

Human Health Issues related to Avian Influenza in Canada
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Acknowledgements: Appendix D was provided by the British Columbia Centre for Disease Control (BCCDC) and modified slightly in this document to remove specific references to local public health authorities in BC. Appendices F, G, H and I were developed and distributed by the BCCDC and Fraser Health Authority during the 2004 H7N3 avian influenza outbreak. Appendix F was developed by the BCCDC for use during the 2004 avian influenza H7N3 outbreak in British Columbia with input from scientists who were previously involved in the response to an avian influenza H7N7 outbreak in the Netherlands in 2003. Appendix J was developed by the BCCDC Pharmacy Services for specific use in managing the BC outbreak. Further use or modification of any of the appendices developed specifically for the BC outbreak would constitute use outside of the document(s) originally intended purpose and therefore it would be up to the distributor/modifier/user to verify that the content is appropriate for the new situation.

The provision of these documents for the purpose of national resource sharing is appreciated, as these documents are anticipated to be a useful tool for other jurisdictions that may have to deal with similar outbreaks in the future.

1 Introduction

Avian Influenza is a contagious viral infection that can affect all species of birds (poultry, exotic and pet birds, and wild birds), although some species are more resistant to infection than others¹ (1,2,3). Avian influenza viruses do not normally infect mammalian species; however humans and a few other species including pigs and felines can be infected, and in some instances the ability to transmit the avian virus from mammal to mammal has been observed. The documented history of avian influenza dates back to the last century when “fowl plague”, now known as influenza, was first described in 1878. In 1955 Schafer demonstrated that fowl plague was a member of the influenza A virus group. (4) Since 1959, twenty-four epizootics (outbreaks) of highly pathogenic avian influenza caused by H5 or H7 strains have been documented worldwide (5). The majority of human cases linked to these avian influenza outbreaks have been identified since 1997.

The human health risks (actual and potential) associated with avian influenza are:

- Direct infection of humans with the avian influenza virus
- The emergence of a new pandemic strain of type A influenza

The purpose of this document is to provide recommendations for public health authorities and other stakeholders involved in the management of actual and potential human health issues related to domestic avian influenza outbreaks². The management of the animal health component of the outbreak response is the responsibility of the Canadian Food Inspection Agency (CFIA) and is not addressed in this document. Wildlife management issues are also not addressed within the scope of this document. Information on avian influenza and outbreak management from an animal health perspective can be found on the CFIA website and on the OIE (World Organization for Animal Health) website (see section 2.4 below).

In this document the recommendations have been organized to align with certain components of the *Canadian Pandemic Influenza Plan for the Health Sector*, specifically: surveillance, public health measures, infection control, antivirals, and vaccine programs. This document is intended to serve as a reference for jurisdictions dealing with an outbreak of avian influenza. Other jurisdictions, not directly affected by the outbreak, are encouraged to refer to the sections of the *Plan* that correspond to the phases within the pandemic alert period (e.g., Canadian Phase 1.0, 2.0 or 3.0) as indicated by the epidemiological findings from the outbreak.

The objective of this document is to provide recommendations aimed at:

- protecting individuals who are involved in the response to an outbreak of avian influenza
- protecting individuals who have been exposed to the virus
- controlling the outbreak in the human population³ (if applicable), and
- minimizing the risk of viral reassortment (i.e., mixing of genes from human and avian viruses)

Typically the first opportunity for public health intervention occurs when the virus causes illness in a domestic poultry flock. The recommendations in this document include prevention and

¹ Although all birds are thought to be susceptible, not all species are equally susceptible or affected by avian influenza viruses (e.g., pigeons resist infection with avian influenza)

² It is expected that these recommendations may also be applicable to outbreaks of influenza in pigs that result in human illness, with consideration given to the unique aspects of such an outbreak at the time.

³ If efficient human to human transmission occurs and the outbreak is not contained through the use of the recommended control measures, then all jurisdictions should use the measures outlined in the *Canadian Pandemic Influenza Plan* to respond to the potential pandemic threat.

control measures that should be implemented immediately, based on a risk assessment, to decrease the human health risk from a zoonotic infection and decrease pandemic potential. With respect to wild bird exposure, the recommendations in this document apply to individuals working with sick wild birds or participating in environmental clean-up of dead wild birds in areas/regions where highly pathogenic avian influenza (HPAI), for example H5N1 Asian strain, has been identified.

