World Health Organization

Avian influenza frequently asked questions

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What is avian influenza?

Avian influenza, or "bird flu", is a contagious disease of animals caused by viruses that normally infect only birds and, less commonly, pigs. While all bird species are thought to be susceptible to infection, domestic poultry flocks are especially vulnerable to infections that can rapidly reach epidemic proportions.

The disease in birds has two forms. The first causes mild illness, sometimes expressed only as ruffled feathers or reduced egg production. Of greater concern is the second form, known as “highly pathogenic avian influenza”. This form, which was first recognized in Italy in 1878, is extremely contagious in birds and rapidly fatal, with a mortality approaching 100%. Birds can die on the same day that symptoms first appear.

What are the control measures in birds?

The most important control measures are rapid destruction (“culling” or “stamping out”) of all infected or exposed birds, proper disposal of carcasses, and the quarantining and rigorous disinfection of farms.

The virus is killed by heat (56 degrees C for 3 hours or 60 degrees C for 30 minutes) and common disinfectants, such as fomalin and iodine compounds.

The virus can survive, at cool temperatures, in contaminated manure for at least three months. In water, the virus can survive for up to four days at 22 degrees C and more than 30 days at 0 degrees C. For the highly pathogenic form, studies have shown that a single gram of contaminated manure can contain enough virus to infect 1 million birds.

Restrictions on the movement of live poultry, both within and between countries, are another important control measure.

What are the consequences of outbreaks in poultry?

Outbreaks of avian influenza, especially the highly pathogenic form, can be devastating for the poultry industry and for farmers. For example, an outbreak of highly pathogenic avian influenza in the USA in 1983–1984, largely confined to the state of Pennsylvania, resulted in the destruction of more than 17 million birds at a cost of nearly US$ 65 million. Economic consequences can be especially devastating in developing countries where poultry raising is an important source of income – and of food – for impoverished rural farmers and their families.

When outbreaks become widespread within a country, control can be extremely difficult. For example, an outbreak that began in Mexico in 1992 was not completely controlled until 1995.

For these reasons, government authorities usually undertake aggressive emergency control measures as soon as an outbreak is detected.

How do outbreaks of avian influenza spread within a country?

Within a country, the disease spreads easily from farm to farm. Large amounts of virus are secreted in bird droppings, contaminating dust and soil. Airborne virus can spread the disease from bird to bird, causing infection when the virus is inhaled. Contaminated equipment, vehicles, feed, cages or clothing – especially shoes – can carry the virus from farm to farm. The virus can also be carried on the feet and bodies of animals, such as rodents, which act as “mechanical vectors” for spreading the disease. Limited evidence suggests that flies can also act as mechanical vectors.

Droppings from infected wild birds can introduce the virus into both commercial and backyard poultry flocks. The risk that infection will be transmitted from wild birds to domestic poultry is greatest where domestic birds roam freely, share a water supply with wild birds, or use a water supply that might become contaminated by droppings from infected wild-bird carriers.

So called “wet” markets, where live birds are sold under crowded and sometimes unsanitary conditions, can be another source of spread.

How does the disease spread from one country to another?

The disease can spread from country to country through international trade in live poultry. Migratory birds, including wild waterfowl, sea birds, and shore birds, can carry the virus for long distances and have, in the past, been implicated in the international spread of highly pathogenic avian influenza. Migratory waterfowl – most notably wild ducks – are the natural reservoir of bird flu viruses, and these birds are also the most resistant to infection. They can carry the virus over great distances, and excrete it in their droppings, yet develop only mild and short-lived illness.

Domestic ducks, however, are susceptible to lethal infections, as are turkeys, geese, and several other species raised on commercial or backyard farms.

What is the present situation?

Since mid-December 2003, a growing number of Asian countries have reported outbreaks of highly pathogenic avian influenza in chickens and ducks. Infections in several species of wild birds and in pigs have also been reported.

The rapid spread of highly pathogenic avian influenza, with outbreaks occurring at the same time in several countries, is historically unprecedented and of great concern for human health as well as for agriculture.

Particularly alarming, in terms of risks for human health, is the detection of a highly pathogenic strain, known as “H5N1”, as the cause of most of these outbreaks. H5N1 has jumped the species barrier, causing severe disease in humans, on two occasions in the recent past and is now doing so again, in gradually growing numbers, in Viet Nam and Thailand.

Why so much concern about the current outbreaks?

