

Avian Influenza and the risks in Aviation

Avian influenza is an infectious disease of birds caused by type A strains of the influenza virus. It is able to infect all birds, though some species are more resistant to infection than others. Migratory waterfowl – most notably wild ducks – are the natural reservoir of avian influenza virus, and these birds are also the most resistant to infection. Avian influenza virus can also be isolated from samples taken from pigs. Infection causes a wide spectrum of symptoms in birds, ranging from mild illness to a highly contagious and rapidly fatal disease resulting in severe epidemics. The latter is known as “highly pathogenic avian influenza”.

Fifteen subtypes of influenza virus are known to infect birds, thus providing an extensive reservoir of influenza viruses potentially circulating in bird populations. To date, all outbreaks of the highly pathogenic form have been caused by influenza A virus of subtypes H5 and H7.

Direct or indirect contact of domestic flocks with wild migratory waterfowl has been implicated as a frequent cause of epidemics. Live bird markets have also played an important role in the spread of epidemics.

Recent research has shown that viruses of low pathogenicity can, after circulation for sometimes short periods in a poultry population, mutate into highly pathogenic virus. During a 1983–1984 epidemic in the USA, the H5N2 virus initially caused low mortality, but within six months became highly pathogenic, with a mortality approaching 90%. During a 1999–2001 epidemic in Italy, the H7N1 virus, initially of low pathogenicity, mutated within 9 months to a highly pathogenic form. More than 13 million birds died or were destroyed. Control measures to prevent the spread of the virus include destroying the infected birds and quarantining the infected farms.

Human infections

Avian influenza virus does not infect humans easily; they do not normally infect species other than birds and pigs. There has to be a close contact with the infected bird or its faeces to be infected. No proven infections between humans have been reported. The first documented infection of humans with an avian influenza virus occurred in Hong Kong in 1997, when the H5N1 strain caused severe respiratory disease in 18 humans, of whom 6 died. Latest data reveals 170 laboratory confirmed infections of avian influenza A/(H5N1) had been reported to WHO, of which 92 were fatal (Table 1). It is worth noting that even though according to the statistics the mortality is over 50%, in reality it is definitely less. There have been many undiagnosed as well as mild infections in which the patients have not sought medical advice.

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The clinical course of the human infection

Published information about the clinical course of human infection with H5N1 avian influenza is limited to studies of cases in the 1997 Hong Kong outbreak. In that outbreak, patients developed symptoms of fever, sore throat, cough and, in several of the fatal cases, severe respiratory distress secondary to viral pneumonia. Previously healthy adults and children, and some with chronic medical conditions, were affected.

Table 1: Cumulative number of confirmed human cases of avian influenza (A/H5N1) reported by the WHO

	2003		2004		2005		2006 (to date)		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Cambodia	0	0	0	0	4	4	0	0	4	4
China	0	0	0	0	8	5	4	3	12	8
Indonesia	0	0	0	0	17	11	9	8	26	19
Iraq	0	0	0	0	0	0	1	1	1	1
Thailand	0	0	17	12	5	2	0	0	22	14
Turkey	0	0	0	0	0	0	12	4	12	4
Vietnam	3	3	29	20	61	19	0	0	93	42
Total	3	3	46	32	95	41	26	16	170	92

Laboratory tests for avian influenza

Tests for diagnosing all influenza strains of animals and humans are rapid and reliable. Many laboratories in the WHO global influenza network have the necessary high-security facilities and reagents for performing these tests as well as considerable experience. Rapid bedside tests for the diagnosis of human influenza are also available, but do not have the precision of the more extensive laboratory testing that is currently needed to fully understand the most recent cases and determine whether human infection is spreading, either directly from birds or from person to person.

Pandemics

Influenza pandemics have occurred, on average, three to four times each century. However, the occurrence of influenza pandemics is unpredictable. In the 20th century, the great influenza pandemic of 1918–1919, which caused an estimated 40 to 50 million deaths worldwide, was followed by pandemics in 1957–1958 and 1968–1969.

A pandemic can start when three conditions have been met: a new influenza virus subtype emerges that infects humans, causing serious illness; and it spreads easily and sustainably among humans. The H5N1 virus fully 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 the infected. No one will have immunity if an H5N1-like pandemic virus emerges. Experts agree that another influenza pandemic is inevitable and possibly imminent.

All prerequisites for the start of a pandemic have therefore been met but one: the establishment of efficient and sustained human-to-human transmission of the virus. The risk that the H5N1 virus will acquire this ability will persist as long as opportunities for human infections occur. These opportunities

ties, in turn, will persist as long as the virus continues to circulate in birds, and this situation could endure for some years to come.

In the case of a pandemic outbreak, approximately 25 to 30 % of the population will be infected. Estimated mortality is 0.1-1% of the infected population. The spreading of pandemics around the world will be extremely fast, taking only one to two months. Once international spread begins, pandemics are considered unstoppable, caused as they are by a virus that spreads very rapidly by coughing or sneezing. The fact that infected people can shed virus before symptoms appear adds to the risk of international spread via asymptomatic air travellers.

Treatment

Neuraminidase inhibitors oseltamivir (Tamiflu®) and zanamivir (Relenza®) can reduce the severity and duration of illness caused by seasonal influenza. In laboratory tests, these drugs affect also H5N1, but clinical data are limited. Neuraminidase inhibitors inhibit the duplication of the virus, and therefore these drugs have to be started within 48 hours after symptom onset.

For the neuraminidase inhibitors, the main constraints involve limited production capacity and a price that is too high for many countries. At present manufacturing capacity, which has recently quadrupled, it will take a decade to produce enough oseltamivir to treat 20% of the world's population. The manufacturing process for oseltamivir is complex and time-consuming, and is not easily transferred to other facilities.

Vaccination

Until now, there are no vaccines against a pandemic virus available, but a vaccine against the H5N1 virus is under development in several countries. However, it is not to be expected ready before late 2006 or early 2007. A specific vaccine against the pandemic virus can only be produced after the onset of the pandemics, and that would require at least four months. A more likely strategy would be a first vaccination with a vaccine against H5N1 virus and a second vaccination with the relevant specific subtype after the outbreak of the pandemics.

Prevention

If you are travelling in the area, where bird flu has been detected, you should avoid contact with live poultry population (live bird markets) as well as wild birds. One should also avoid touching dead birds and surfaces that are contaminated by birds' faeces. The most effective countermeasure, not only against bird flu, but also other flu, is a frequent washing of hands.

Concerns in aviation

Pilots and cabin personnel are at risk of early infection, either getting infected during layover, or in the airplane by passengers carrying avian influenza. In the case of infection, the treatment should be started within 48 hours, and this may be hard to achieve for example at layovers. Importing of drugs is highly restricted, and it may be impossible for an airline to transport drugs e.g. oseltamivir, to a foreign base to be used in the case of a pandemic. Neuraminidase inhibitors can also be taken prophylactically, e.g. before one has been infected, in order to prevent the full infection. It is not clear however, whether one is allowed to fly with this medication or not. In any case, each airline should have a plan in the event of a pandemic.

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References: www.who.int