in egg production). However, the ?highly pathogenic? form spreads more rapidly through flocks of poultry. This form may cause disease that affects multiple internal organs and has a mortality rate that can reach 90-100%, often within 48 hours.

How does avian influenza spread among birds?
Infected birds shed influenza virus in their saliva, nasal secretions, and feces. Susceptible birds become infected when they have contact with contaminated excretions or with surfaces that are contaminated with excretions or secretions. Domesticated birds may become infected with avian influenza virus through direct contact with infected waterfowl or other infected poultry or through contact with surfaces (such as dirt or cages) or materials (such as water or feed) that have been contaminated with the virus.

Do avian influenza viruses infect humans?
Bird flu viruses do not usually infect humans, but more than 100 confirmed cases of human infection with bird flu viruses have occurred since 1997. The World Health Organization (WHO) maintains situation updates and cumulative reports of human cases of avian influenza A (H5N1). Please visit these and previous WHO situation updates and cumulative reports for additional information.

How do people become infected with avian influenza viruses?
Most cases of avian influenza infection in humans have resulted from direct or close contact with infected poultry (e.g., domesticated chicken, ducks, and turkeys) or surfaces contaminated with secretions and excretions from infected birds. The spread of avian influenza viruses from an ill person to another person has been reported very rarely, and transmission has not been observed to continue beyond one person. During an outbreak of avian influenza among poultry, there is a possible risk to people who have direct or close contact with infected birds or with surfaces that have been contaminated with secretions and excretions from infected birds.

What are the symptoms of avian influenza in humans?
Symptoms of avian influenza in humans have ranged from typical human influenza-like symptoms (fever, cough, sore throat, and muscle aches) to eye infections, pneumonia, severe respiratory diseases (such as acute respiratory distress syndrome), and other severe and life-threatening complications. The symptoms of avian influenza may depend on which specific virus subtype and strain caused the infection.

How is avian influenza detected in humans?
A laboratory test is needed to confirm avian influenza in humans.

What are the implications of avian influenza to human health?
Two main risks for human health from avian influenza are 1) the risk of direct infection when the virus passes from the infected bird to humans, sometimes resulting in severe disease; and 2) the risk that the virus ? if given enough opportunities ? will change into a form that is highly infectious for humans and spreads easily from person to person.

How is avian influenza in humans treated?
Studies done in laboratories suggest that the prescription medicines approved for human influenza viruses should work in treating avian influenza infection in humans. However, influenza viruses can become resistant to these drugs, so these medications may not always work. Additional studies are needed to determine the effectiveness of these medicines.

Does the current seasonal influenza vaccine protect me from avian influenza?
No. Influenza vaccine for the 2005-06 season does not provide protection against avian influenza.

Should I wear a surgical mask to prevent exposure to avian influenza?
Currently, wearing a mask is not recommended for routine use (e.g., in public) for preventing influenza exposure. In the United States, disposable surgical and procedure masks have been widely used in health-care settings to prevent exposure to respiratory infections, but the masks have not been used commonly in community settings, such as schools, businesses, and public gatherings.

Is there a risk for becoming infected with avian influenza by eating poultry?
There is no evidence that properly cooked poultry or eggs can be a source of infection for avian influenza viruses. For more information about avian influenza and food safety issues, visit the World Health Organization website .

The U.S. government carefully controls domestic and imported food products, and in 2004 issued a ban on importation of poultry from countries affected by avian influenza viruses, including the H5N1 strain. This ban still is in place. For more information, see Embargo of Birds, http://www.cdc.gov/flu/avian/outbreaks/embargo.htm .

We have a small flock of chickens. Is it safe to keep them?
Yes. In the United States there is no need at present to remove a flock of chickens because of concerns regarding avian influenza. The U.S. Department of Agriculture monitors potential infection of poultry and poultry products by avian influenza viruses and other infectious disease agents.