2 Background

Avian influenza is an infectious disease of birds caused by type A strains of influenza virus. Since the clinical signs of avian influenza can resemble other diseases, such as Newcastle Disease in poultry, the diagnosis of avian influenza must be made on the basis of laboratory confirmation.

In birds, all of which are thought to be susceptible, influenza viruses may cause asymptomatic infection or a wide spectrum of symptoms, ranging from mild illness to a highly contagious and rapidly fatal disease. The occurrence of predominantly mild illness or asymptomatic infection in birds due to influenza is referred to as “low pathogenic avian influenza” or LPAI. When influenza has resulted in severe epizootics, characterized by sudden onset, severe illness and rapid death of affected birds/flocks, with a mortality rate that can approach 100%, the strain is referred to as “highly pathogenic avian influenza” or HPAI based on the observed morbidity and mortality in affected bird population(s). Laboratory testing (e.g., genetic analysis and in vivo biologic studies in chickens) of the avian influenza virus can also result in a particular virus being labeled as “highly pathogenic”. The degree of correlation between laboratory-determined pathogenic potential, and pathogenic behaviour as evidenced by the negative outcomes in the affected bird population(s), is unclear.

For the purposes of this document either a clinical or laboratory finding should trigger the recommended control measures with the duration and aggressiveness of the control measures being determined by the epidemiological data available at the time of the outbreak.

The World Organization for Animal Health (OIE) defines an ***outbreak of disease or infection*** as:

“the occurrence of one or more cases [an individual animal (mammal, bird, bee) infected by a pathogenic agent, with or without clinical signs] of a disease or an infection in an epidemiologic unit or group of animals with a defined epidemiological relationship that share approximately the same likelihood of exposure to a pathogen. This may be because they share a common environment (e.g. animals in a pen), or because of common management practices. Usually, this is a herd or a flock. However, an epidemiological unit may also refer to groups such as animals belonging to residents of a village, or animals sharing a communal animal handling facility. The epidemiological relationship may differ from disease to disease, or even strain to strain of the pathogen.”
(6)

This includes the first occurrence of an OIE-listed disease or infection in a country or zone/compartiment; the first occurrence of a new strain of a pathogen of a listed disease in a country or zone/compartiment; an emerging disease with significant morbidity/mortality or zoonotic potential; or evidence of change in the epidemiology of a listed disease (e.g. host range, pathogenicity, strain of causative pathogen), in particular if there is a zoonotic impact. The scope of this document has been expanded from the previous version which provided

recommendations during poultry outbreaks, to include the human health issues that may arise from confirmed cases of AI in wild birds or single cases in domestic birds.

2.1 Avian Influenza in the Wild Bird Population

Wild birds can serve as a silent reservoir for avian influenza viruses. If infected wild birds come into contact with, or contaminate an area populated by, commercial/domestic birds the virus may spread to the domestic flock providing an opportunity for the virus to proliferate and possibly mutate. Viruses introduced in this manner may start out as low pathogenic strains and mutate into highly pathogenic strains.

The first Canadian wild bird survey, conducted in 2005, identified many different AI viruses including four H5 subtypes – H5N1, H5N2, H5N3 and H5N9. In all cases, these viruses were clearly characterized by scientists as low pathogenic, North American strains. The low pathogenic strain of H5N1 was determined to be similar to strains previously identified in North America⁴. These laboratory results were supported by the absence of any increased mortality observed in Canadian birds. All North American samples originated from healthy wild birds which can also be attributed to the low pathogenic nature of the North American strain, as distinguished from the outbreaks of highly pathogenic H5N1 Asian strain seen in Eurasia and Africa. A 2006 survey will also be carried out to provide an early warning for the possible entry of highly pathogenic avian influenza into Canada.