Public health officials are alarmed by the unprecedented outbreaks in poultry for several reasons. First, most – but not all – of the major outbreaks recently reported in Asia have been caused by the highly pathogenic H5N1 strain. There is mounting evidence that this strain has a unique capacity to jump the species barrier and cause severe disease, with high mortality, in humans.

A second and even greater concern is the possibility that the present situation could give rise to another influenza pandemic in humans. Scientists know that avian and human influenza viruses can exchange genes when a person is simultaneously infected with viruses from both species. This process of gene swapping inside the human body can give rise to a completely new subtype of the influenza virus to which few, if any, humans would have natural immunity. Moreover, existing vaccines, which are developed each year to match presently circulating strains and protect humans during seasonal epidemics, would not be effective against a completely new influenza virus.

If the new virus contains sufficient human genes, transmission directly from one person to another (instead of from birds to humans only) can occur. When this happens, the conditions for the start of a new influenza pandemic will have been met. Most alarming would be a situation in which person-to-person transmission resulted in successive generations of severe disease with high mortality.

This was the situation during the great influenza pandemic of 1918–1919, when a completely new influenza virus subtype emerged and spread around the globe, in around 4 to 6 months. Several waves of infection occurred over 2 years, killing an estimated 40–50 million persons.

Is there evidence of efficient human-to-human transmission now?

No. However, in Thailand, on 27 September 2004 the Ministry of Health announced possible human-to-human transmission in a family cluster. Thai officials have concluded that the mother could have acquired the infection either from some environmental source or while caring for her daughter, and that this represents a probable case of human-to-human transmission. While the investigation of this family cluster provides evidence that human-to-human transmission may have occurred, evidence to date indicates that transmission of the virus among humans has been limited to family members and that no wider transmission in the community has occurred. Continued vigilance is needed to determine whether the epidemiological situation in humans remains stable. (published 5.10.04)

Does human infection with H5N1 happen often?

No. Only very rarely. The first documented human infections with the H5N1 avian strain occurred in Hong Kong in 1997. In that first outbreak, 18 persons were hospitalized and 6 of them died. The source of infection in all cases was traced to contact with diseased birds on farms (1 case) and in live poultry markets (17 cases).

The human cases coincided with outbreaks of highly pathogenic H5N1 avian influenza in poultry. Very limited human-to-human transmission of the H5N1 strain was documented in health care workers, family members, poultry workers, and workers involved in culling operations. Though H5 antibodies were detected in these groups, indicating infection with the virus, no cases of severe disease occurred as a result. Antibodies were detected in 10% of the poultry workers studied, and in 3% of the cullers.

In February 2003, the H5N1 strain again jumped from birds to infect two members of a family (a father and his son) when they returned to Hong Kong following travel in southern China. The father died but the son recovered. A third member of the family, the boy's sister, died of a severe respiratory illness in China. No samples were available for determining the cause of her death.

Are all of the currently reported outbreaks in birds equally dangerous for humans?

No. Outbreaks caused by the H5N1 strain are presently of the greatest concern for human health.
In assessing risks to human health, it is important to know exactly which avian virus strains are causing the outbreaks in birds. For example, the outbreak of avian influenza recently reported in Taiwan, China is caused by the H5N2 strain, which is not highly pathogenic in birds and has never been known to cause illness in humans. The outbreak recently announced in Pakistan is caused by H7 and H9 strains, and not by H5N1.

However, urgent control of all outbreaks of avian influenza in birds – even when caused by a strain of low pathogenicity – is of utmost importance. Research has shown that certain avian influenza

virus strains, initially of low pathogenicity, can rapidly mutate (within 6 to 9 months) into a highly pathogenic strain if allowed to circulate in poultry populations.

Can a pandemic be averted?

No one knows for sure. Influenza viruses are highly unstable and their behaviour defies prediction. However, WHO remains optimistic that, if the right actions are taken quickly, an influenza pandemic can be averted. This is WHO's foremost objective at present.

The first priority, and the major line of defence, is to reduce opportunities for human exposure to the largest reservoir of the virus: infected poultry. This is achieved through the rapid detection of poultry outbreaks and the emergency introduction of control measures, including the destruction all infected or exposed poultry stock, and the proper disposal of carcasses.