What precautions can be taken to reduce the risk for infection from wild birds in the United States? As a general rule, the public should observe wildlife, including wild birds, from a distance. This protects you from possible exposure to pathogens and minimizes disturbance to the animal. Avoid touching wildlife. If there is contact with wildlife do not rub eyes, eat, drink, or smoke before washing hands with soap and water. Do not pick up diseased or dead wildlife. Contact your state, tribal, or federal natural resource agency if a sick or dead animal is found.

What precautions can hunters take to reduce the risk for infection when hunting birds in the United States ?
Hunters should follow routine precautions when handling game, including wild birds. The National Wildlife Health Center recommends that hunters:

- Do not handle or eat sick game.
- Wear rubber or disposable latex gloves while handling and cleaning game, wash hands with soap and water (or with alcohol-based hand products if the hands are not visibly soiled), and thoroughly clean knives, equipment and surfaces that come in contact with game.
- Do not eat, drink, or smoke while handling animals.
- Cook all game thoroughly.

Avian Influenza A (H5N1)

What is the avian influenza A (H5N1) virus that has been reported in Asia and Europe?
Influenza A (H5N1) virus ? also called ?H5N1 virus? ? is an influenza A virus subtype that occurs mainly in birds, is highly contagious among birds, and can be deadly to them.

Outbreaks of avian influenza H5N1 occurred among poultry in eight countries in Asia (Cambodia , China, Indonesia, Japan, Laos, South Korea, Thailand, and Vietnam) during late 2003 and early 2004. At that time, more than 100 million birds in the affected countries either died from the disease or were killed in order to try to control the outbreaks. By March 2004, the outbreak was reported to be under control.

Since late June 2004, however, new outbreaks of influenza H5N1 among poultry have been reported by several countries in Asia (Cambodia, China [Tibet], Indonesia, Kazakhstan, Malaysia, Mongolia, Russia [Siberia], Thailand, and Vietnam). It is believed that these outbreaks are ongoing. Influenza H5N1 infection also has been reported among poultry in Turkey and Romania and among wild migratory birds in Croatia .

Human cases of influenza A (H5N1) infection have been reported in Cambodia, China, Indonesia, Thailand, Turkey, and Vietnam. For the most current information about avian influenza and cumulative case numbers, see the World Health Organization website at http://www.who.int/csr/disease/avian_influenza/en/ .

What are the risks to humans from the current H5N1 outbreak in Asia and Europe?
H5N1 virus does not usually infect people, but more than 140 human cases have been reported. Most of these cases have occurred from direct or close contact with infected poultry or contaminated surfaces; however, a few cases of human-to-human spread of H5N1 virus have occurred.

So far, spread of H5N1 virus from person to person has been rare and has not continued beyond one person. Nonetheless, because all influenza viruses have the ability to change, scientists are concerned that H5N1 virus one day could be able to infect humans and spread easily from one person to another. Because these viruses do not commonly infect humans, there is little or no immune protection against them in the human population.

If H5N1 virus were to gain the capacity to spread easily from person to person, an influenza pandemic (worldwide outbreak of disease) could begin. No one can predict when a pandemic might occur. However, experts from around the world are watching the H5N1 situation in Asia and Europe very closely and are preparing for the possibility that the virus may begin to spread more easily from person to person.

How does H5N1 virus differ from seasonal influenza viruses that infect humans?
Of the few avian influenza viruses that have crossed the species barrier to infect humans, H5N1 virus has caused the largest number of reported cases of severe disease and death in humans. In the current situation in Asia, more than half of the people infected with the virus have died. Most cases have occurred in previously healthy children and young adults. However, it is possible that the only cases currently being reported are those in the most severely ill people and that the full range of illness caused by the H5N1 virus has not yet been defined.

Unlike seasonal influenza, in which infection usually causes only mild respiratory symptoms in most people, H5N1 infection may follow an unusually aggressive clinical course, with rapid deterioration and high fatality. Primary viral pneumonia and multi-organ failure have been common among people who have become ill with H5N1 influenza.

How is infection with H5N1 virus in humans treated?
Most H5N1 viruses that have caused human illness and death appear to be resistant to amantadine and rimantadine, two antiviral medications commonly used for treatment of patients with influenza. Two other antiviral medications, oseltamivir and zanamavir, would probably work to treat influenza caused by H5N1 virus, but additional studies are needed to demonstrate their current and ongoing effectiveness.

