QUESTIONS AND ANSWERS

ON

AVIAN INFLUENZA

In relation to animals, food and water

World Health Organization

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FOREWORD

The epizootic of the Avian influenza A/H5N1 virus that started affecting domestic and wild birds and humans in South-East Asia in mid-2003, and has since spread to the rest of Asia, Africa and Europe, is the largest and most severe outbreak on record. Previously, outbreaks of highly pathogenic avian influenza in poultry and wild birds were rare. Since December 2003, more than 50 countries in Africa, Asia, Europe and the Middle East have reported outbreaks of H5N1 avian influenza in poultry and/or wild birds. More than ten countries have also reported human H5N1 influenza cases.

Before the outbreaks in Hong Kong (1997) and in the Netherlands (2003), human infection with avian influenza viruses were rarely reported and usually resulted in mild disease. The widespread persistence of H5N1 in poultry populations poses two main risks for human health: (1) Sporadic human infections with the H5N1 avian influenza and (2) emergence of a pandemic influenza strain.

Of the few avian influenza viruses that have crossed the species barrier to infect humans, H5N1 has caused the largest number of cases of severe disease and death in humans. Unlike normal seasonal influenza, where infection causes self-limited respiratory symptoms in most people, the disease caused by H5N1 follows an unusually aggressive clinical course, with rapid deterioration and high fatality.

A second risk, of even greater global concern, is that the virus – if given enough opportunities – could change into a form that is highly infectious for humans and spreads easily from person to person. Such a change could mark the start of a global outbreak (a pandemic). Thus, preventing the human pandemic requires control of the disease in animals and sensible precautionary measures to prevent human infection.

To prevent human disease, and especially to lower the risk of a human pandemic, this document aims to provide professionals with science-based answers to a number of common questions about avian influenza as related to animals, food and water. It addresses both the risks and associated preventive measures related to the transmission of the current H5N1 avian influenza virus (in relation to animal, food and water management); and the prevention of environmental transmission of a potential future pandemic human strain (with particular reference to hygiene and water/wastewater management).

More general information on avian and pandemic influenza is available on the WHO website**:** http://www.who.int/csr/disease/avian_influenza/en

TO START: WHAT IS THE DIFFERENCE BETWEEN SEASONAL, AVIAN AND PANDEMIC INFLUENZA?

Seasonal influenza

Seasonal influenza is a highly infectious disease which spreads in humans around the world in seasonal epidemics, affecting 10% to 20% of the total population. The most important strains[1] of human influenza virus are A and B. Influenza virus A has several subtypes, of which two, H1N1 and H3N2, are currently of epidemiological significance. WHO recommends annual immunization of at-risk persons as the best and most cost-effective strategy for reducing influenza-related morbidity and mortality.

Avian influenza

Avian influenza, or "bird flu", is a contagious disease caused by Influenza A viruses that normally infect only birds and, less commonly some mammals such as pigs. Avian influenza viruses can be highly species-specific, but have, on occasions, crossed the species barrier to infect humans and other mammals. The currently circulating H5N1 viruses represent a previously unrecognized type of avian influenza that is causing fatal infections in wild birds, domestic poultry, mammals like cats, and occasionally humans on a broad geographic scale.

Wild waterfowl are considered the natural reservoir of all non or low pathogenic influenza A viruses. They have probably carried influenza viruses, with no apparent harm, for centuries. However, in domestic poultry, infection with avian influenza viruses causes two main forms of disease, distinguished by low and high virulence. The so-called "low pathogenic" avian influenza (LPAI) commonly causes only mild symptoms (e.g. ruffled feathers, a drop in egg production) and may easily go undetected. The highly pathogenic avian influenza (HPAI) form is far more dramatic. It spreads very rapidly through poultry flocks, causes disease affecting multiple internal organs, and has a mortality that can approach 100%, often within 48 hours. Currently only some strains of viruses of the H5 and H7 subtypes are known to cause the highly pathogenic form of the disease in poultry.

Pandemic Influenza

A pandemic occurs when a new influenza virus emerges and starts spreading as easily as seasonal influenza – by coughing and sneezing. Because the virus is new, the human immune system will have no pre-existing immunity. This makes it likely that people who contract pandemic influenza will experience more serious disease than that caused by seasonal influenza.