2.2 Avian Influenza in Poultry Flocks

In the 1960's when turkeys were often raised outdoors, cases of low pathogenic avian influenza were often reported in the autumn. One of the viruses isolated in Canada in 1966 was later found to meet the modern criteria of a highly pathogenic influenza virus. Since 1975, low pathogenic avian influenza – subtypes H5 and H7 – has been detected five times in domestic poultry in Canada, most recently in 2005 (7).

Low pathogenic strains (for example H9N2) have occasionally caused minor self-limiting illness in humans. Although no human deaths have been associated with any LPAI virus (5), these viruses may still have pandemic potential. Also some LPAI H5 and H7 virus strains have mutated to HPAI following circulation in domestic poultry flocks (5). During the 2004 outbreak in British Columbia the H7N3 virus was initially LPAI but converted to HPAI within days of the first outbreak on the index farm through a minor recombination event (8). Therefore precautions are warranted regardless of the pathogenicity of the avian influenza virus in the poultry population.

Highly pathogenic strains of avian influenza virus have also caused disease in humans (9). To date implicated strains have included: H5N1, H7N2⁵, H7N3 and H7N7. Human fatalities were observed with a H5N1 strain in Hong Kong in 1997 and a single fatality was associated with the H7N7 outbreak in the Netherlands in early 2003 (10). In the fall of 2003 a new sub-type of

⁴ This finding highlights the importance of basing the risk assessment on the specific virus subtype/strain as recommended in section 7.2.1.

⁵ Recently a single case of H7N2 infection was retrospectively identified in an individual who had recovered from a respiratory illness (including chest x-ray changes) that occurred in the United States in November 2003. This case was reported to the WHO on April 19, 2004 after it was laboratory confirmed by the CDC, Atlanta.

H5N1 started causing poultry outbreaks in Asia and widespread infection in wild birds (11). This virus continues to circulate in 2006 and has resulted in human cases and fatalities among people who had close contact with infected birds. Human cases have occurred in Asia, Europe and Africa. Spread of H5N1 into avian populations in Europe has been observed as a result of migration of infected birds. Current Avian influenza (H5N1) affected areas, including a table of human H5N1 and avian H5N1 affected areas can be found at <http://www.phac-aspc.gc.ca/h5n1/index.html>

2.3 Human Health Context

Avian influenza infection in humans can potentially occur as a result of contact with infected poultry and under- or uncooked poultry products, infected wild or pet birds, manure and litter containing high concentrations of virus, contaminated surfaces, or contact with contaminated vehicles, equipment, clothing and footwear at involved sites (e.g., infected poultry farms). Direct contamination of the mucous membranes by infectious droplets or inhalation of aerosolized viruses are other possible transmission routes. Close contact with sick or dead domestic poultry (especially backyard flocks where biosecurity measures are non-existent or not stringent), has evolved as the predominant risk factor for H5N1 Asian strain infection (12). In general, the risk to human health from wild birds infected with an avian influenza virus (both low and high pathogenic strains) is considered to be low. Recommendations for safe practices when handling wild birds, including information for hunters, are available on the internet at: http://www.influenza.gc.ca/ai-ga_e.html

The main global human health concern is that outbreaks particularly in domestic poultry flocks present an opportunity for ongoing genetic mutation or viral reassortment. Since simultaneous infection with human influenza and avian influenza viruses in an intermediary host, including a human, may provide an opportunity for an exchange of genes, one possible outcome is the development of a new influenza virus subtype with pandemic potential.

According to the World Health Organization (WHO) pandemic phases, identification of a novel virus (e.g. avian) in a human denotes the beginning of Phase 3, the first phase in a period called Pandemic Alert. This situation raises the level of pandemic preparedness activity for all jurisdictions since this finding is considered to be a potential precursor to a pandemic. During this phase there is no or at most rare instances of human-to-human transmission. WHO Phases 4 and 5 are characterized by limited but increasingly efficient human-to-human transmission of the novel virus resulting in clusters of human cases⁶.

Education of all stakeholders, ideally in advance as part of pandemic preparedness activities, but definitely as part of the first response to an outbreak, should be given high priority. Awareness of the potential consequences of these outbreaks may facilitate compliance with recommended control measures.