Is there a vaccine to protect humans from H5N1 virus?
There currently is no commercially available vaccine to protect humans against the H5N1 virus that is being detected in Asia and Europe. However, vaccine development efforts are taking place. Research studies to test a vaccine that will protect humans against H5N1 virus began in April 2005, and a series of clinical trials is under

way. For more information about the H5N1 vaccine development process, visit the National Institutes of Health website .

What does CDC recommend regarding H5N1 virus?
In February 2004, CDC provided U.S. public health departments with recommendations for enhanced surveillance (?detection?) of H5N1 influenza in the country. Follow-up messages, distributed via the Health Alert Network, were sent to the health departments on August 12, 2004, and February 4, 2005; both alerts reminded public health departments about recommendations for detecting (domestic surveillance), diagnosing, and preventing the spread of H5N1 virus. The alerts also recommended measures for laboratory testing for H5N1 virus. To read the alerts, visit Health Updates on Avian Influenza .

Does CDC recommend travel restrictions to areas with known H5N1 outbreaks?
CDC does not recommend any travel restrictions to affected countries at this time. However, CDC currently advises that travelers to countries with known outbreaks of H5N1 influenza avoid poultry farms, contact with animals in live food markets, and any surfaces that appear to be contaminated with feces from poultry or other animals. For more information, visit Travelers' Health .

Is there a risk in handling feather products that come from countries experiencing outbreaks of avian influenza A (H5N1)?
The U.S. government has determined that there is a risk to handling feather products from countries experiencing outbreaks of H5N1 influenza.

There is currently a ban on the importation of birds and bird products from H5N1-affected countries in Asia and Europe. The regulation states that no person may import or attempt to import any birds (Class Aves), whether dead or alive, or any products derived from birds (including hatching eggs), from the following countries: Cambodia, Indonesia, Japan, Laos, Kazakhstan, Malaysia, People's Republic of China, Romania, Russia, South Korea, Thailand, Turkey, Ukraine, and Vietnam (**current as of December 29, 2005**)**.** This prohibition does not apply to any person who imports or attempts to import products derived from birds if, as determined by federal officials, such products have been properly processed to render them noninfectious so that they pose no risk of transmitting or carrying H5Nl and which comply with the U.S. Department of Agriculture (USDA) requirements. Therefore, feathers from these countries are banned unless they have been processed to render them noninfectious. Additional information about the import ban is available on the USDA website.

Is there a risk to importing pet birds that come from countries experiencing outbreaks of avian influenza A (H5N1)?
The U.S. government has determined that there is a risk to importing pet birds from countries experiencing outbreaks of H5N1 influenza. CDC and USDA have both taken action to ban the importation of birds from areas where H5N1 has been documented. There is currently a ban on the importation of birds and bird products from H5N1-affected countries in Asia. The regulation states that no person may import or attempt to import any birds (Class Aves), whether dead or alive, or any products derived from birds (including hatching eggs), from the following countries: Cambodia, Indonesia, Japan, Laos, Kazakhstan, Malaysia, Peoples' Republic of China, Romania, Russia, South Korea, Thailand, Turkey, Ukraine, and Vietnam.
(**current as of December 29, 2005**) **.**

Can a person become infected with avian influenza A (H5N1) virus by cleaning a bird feeder?
There is no evidence of H5N1 having caused disease in birds or people in the United States . At the present time, the risk of becoming infected with H5N1 virus from bird feeders is low. Generally, perching birds (Passeriformes) are the predominate type of birds at feeders. While there are documented cases of H5N1 causing death in some Passeriformes (e.g., house sparrow, Eurasian tree-sparrow, house finch), in both free-ranging and experimental settings, most of the wild birds that are traditionally associated with avian influenza viruses are waterfowl and shore birds.