An influenza pandemic is a rare but recurrent event. Only influenza A viruses have so far caused pandemics. Three pandemics occurred in the previous century: "Spanish influenza" in 1918, "Asian influenza" in 1957, and "Hong Kong influenza" in 1968. The 1918 pandemic killed an estimated 40–50 million people worldwide. That pandemic, which was exceptional, is considered one of the deadliest disease events in human history. Subsequent pandemics were much milder, with an estimated 2 million deaths in 1957 and 1 million deaths in 1968.

In this publication we will only address the different aspects of avian influenza (in relation to animal, food and water management); and the prevention of environmental

1 Influenza viruses are grouped into three types, designated A, B, and C.

transmission of a potential future pandemic human strain (with particular reference to hygiene and water/wastewater management).

SECTION 1: ANIMALS AND FOOD

INTRODUCTION

This section discusses the current Avian influenza A/H5N1 epidemic in animals including domestic and wild animals that have been found to be infected with or involved in the transmission of the disease to humans. It also describes the safety of poultry and eggs which form an important part of the diet of people in all countries affected by the epidemic.

Which influenza viruses cause highly pathogenic disease in poultry?

Influenza A viruses exist in at least 16 H subtypes and 9 N subtypes[2]. Only viruses of the H5 and H7 subtypes are known to cause the highly pathogenic form of the disease. However, not all viruses of the H5 and H7 subtypes are highly pathogenic and not all will cause severe disease in poultry.

On present understanding, H5 and H7 viruses are introduced to poultry flocks in their low pathogenic form. When allowed to circulate in poultry populations, the viruses can mutate into the highly pathogenic form. This is why the presence of an H5 or H7 virus in poultry is always cause for concern, even when the initial signs of infection are mild. Under the rules of the World Organisation for Animal Health (OIE, www.oie.int), Member countries must report all instances of H5 or H7 avian influenza in poultry to the international community.

What is special about the current global spread of Avian Influenza A/H5N1?

The current outbreaks of highly pathogenic avian influenza, which began in South-East Asia in mid-2003, are the largest and most severe on record. Never before in the history of this disease have so many countries been simultaneously affected, resulting in the loss of so many birds.

The causative agent, the H5N1 strain of influenza virus, has proved to be especially tenacious. Despite ongoing control efforts, the virus continues to circulate in Asia, Africa, and Europe and has become firmly established in several countries. Control of the disease in poultry is expected to take many years. The H5N1 virus is also of particular concern for human health, as explained in the foreword.

Which countries have been affected by Avian influenza A/H5N1 outbreaks in poultry?

Since the beginning of the current outbreak, poultry outbreaks caused by the H5N1 virus have been reported in a growing number of countries in Asia, Europe and Africa. Updated maps of affected countries can be found on the WHO website: http://gamapserver.who.int/mapLibrary/app/searchResults.aspx.

[2] The H subtypes are epidemiologically most important, as they govern the ability of the virus to bind to and enter cells, where multiplication of the virus then occurs. The N subtypes govern the release of newly formed virus from the cells

Where have human cases of Avian Influenza A/H5N1 occurred?

WHO updates regularly on its website information on the countries affected by human H5N1 avian influenza cases and details on individual human cases: http://www.who.int/csr/disease/avian_influenza/en/index.html

How do people become infected with Avian Influenza A/H5N1?

Direct contact with infected poultry, or surfaces and objects contaminated by their faeces, is presently considered the main route of human infection. To date, most human cases have occurred in rural or periurban areas where many households keep small poultry flocks, which often roam freely, sometimes entering homes or sharing outdoor areas where children play. As infected birds shed large quantities of virus in their faeces, opportunities for exposure to infected droppings or to environments contaminated by the virus are abundant under such conditions. Moreover, because households in many countries depend on poultry for income and food, many families sell or slaughter and consume birds when signs of illness appear in a flock, and this practice has proved difficult to change. Exposure is considered most likely during slaughter, defeathering, butchering, and preparation of poultry for cooking. Ducks and other aquatic birds may present a special risk, they may be infected without showing any signs of disease.

Does the Avian Influenza A/H5N1 virus spread easily from birds to humans?