2.4 Sources of Additional information

Canadian Food Inspection Agency website:
<http://www.inspection.gc.ca/english/anima/heasan/disemala/avflu/avflue.shtml>

⁶ See the Canadian Pandemic Influenza Plan for more details on the WHO and Canadian Pandemic Phases.

Public Health Agency of Canada website(s):
http://www.phac-aspc.gc.ca/influenza/avian_e.html
<http://www.phac-aspc.gc.ca/fluwatch/index.html>

European Centre for Disease Prevention and Control website:
<http://www.ecdc.eu.int/index.php>

OIE (World Organization for Animal Health) website:
http://www.oie.int/eng/en_index.htm

WHO avian influenza website:
http://www.who.int/csr/disease/avian_influenza/guidelines/en/

3 Roles and Responsibilities

Due to the paucity of outbreaks of highly pathogenic avian influenza in Canada, the roles and responsibilities of various responders and stakeholders have not been previously compiled in one document for the purpose of national consensus. The current draft of the Respiratory Illness Outbreak Response Protocol (RIORP) (13) includes roles and responsibilities for the various levels of government, general principles and operating procedures agreed to by federal, provincial and territorial agencies in order to help coordinate the investigation and control of severe respiratory illness outbreaks in Canada. Coordination with animal health authorities is not currently specifically addressed in RIORP; however federal departments and agencies are working on protocols for collaboration including a Zoonotic Illness Outbreak Response Protocol (ZIORP). ZIORP will include an agreed-upon roles and responsibilities framework.

The outbreak in British Columbia in 2004 highlighted the importance in having roles and responsibilities clearly defined in order to ensure appropriate and timely communication and optimal implementation of the outbreak response. As part of the response to the BC 2004 outbreak, lead agencies responsible for enhanced surveillance recommendations, public health recommendations and clinical occupational health responsibilities for each type of worker potentially involved in the response, were identified and agreed upon on a teleconference involving the participants from the lead agencies (14). This detailed information, compiled in table format, is provided in Appendix D. It can be used as a starting point to clarify roles and responsibilities at the outset of any future avian outbreaks.

Provinces and Territories may have existing response frameworks that involve more organizations than those listed below (e.g. Ministry of Labour). The following list outlines key departments/organizations. This list is not necessarily all inclusive and may not reflect P/T variations.

Federal

Canadian Food Inspection Agency (CFIA): The Canadian Food Inspection Agency (CFIA) is responsible for the administration and enforcement of the federal Health of Animals Act and Regulations. Consequently, the CFIA is the lead authority for the monitoring, control and eradication of foreign animal diseases in Canada. This includes Avian influenza (AI), a reportable disease under the Health of Animals Act. CFIA AI activity focuses on five areas:

import controls, surveillance of domestic poultry and wild birds, biosecurity, disease response strategies, and international cooperation, With respect to avian influenza this includes:

- animal health surveillance
- lead for the animal outbreak response and the implementation of animal disease control measures
- occupational health and safety for CFIA workers (including workers contracted by the CFIA)⁷
- scientific advice, risk assessment and research to contribute to AI prevention, preparedness and response measures
- receiving and testing samples from animals and receiving reports re. Avian influenza from provincial/territorial laboratories (National Centre for Foreign Animal Diseases, CFIA).
- **Environment Canada (EC):** The identification of risks associated with outbreaks in wildlife and the overall health of wildlife is the collaborative responsibility of both federal and provincial/territorial departments and agencies as well as academia (such as EC, the Canadian Cooperative Wildlife Health Centre (CCWHC) and CFIA). The National Wildlife Disease Strategy (approved by the Canadian Council of Forest Ministers, Wildlife Ministers' Council of Canada, Canadian Endangered Species Conservation Council, Canadian Council of Fisheries and Aquaculture Ministers in 2005) identifies diseases such as avian influenza that have the potential to cause significant social, ecological or economic harm and potential management options in wildlife settings.
- **Workplace Health and Public Safety Programme (WHPSP), Health Canada:**
 - Provide advice and support on occupational health issues relating to federal employees involved in the outbreak response e.g. for CFIA workers if so requested.
- **Centre for Infectious Disease Prevention and Control, Public Health Agency of Canada (PHAC):**
 - international reporting of the Canadian situation and international consultation,
 - convening of expert committees to provide advice on risks to human health,
 - human resources to support outbreak response if necessary,
 - liaison with the involved P/T to ensure that technical advice provided to CFIA and WHPSP is consistent with recommendations being provided by the P/T and local public health authority.
- **National Microbiology Laboratory, PHAC:**
 - consultation with CIDPC and P/T public health authorities regarding recommendations for the collection, transportation and reporting of human laboratory specimens and tests,
 - consultation with P/T public health laboratories to facilitate appropriate and timely outbreak specimen management,
 - laboratory testing including virus isolation and characterization,
 - provision of reagents/diagnostic testing kits (PCR primers etc.)
- **First Nations and Inuit Health Branch, HC:**
 - role will likely be consistent with that identified below for the Provincial/Territorial Public Health Authorities with application to on reserve populations