All available evidence points to an increased risk of transmission to humans when outbreaks of highly pathogenic avian H5N1 influenza are widespread in poultry. As the number of human infections grows, the risk increases that a new virus subtype could emerge, triggering an influenza pandemic. This link between widespread infection in poultry and increased risk of human infection is being demonstrated right now in Asia. All human cases and deaths detected so far are in two countries – Viet Nam and Thailand – with very widespread outbreaks in poultry.

WHO stresses the urgency of the situation and the need for rapid action in the animal and agricultural sectors. For example, the culling in 1997 of Hong Kong's entire bird population – an estimated 1.5 million chickens and other birds – was done in 3 days. Again in 2003, the culling of nearly 30 million birds (out of a total bird population of 100 million) in the Netherlands was done within a week. Rapid action in both of these situations is thought by many influenza experts to have averted an influenza pandemic in humans.

Is it reassuring that so few human cases have occurred?

Yes. WHO has some evidence that the H5N1 strain may have been circulating in birds since April 2003. The detection so far of only a few human cases suggests that the virus may not be easily transmitted from birds to humans at present. However, the situation could change quickly, as the H5N1 strain has been shown to mutate rapidly and has a documented propensity to exchange genes with influenza viruses from other species.

In situations that could favour the emergence of a new pandemic strain of influenza virus, every case of human infection is one too many. In addition to the rapid destruction of infected animals, another opportunity to prevent human cases is through the protection of workers involved in culling operations. WHO has issued guidelines for conducting these operations safely.

Are the right control measures being applied?

In some cases, yes. Japan and the Republic of Korea appear to have controlled their outbreaks in poultry, quickly and safely. Studies of workers involved in culling operations have been conducted,

and no cases of human infection have been detected. The situation in other countries is more problematic.

WHO is fully aware that governments in several countries with serious poultry outbreaks do not have the resources needed to introduce recommended protective measures for cullers or carry out the very rapid destruction of poultry flocks. In some of these countries, the practice of raising poultry on backyard farms in remote rural areas, which may not be registered with agricultural authorities, further complicates rapid and systematic elimination of the animal reservoir.

WHO, FAO, and OIE have jointly issued an urgent appeal to the international community to make adequate resources and other forms of support available quickly in the interest of protecting international public health.

Apart from H5N1, have other avian influenza viruses ever infected humans?

Yes. Two other avian strains have caused illness in humans, but the outbreaks were not as severe as those caused by the H5N1 strain

The H9N2 strain, which is not highly pathogenic in birds, caused mild cases of illness in two children in Hong Kong in 1999 and in one child in mid-December 2003, also in Hong Kong.

An outbreak of highly pathogenic H7N7 avian influenza in birds, which began in the Netherlands in February 2003, caused the death of one veterinarian (from acute respiratory distress syndrome) two months later, and mild illness in 83 poultry workers and members of their families.

Is there a vaccine effective against H5N1 in humans?

No. Currently available vaccines will not protect against disease caused by the H5N1 strain in humans. WHO is urgently working together with laboratories in the WHO Global Influenza Surveillance Network to develop a prototype H5N1 virus for use by leading vaccine manufacturers.

An available vaccine prototype virus, developed using the 2003 strain of H5N1 (which caused the two human cases in Hong Kong), cannot be used to expedite vaccine development. Initial analysis of the 2004 virus, conducted by laboratories in the WHO network, indicates that the virus has mutated significantly.

Are there drugs available for prevention and treatment?

Yes. Two classes of drugs are available. These are the M2 inhibitors (amantadine and rimantadine) and the neuraminidase inhibitors (oseltamivir and zanimivir). These drugs have been licensed for the prevention and treatment of human influenza in some countries, and are thought to be effective regardless of the causative strain.

However, initial analysis of viruses isolated from the recently fatal cases in Viet Nam indicates that the viruses are invariably resistant to the M2 inhibitors. Further testing is under way to confirm the

resistance of amantadine. Network laboratories are also conducting studies to confirm the effectiveness of neuraminidase inhibitors against the current H5N1 strains.

Are presently available vaccines useful in averting an influenza pandemic?

Yes, but in a precisely targeted way. Current vaccines, when administered to high-risk groups, such as poultry cullers, protect against circulating human strains and thus reduce the risk that humans at high risk of exposure to the bird virus might become infected with human and avian viruses at the same time. Such dual infections give the avian and human viruses an opportunity to exchange genes, possibly resulting in a new influenza virus subtype with pandemic potential.

Annual vaccines are produced for routine use in protecting humans during seasonal epidemics of influenza. They offer no protection against infection with the H5N1 avian virus.