No. Despite the extension and duration of the outbreaks in animals presenting vast opportunities for animal to human exposure (in particular in areas where backyard flocks are common), the number of human H5N1 avian influenza cases remains very small. It is not presently understood why some people, and not others, become infected following similar 'high risk' exposures. Family genetic predisposition might play a role as a blood relationship has been found in most of the clusters of cases.

WILD BIRDS

What bird species are the main carriers of avian influenza?

Many wild bird species, especially those in wetlands and aquatic environments, harbour influenza viruses. Anseriformes (particularly ducks, geese and swans) and Charadriiformes (particularly gulls, terns, wadres) constitute the major natural reservoir for LPAI viruses. Transmission of avian influenza viruses between shore birds and wild ducks may occur when their breeding grounds overlap providing an opportunity for the mixing and recombination of different avian influenza virus subtypes. Avian influenza viruses are less common in birds more closely associated with human environments such as domestic chickens, turkeys, pheasants, pigeons and parrots.

Do migratory birds spread highly pathogenic avian influenza viruses to poultry?

Wild aquatic birds are considered the natural reservoir of all LPAI viruses. Unfortunately, the knowledge on LPAI in wild birds cannot be extrapolated to HPAI viruses. Therefore, the role of migratory birds in the spread of HPAI is not yet fully understood. Wild birds have probably carried influenza viruses, with no apparent harm, for centuries. Considerable circumstantial evidence suggests that migratory birds can introduce low pathogenic H5 and H7 viruses to poultry flocks. In some cases these viruses may then mutate in poultry to the highly pathogenic form.

Recent events suggest that in some cases, migratory birds are now directly spreading the Avian influenza A/H5N1 virus in its highly pathogenic form to regions not previously affected. However, there is currently no scientific basis for culling migratory and wild birds to control the outbreaks and prevent possible spread of Avian influenza A/H5N1. This measure should therefore be strongly discouraged and more emphasis should be put on further investigating other mechanisms for spread such as through legal or illegal trade of birds and poultry products Until virus circulation can be controlled where it occurs, further spread to new areas by both mechanisms can be expected.

Can migratory and wild birds transmit Avian influenza A/H5N1 to humans?

Avian influenza A/H5N1 is first and foremost a disease of poultry. Most human cases of H5N1 avian influenza have occurred in rural or periurban areas where many households keep small domestic poultry flocks. However, defeathering or butchering of dead wild birds, especially waterfowl, is particularly hazardous in areas where Avian influenza A/H5N1 virus has been reported or is likely to occur, such as along migratory routes. The public should be advised to report, and avoid contact with, wild birds found dead.

PIGEONS

Do pigeons carry and spread avian influenza viruses in nature?

The Avian influenza A/H5N1 virus was isolated from one dead pigeon in Hong Kong in 2001, while all other birds sampled around the quarantine area, including 57 other pigeons, tested negative for the virus. In 2002, comparative studies involving pigeons and other bird species determined that pigeons were resistant or minimally susceptible to infection with avian influenza viruses. In 2003, various avian influenza viruses were isolated from 0.5% of the pigeons sampled in south central China. In 2006, a total of six individual pigeons were found infected with H5N1 avian influenza virus in Romania, Turkey and the Ukraine. These findings suggest that pigeons have played a minimal role in the spread of the virus. However, the latest studies conducted with the Avian influenza A/H5N1 virus, which emerged in Asia in 2004, demonstrated an increased susceptibility of pigeons to this virus compared to the 1997 Hong Kong virus. Thus, the general public should try to avoid unnecessary close contact with pigeons, especially in places where pigeons congregate in large numbers.

PIGS

What role do pigs play in the current epidemic?

A study from Hong Kong (2005) experimentally infecting pigs with Avian influenza A/H5N1 2004 isolates from Vietnam and Thailand showed that pigs can be infected with highly lethal Asian H5N1 viruses but that these viruses are not readily transmitted between pigs under experimental conditions. A new large study from Korea on seroprevalence in pigs of different influenza strains could not identify any sero-epidemiological evidence of avian H5 and H9 influenza transmission to Korean pigs

In general, pigs can be easily infected by many human and avian influenza viruses and thereby provide an environment favourable for viral replication and genetic re-assortment. Until recently pigs were considered the most likely “mixing vessels” for

the generation of a human pandemic strain of the avian influenza virus. Pigs have not played a role in the current epidemic of H5N1 avian influenza.