Provincial/Territorial

⁷ Each employer is responsible for the occupational health and safety of their own employees. However CFIA could provide PPE to non-CFIA employed individuals who visit CFIA designated work sites. Occupational health personnel may be involved in case detection / surveillance activities however the case and contact follow-up and management would be the responsibility of local public health.

- **Provincial/Territorial Public Health Authority involved in outbreak:**
 - tailoring of national recommendations to suit the local situation/epidemiology,
 - developing additional public health recommendations as needed based on the local situation/epidemiology,
 - liaison with The Public Health Agency of Canada, CFIA, EC and others (e.g. Ministry of Agriculture, Natural Resources) to ensure consistency of recommendations being provided to the workers and others involved in the outbreak,
 - reporting summary data on human health issues and prevention/control measures taken to The Public Health Agency of Canada,
 - provision of information to the public and health care providers (particularly those within the P/T that reside outside of the jurisdiction of the local public health authority(s) with the outbreak(s)).
- **Provincial/Territorial Workplace Health / Occupational health departments**
- Working with public health authorities, address occupational health issues relating to populations under P/T jurisdiction
- **Provincial/Territorial Veterinary Diagnostic Laboratories⁸:**
 - receiving and testing samples from animals
- **Provincial/Territorial Public Health Authority NOT involved in outbreak:**
 - monitoring of the outbreak and its potential impact on the population in their respective jurisdictions,
 - review and implementation as necessary of actions identified in the *Canadian Pandemic Influenza Plan* for the Canadian Pandemic Phase as determined by the epidemiology of the avian outbreak,
 - potential source of human health resources to support the outbreak response if requested by the affected P/T(s).

Local

- **Local Public Health Authority:**
 - implementation of enhanced surveillance and public health recommendations related to human health issues (e.g. surveillance of farm families, personal protection or occupational advice for farm families and local veterinarians, quarantining of contacts-if appropriate),
 - occupational health issues pertaining to any of local public health staff involved in the response,
 - provision of information to local health care providers and public as necessary,
 - reporting data on human health issues and prevention/control measures taken to P/T Public Health Authority.
- **Local physicians or occupational health staff:**
 - reporting of any individuals who may have avian influenza infection to local public health authority

While the reporting of human illness to public health authorities is usually a requirement under provincial/territorial legislation, the reporting of avian or animal illness that may impact human health is not as well defined. These processes are currently being examined at the national

⁸ Note; the provincial veterinary service in most P/Ts operates a veterinary diagnostic laboratory that is used by veterinary practitioners, and may play a significant role in an outbreak (as was the case in the British Columbia 2004 outbreak of H7N3), both in testing of specimens and liaising with local producers.

level. In the meantime, P/T public health authorities are encouraged to develop working relationships with their animal health counterparts (including occupational health authorities) within their respective jurisdictions in order to facilitate timely two-way communication and management of these types of events. This should include consensus on outbreak management structure, to facilitate an efficient outbreak response, and development of a coordinated P/T specific response plan(s).

4 Terminology

This section is intended to clarify some of the terminology that is included in this document.

4.1 National Case Definitions

A national case definition is needed to assist with the identification of affected individuals, the assessment of human health risks and the direction of public health and surveillance activities. National case definitions allow for common and consistent communication both nationally and internationally and as an integral part of surveillance, they help to inform the pandemic phase.