Influenza Pandemic Preparedness

What changes are needed for H5N1 or another avian influenza virus to cause a pandemic?
Three conditions must be met for a pandemic to start: 1) a new influenza virus subtype must emerge; 2) it must infect humans and causes serious illness; and 3) it must spread easily and sustainedly (continue without interruption) among humans. The H5N1 virus in Asia and Europe meets the first two conditions: it is a new virus

for humans (H5N1 viruses have never circulated widely among people), and it has infected more than 100 humans, killing over half of them.

However, the third condition, the establishment of efficient and sustained human-to-human transmission of the virus, has not occurred. For this to take place, the H5N1 virus would need to improve its transmissibility among humans. This could occur either by ?reassortment? or adaptive mutation.

Reassortment occurs when genetic material is exchanged between human and avian viruses during co-infection (infection with both viruses at the same time) of a human or pig. The result could be a fully transmissible pandemic virus?that is, a virus that can spread easily and directly to humans. A more gradual process is adaptive mutation, where the capability of a virus to bind to human cells increases during infections of humans.

What is CDC doing to prepare for a possible H5N1 influenza pandemic?
CDC is taking part in a number of pandemic prevention and preparedness activities, including the following:

- Providing leadership to the National Pandemic Influenza Preparedness and Response Task Force, created in May 2005 by the Secretary of the U.S. Department of Health and Human Services.
- Working with the Association of Public Health Laboratories on training workshops for state laboratories on the use of special laboratory (molecular) techniques to identify H5 viruses.
- Working with the Council of State and Territorial Epidemiologists and others to help states with their pandemic planning efforts.
- Working with other agencies, such as the Department of Defense and the Veterans Administration, on antiviral stockpile issues.
- Working with the World Health Organization (WHO) to investigate influenza H5N1 among people (e.g., in Vietnam) and to provide help in laboratory diagnostics and training to local authorities.
- Performing laboratory testing of H5N1 viruses.
- Starting a $5.5 million initiative to improve influenza surveillance in Asia.
- Holding or taking part in training sessions to improve local capacities to conduct surveillance for possible human cases of H5N1 and to detect influenza A H5 viruses by using laboratory techniques.
- Developing and distributing reagent kits to detect the currently circulating influenza A H5N1 viruses.

CDC also is working closely with WHO and the National Institutes of Health on safety testing of vaccine candidates and development of additional vaccine virus seed candidates for influenza A (H5N1) and other subtypes of influenza A viruses.

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Avian Influenza Infection in Humans

Although avian influenza A viruses usually do not infect humans, more than 100 confirmed cases of human infection with avian influenza viruses have been reported since 1997. For example, the World Health Organization (WHO) maintains situation updates and cumulative reports of human cases of avian influenza A (H5N1). Most cases of avian influenza infection in humans are thought to have resulted from direct contact with infected poultry or contaminated surfaces. However, there is still a lot to learn about how different subtypes and strains of avian influenza virus might affect humans. For example, it is not known how the distinction between low pathogenic and highly pathogenic strains might impact the health risk to humans. (For more information, see ?Low Pathogenic versus Highly Pathogenic Avian Influenza Viruses? on the CDC Influenza Viruses Web page.

Because of concerns about the potential for more widespread infection in the human population, public health authorities closely monitor outbreaks of human illness associated with avian influenza. To date, human infections with avian influenza A viruses detected since 1997 have not resulted in sustained human-to-human transmission. However, because influenza A viruses have the potential to change and gain the ability to spread easily between people, monitoring for human infection and person-to-person transmission is important. (See Information about Influenza Pandemics for more information.)

Instances of Avian Influenza Infections in Humans

Confirmed instances of avian influenza viruses infecting humans since 1997 include:

- H5N1, Hong Kong, Special Administrative Region, 1997: Highly pathogenic avian influenza A (H5N1) infections occurred in both poultry and humans. This was the first time an avian influenza A virus transmission directly from birds to humans had been found. During this outbreak, 18 people were hospitalized and six of them died. To control the outbreak, authorities killed about 1.5 million chickens to remove the source of the virus. Scientists determined that the virus spread primarily from birds to humans, though rare person-to-person infection was noted.
- H9N2, China and Hong Kong, Special Administrative Region, 1999: Low pathogenic avian influenza A (H9N2) virus infection was confirmed in two children and resulted in uncomplicated influenza-like illness. Both patients recovered, and no additional cases were confirmed. The source is unknown, but the evidence suggested that poultry was the source of infection and the main mode of transmission was from bird to human. However, the possibility of person-to-person transmission could not be ruled out. Several additional human H9N2 infections were reported from China in 1998-99.
- H7N2, Virginia, 2002: Following an outbreak of H7N2 among poultry in the Shenandoah Valley poultry production area, one person was found to have serologic evidence of infection with H7N2.
- H5N1, China and Hong Kong, Special Administrative Region, 2003: Two cases of highly pathogenic avian influenza A (H5N1) infection occurred among members of a Hong Kong family that had traveled to China. One person recovered, the other died. How or where these two family members were infected was not determined. Another family member died of a respiratory illness in China, but no testing was done.
- H7N7, Netherlands, 2003: The Netherlands reported outbreaks of influenza A (H7N7) in poultry on several farms. Later, infections were reported among pigs and humans. In total, 89 people were confirmed to have H7N7 influenza virus infection associated with this poultry outbreak. These cases occurred mostly among poultry workers. H7N7-associated illness included 78 cases of conjunctivitis (eye infections) only;

5 cases of conjunctivitis and influenza-like illnesses with cough, fever, and muscle aches; 2 cases of influenza-like illness only; and 4 cases that were classified as ?other.? There was one death among the 89 total cases. It occurred in a veterinarian who visited one of the affected farms and developed acute respiratory distress syndrome and complications related to H7N7 infection. The majority of these cases occurred as a result of direct contact with infected poultry; however, Dutch authorities reported three possible instances of transmission from poultry workers to family members. Since then, no other instances of H7N7 infection among humans have been reported.

- H9N2, Hong Kong, Special Administrative Region, 2003: Low pathogenic avian influenza A (H9N2) infection was confirmed in a child in Hong Kong. The child was hospitalized and recovered.
- H7N2, New York, 2003: In November 2003, a patient with serious underlying medical conditions was admitted to a hospital in New York with respiratory symptoms. One of the initial laboratory tests identified an influenza A virus that was thought to be H1N1. The patient recovered and went home after a few weeks. Subsequent confirmatory tests conducted in March 2004 showed that the patient had been infected with avian influenza A (H7N2) virus.
- H7N3 in Canada, 2004: In February 2004, human infections of highly pathogenic avian influenza A (H7N3) among poultry workers were associated with an H7N3 outbreak among poultry. The H7N3-associated, mild illnesses consisted of eye infections.
- H5N1, Thailand and Vietnam, 2004, and other outbreaks in Asia during 2004 and 2005: In January 2004, outbreaks of highly pathogenic influenza A (H5N1) in Asia were first reported by the World Health Organization. Visit the Avian Influenza section of the World Health Organization Web site for more information and updates.

Symptoms of Avian Influenza in Humans

The reported symptoms of avian influenza in humans have ranged from typical influenza-like symptoms (e.g., fever, cough, sore throat, and muscle aches) to eye infections (conjunctivitis), pneumonia, acute respiratory distress, viral pneumonia, and other severe and life-threatening complications.

Antiviral Agents for Influenza

Four different influenza antiviral drugs (amantadine, rimantadine, oseltamivir, and zanamivir) are approved by the U.S. Food and Drug Administration (FDA) for the treatment of influenza; three are approved for prophylaxis. All four have activity against influenza A viruses. However, sometimes influenza strains can become resistant to these drugs, and therefore the drugs may not always be effective. For example, analyses of some of the 2004 H5N1 viruses isolated from poultry and humans in Asia have shown that the viruses are resistant to two of the medications (amantadine and rimantadine). Also, please note the January 14, 2006 CDC Health Alert Notice (HAN), in which CDC recommends that neither amantadine nor rimantadine be used for the treatment or prevention (prophylaxis) of influenza A in the United States for the remainder of the 2005-06 influenza season. Monitoring of avian influenza A viruses for resistance to influenza antiviral medications is ongoing.

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