CATS AND OTHER MAMMALS

How do cats and other mammals get infected with the Avian Influenza A/H5N1 virus?

Since 2003, several reports from South-East Asia and Europe confirmed infection of domestic cats, large wild felines in captivity and other mammals with the Avian influenza A/H5N1 virus. The wild felines involved in the outbreaks ate raw infected chicken carcasses, while the domestic cats are thought to have eaten, or come into contact with, infected dead or sick wild birds.

What are the effects of the Avian Influenza A/H5N1 virus in cats?

The susceptibility of cats to infection by the Avian influenza A/H5N1 virus has been clearly demonstrated. Three recent experimental studies have shown that a few days after infection cats develop severe clinical signs that can result in death. The Avian influenza A/H5N1 virus is excreted from the pharynx and nose for several days after infection and can cause cat to cat transmission. Despite such recent experimental studies, major gaps in our knowledge remain and limit our ability to accurately assess the public health implications of infections in cats. Specifically, issues such as whether cats can excrete the virus without showing clinical signs, and whether cats can transmit the disease to poultry or humans, need to be further addressed.

What are the public health implications of infected cats and other mammals?

No human H5N1 avian influenza case has as yet been associated with a pet animal in any country, even in those countries where the virus has been present in birds for more than two years. Currently there is no scientific evidence to suggest that there has been sustained transmission of the Avian influenza A/H5N1 virus in cats or from cats to humans. In the absence of further data, an assessment of whether cats are dead-end hosts of the H5N1 avian influenza virus or if they pose an additional public health risk is very difficult.

What can be done to prevent avian influenza infections in domestic cats and dogs?

Even domestic cats will eat small animals, including sick birds and poultry, and may become victims of any infection in this prey. To reduce the risks of the Avian influenza A/H5N1 virus infecting domestic cats in areas where the H5N1 avian influenza virus has been identified in domestic or wild birds, direct contact between cats or dogs and birds should be avoided, and any unusual morbidity or mortality in domestic animals should be closely monitored. Owners of cats and dogs in designated control and surveillance areas surrounding an Avian influenza A/H5N1 outbreak should control the movement of their pets. Cats and dogs should not be fed raw poultry meat in areas experiencing Avian influenza A/H5N1 outbreaks.

FOOD SAFETY AND FOOD HANDLING

Is it safe to slaughter chicken and handle dead chicken in outbreak areas?

In backyard production settings, the system of marketing live birds and the practices of home slaughtering, defeathering and eviscerating, create opportunities for

extensive human exposure to potentially contaminated parts of poultry. Therefore, the wearing of protective gear, and practicing measures to prevent personal contamination, is essential. A large number of confirmed human cases are believed to have acquired their infection during the slaughtering or subsequent handling of diseased or dead birds prior to cooking. For this reason, such practices involving obviously diseased or birds found dead must be stopped. In general, birds found in a diseased state or dead should never be used for human consumption.

The Avian influenza A/H5N1 virus spreads to virtually all parts of an infected bird, including blood, meat and bones. Avian influenza viruses survive in contaminated raw poultry meat and therefore can be spread through the marketing and distribution of contaminated food products, such as fresh or frozen meat. In general the viability of the avian influenza virus is maintained at low temperatures. The Avian influenza A/H5N1 virus can survive in faeces for at least 35 days at 4°C and at least six days at 37°C. The virus has also been shown to survive on surfaces for several weeks at ambient temperatures.

In outbreak areas, some poultry species (such as domestic ducks) can be asymptomatic carriers of the virus. Vaccinated poultry can also carry the virus without showing symptoms. In these areas, it is important to effectively monitor the poultry population. In the absence of such monitoring systems, it is recommended that home-slaughtering be avoided. In non-outbreak areas, the likelihood of the virus being present in the poultry population is very low. Therefore, the likelihood of infected poultry being marketed and eventually handled by a consumer or a restaurant worker is considered to be very low. In this case, the public health risk related to avian influenza is negligible.

Is it safe to eat chicken?

Yes, though certain precautions should be followed in countries currently experiencing outbreaks. In areas free of the disease, poultry and poultry products can be prepared and consumed as usual following good hygienic practices and proper cooking, with no fear of acquiring infection with the H5N1 virus.

In areas experiencing outbreaks, poultry and poultry products can also be safely consumed provided these items are properly cooked and properly handled during food preparation. The virus is inactivated at temperatures reached during conventional cooking (70^{o}C in all parts of the food- “piping” hot - no “pink” parts). To date, there is no epidemiological evidence that anyone has become infected following the consumption of properly cooked poultry or poultry products. There have been reports of a few human cases potentially linked to the consumption of raw poultry parts (e.g. raw blood-based dishes). It should therefore be emphasized that the consumption of any raw poultry parts must be considered a high-risk practice and discouraged. In areas affected by Avian influenza A/H5N1 virus, handling of frozen or thawed raw infected poultry meat prior to cooking may be hazardous, if good hygienic practices are not observed. Standard hygienic handling practices should be used to prevent cross contamination:

1) Separate raw meat from cooked or ready-to-eat foods to avoid contamination. Do not use the same chopping board or the same knife for raw meat and other foods. Do not handle both raw and cooked foods without washing your hands in between and do not place cooked meat back on the same plate or surface it was

on before cooking. Do not use raw or soft-boiled eggs in food preparations that will not be heat treated or cooked.

2) Keep clean and wash your hands. After handling frozen or thawed raw chicken or eggs, wash your hands thoroughly with soap. Wash and disinfect all surfaces and utensils that have been in contact with the raw meat.
3) Cook thoroughly. Thorough cooking of poultry meat will inactivate the virus. Either ensure that the poultry meat reaches 70 °C at the centre of the product ("piping" hot) or that the meat is not pink in any part.

Is it safe to eat eggs?

Avian influenza A/H5N1 virus can be found inside and on the surface of eggs laid by infected birds. There is no epidemiological evidence to suggest that people have been infected with avian influenza through the consumption of eggs or egg products. Only proper cooking will inactivate virus present inside the egg. Eggs from areas with outbreaks in poultry should not be consumed raw or partially cooked (runny yolk) and the eggs should not be used as ingredients in foods which will not be cooked. Pasteurization or cooking of eggs will also significantly decrease the potential for transmission of other infections; (e.g. salmonellosis).

More information on the food safety aspects of avian influenza and the risks of handling infected poultry and poultry products can be found at: http://www.who.int/foodsafety/micro/avian/en/index.html.

See the WHO food safety website for more information on the prevention of foodborne diseases: http://www.who.int/foodsafety/consumer/5keys/en/.

SECTION 2: DRINKING-WATER AND SANITATION

INTRODUCTION

This section aims to provide public health authorities, those involved in the management of water resources and supplies, those involved with patient care and the general public with answers to common questions related to pandemic influenza planning as it affects drinking-water, sanitation, hygiene in healthcare settings and hygiene in domestic and community settings. By design, these answers are provisional due to the changing nature of the virus. The character of the pandemic influenza virus may be very different from the H5N1 avian influenza virus which is currently producing disease in birds. The answers here relate to both the current Avian influenza A/H5N1 virus and a potential future pandemic human strain. Additionally, a technical review paper (*Review of latest available evidence on risks to human health through potential transmission of avian influenza (H5N1) through water and sewage*) is available from the Department for Public Health and Environment [3].

DRINKING-WATER

Could the avian influenza virus contaminate drinking-water sources?

Sources of drinking-water that may be susceptible to contamination with the avian influenza virus include surface water bodies (e.g. reservoirs, ponds, lakes and rivers), groundwater aquifers and rainwater collection systems. Of these sources, open water bodies where infected waterfowl gather are the most likely potential route of entry of virus into the drinking-water supply.

Avian influenza viruses are known to persist for extended periods of time in water, depending on temperature, pH and salinity. However, information on the persistence of highly pathogenic avian influenza viruses, including Avian influenza A/H5N1 virus, in water is lacking. In general, the avian influenza virus viability in natural water (fresh, brackish and seawater) decreases with increasing salinity and increasing pH above neutral.

Due to their structure, all influenza viruses are relatively susceptible to disinfectants, including oxidizing agents such as chlorine. They are also readily inactivated by heating. Bacteria and other microorganisms may also play a role in virus inactivation.

Should any precautions be taken to avoid consuming virus-contaminated water?

The fact that waterfowl excrete influenza viruses into water does not confirm waterborne transmission between birds; nor does it offer an indication of the extent of the risk of infection to humans exposed to the water. Although there is no epidemiological evidence, the little evidence available regarding modes of transmission and infection suggests that the potential risk of human infection from water contaminated with the Avian influenza A/H5N1 virus is small.

Prevention and control measures can be suggested to minimize, if not eliminate, the risk from the consumption of virus-contaminated water. If water from open water reservoirs is to be used for the supply of potable water then, as indicated in the *WHO Guidelines for drinking-water quality*, treatment is strongly recommended, specifically disinfection[4].

[3] http://www.who.int/water_sanitation_health/emerging/avianflu/en
[4] http://www.who.int/water_sanitation_health/dwq/gdwq3/en

Authorities charged with managing any potential risk in drinking-water may consider ensuring that chlorine or alternative disinfectant be maintained throughout distribution. For effective disinfection of adequately pre-treated water, there should be a residual concentration of free chlorine of at least 0.5 mg/litre after a contact of 30 minutes (minimum) with the water at pH <8.0.

Where there is no access to community drinking-water treatment systems, and where household water safety is suspect, authorities should consider advising families to treat their drinking-water with available and acceptable household-level interventions, including home chlorination (addition of bleach) or boiling. These interventions are effective at inactivating viruses.

SANITATION

How might the avian influenza virus be transmitted to humans from sewage, excreta and animal wastes?

The Avian influenza A/H5N1 virus could potentially enter into sewage in urine or faeces excreted by infected humans or in animal waste that is combined with human sewage. Although human and animal excreta are often managed separately, there are settings and scenarios where animal waste may be combined with human waste. There is some evidence to show that the Avian influenza A/H5N1virus is excreted in faeces of infected persons, but information on the excretion of Avian influenza A/H5N1 viruses in urine or faeces by mammalian species, including humans, is very limited and unlikely to be representative of a potential future human pandemic strain.

Given the relatively small number of human cases to date, it is not surprising that information specific to Avian influenza A/H5N1 virus persistence in sewage is lacking. The period of avian influenza infectivity in bird faeces and secretions depends primarily on the initial virus concentration, pH and temperature conditions, but, generally, four weeks after infection the avian influenza virus can no longer be detected.

The transmission of human influenza is commonly by aerosols (droplets and small particles in air) carrying the virus that enter the body through the nose or throat. Thus, other means of excreta disposal where aerosol formation is unlikely, such as latrines, probably represent an extremely low risk of virus transmission. The widespread use of untreated poultry faeces as fertilizer is, however, a possible risk factor.

What precautions should be taken with sewage?

To date, human infections with avian influenza viruses detected since 1997 have not resulted in sustained human-to-human transmission. However, national planning for pandemic influenza should include consideration of how to manage human sewage in outbreak areas where humans may excrete high levels of the virus.

Although there is no specific information available on the response of Avian influenza A/H5N1 virus to wastewater treatment processes, virus concentrations are generally reduced at various rates and to various extents in both human and animal waste treatment processes, but the virus is typically not completely eliminated. Furthermore, virus concentrations may be enriched in certain treated or separated waste fractions (such as waste solids) by sedimentation and solid-liquid separation processes.

Providing that poultry house waste is not mixed with human sewage, there is currently little risk to sewage treatment workers. In the event of outbreaks of human infection with highly pathogenic avian influenza, human excreta could contain highly pathogenic avian influenza viruses and the exposure risks to sewage workers would need to be reconsidered.

In situations where exposure to potentially-infected poultry waste currently exists, there needs to be prevention and control measures in place to reduce airborne droplet and aerosol transmission.

HYGIENE IN HEALTH-CARE SETTINGS

What is the role of hygiene in facilities treating patients infected with the avian influenza virus?

Presently, sound evidence on exact modes of human transmission of highly pathogenic avian influenza viruses is lacking. It is believed that multiple modes of transmission exist (large droplet, small particle aerosol, hand-contamination and self-inoculation, and possibly oral contamination), but their relative importance in sporadic highly pathogenic avian influenza infections is uncertain. Furthermore, if the virus changes to become more readily transmissible from person to person, the importance of particular practices may change.

Given the uncertainty about the exact modes by which the avian influenza virus, including highly pathogenic avian influenza, may be transmitted between humans, enhanced infection control precautions for patients with suspected or confirmed avian influenza infection are warranted. There is the need to minimize infection opportunities because every infection presents a chance of genetic mutation that might give rise to pandemic virus. In hospital settings, it is important to protect both patients and health-care workers from the avian influenza infection.

Strong hygiene practices are always a critical component of infection control. Of these practices, hand hygiene and surface cleaning are among the simplest and most cost-effective ways to prevent transmission of the highly pathogenic avian influenza virus.

What hygiene practices require specific attention?

Hand hygiene is a prerequisite to prevent the transmission of many infectious diseases. In environments where the HPAI virus may be present, hand hygiene, which includes hand washing and the use of alcohol-based hand rubs, is critical to prevent possible viral inoculation of the nose, mouth and conjunctivae by contaminated hands. Hand hygiene is also necessary to prevent the transmission of nosocomial infections to other patients and healthcare workers. Pathogens are removed by the mechanical action of hand washing. Alcohol disinfects (kills the pathogens). If hands are visibly dirty, washing with soap and water is required prior to disinfection. Otherwise, alcohol-based preparations or washing are both appropriate.

For **soiled surfaces**, cleaning **MUST** precede disinfection. Items and surfaces cannot be disinfected if they are not first cleaned of organic matter (patients' excretions, secretions, dirt, soil, etc). Potent disinfectants are not required to kill

influenza viruses, common soaps and dilute household bleach are generally adequate.

Use cleaning methods that do not produce **aerosols** (e.g. use wet dusting methods instead of feather dusting) to mitigate any potential risk for virus transmission through direct inoculation (e.g. via inhalation or direct impact) into the respiratory (e.g. nose) or conjunctival mucosa. In healthcare settings, standard precautions are recommended for **cleaning linen and laundry** and **managing clinical or nonclinical waste** that may be contaminated with the highly pathogenic avian influenza virus.

PERSONAL HYGIENE

What is the role of personal hygiene in responding to the threat of pandemic influenza?

To date, human infections with the avian influenza viruses detected since 1997 have not resulted in sustained human-to-human transmission. If the current Avian influenza A/H5N1 virus changes to produce a strain that is more transmissible among humans, it could signal the start of a pandemic. Strengthening personal hygiene practices to reduce human to human transmission will help stop or slow the spread of a pandemic virus.

Personal hygiene includes individual practices that serve to promote or preserve health such as habits of cleanliness. In the case of highly contagious diseases such as influenza, special attention should be paid to personal behaviour in community settings as well as the household. Public education, including public health messages, is an important part of national and local planning for pandemic influenza.

Should special personal hygiene precautions be taken in the home or at schools?

While WHO has guidance for issues such as personal hygiene, primarily for health-care workers, such guidance is based on general transmission patterns of seasonal human influenza. It is not known how effective this guidance would be in slowing the spread of a pandemic from a new virus strain.

However, there are basic good health habits that will help reduce the spread of influenza virus in the home or community settings. These include:

- Cover your mouth and nose with a tissue when coughing or sneezing.
- Wash your hands often, especially: before, during, and after you prepare food; before you eat; after you use the toilet; after handling animals or animal waste; when your hands are dirty; and more frequently when someone in your home is sick.
- Avoid touching your eyes, nose or mouth. Infections are often spread when a person touches something that is contaminated with microorganisms and then touches his or her eyes, nose, or mouth.

Cleaning and disinfection of household surfaces likely to be contaminated by infectious secretions appears worthwhile. However, presently, there is no evidence to support the efficacy of widespread disinfection of the environment or air.

As part of pandemic influenza planning, special attention should be given to teaching staff, children, and their parents on how to limit the spread of infection. Programmes should already be teaching these things (e.g. use good hand washing; cover the mouth when coughing or sneezing; and clean toys frequently) to build habits that protect children from disease in general.

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