The process for developing a specific national case definition relies on the clinical presentation and laboratory techniques that are associated with identifying the illness. The identified clinical presentation can change as more epidemiologic information becomes available and this may require an update to the case definition.

National definitions that include categories for confirmed cases, suspect cases and asymptomatic or atypical infections are preferred. The latter two categories can assist with the management and investigation of potential cases and be a place holder should the confirmed case definition be updated to include some of the asymptomatic or atypical infections.

Since the case definitions are meant to be used nationally, their development should be through consensus and in collaboration with the federal, provincial and territorial working group that has been developed to assist with issues surrounding national surveillance. Currently, this working group is named the Vaccine Preventable and Respiratory Infections Surveillance Working Group (VPRIS).

The case definitions used in the 2004 avian influenza H7N3 outbreak in British Columbia and the WHO confirmed case definitions for avian influenza H5 can be found in appendix A and B respectively. If an outbreak occurs and it is known to be a H7 or H5 strain, then the case definitions in the appendices can serve as initial national case definitions. They can be adapted for the specific outbreak situation by the province or territory involved in the outbreak in collaboration with the VPRIS and the Public Health Agency of Canada as necessary.

4.2 Other key terms

Sources of avian influenza virus:

There is relatively limited public health experience with avian influenza outbreaks and variability has been observed in the epidemiology of avian influenza outbreaks caused by different strains. Therefore, it may be necessary to modify the list of sources of avian influenza virus as the

outbreak progresses, more information becomes available, or the situation changes (e.g. if there is evidence of airborne spread of the virus from an avian source).

Potential sources include:

- infected poultry
- under- or uncooked products from infected birds,
- infected wild or pet birds,
- other infected animals (e.g. pigs)
- manure and litter containing high concentrations of virus,
- contaminated surfaces,
- contaminated vehicles, equipment, clothing and footwear at involved sites (e.g., infected poultry farms),
- Contaminated air space (e.g. a barn when movement of birds or manure may have resulted in aerosolization of the virus), OR
- Individuals known to be infected with an avian influenza virus⁹

Note: For outbreak control purposes a flock, location (e.g. farm), or an ill individual with a history of exposure to an avian source of virus, might be considered a “potential source of avian influenza virus” on epidemiological grounds in the absence of confirmed infection.

Contact – avian/animal source

An asymptomatic individual who has been in direct contact with an avian source or potential avian source of avian influenza virus (see list above). (i.e., this excludes individuals whose only exposure was to another individual known to be infected with an avian influenza virus.)

Note: For surveillance purposes, if this individual develops symptoms and meets the case definition they would be referred to as a “*primary case*”. However, if the individual develops a confirmed infection but is asymptomatic or atypical in clinical presentation, they would be considered to have a “*primary infection*”.

Contact – human source

An asymptomatic individual who has been in close contact with an individual known to be or suspected to be infected with an avian influenza virus.

Note: For surveillance purposes, if this individual develops symptoms and meets the case definition they would be referred to as a “*secondary case*”. However, if the individual develops a confirmed infection but is asymptomatic or atypical in clinical presentation, they would be considered to have a “*secondary infection*”.

Affected site

Any site at which:

- avian influenza has been laboratory confirmed in one or more birds in a poultry flock, OR
- a higher than normal rate of morbidity or mortality consistent with avian influenza has been observed in one or more flocks,

⁹ With the exception of this source (i.e. an infected human), all other sources are considered “avian/animal sources”.

- OR
- a highly pathogenic avian influenza strain has been laboratory confirmed in one or more wild birds¹⁰.

5 Avian/ Animal Surveillance

Routine surveillance for avian/animal influenza is overseen by the Canadian Food Inspection Agency, in conjunction with federal partners, provincial and territorial veterinary services, diagnostic laboratories, veterinary colleges, veterinary practitioners, producer organizations and wildlife interest groups. Chief Veterinary Officers are the key contacts at the provincial level (Appendix E).

Highly pathogenic Avian Influenza (HPAI) is federally reportable. New OIE reporting requirements define Notifiable Avian Influenza as H5, H7 and all highly pathogenic subtypes. In order to mirror these changes in OIE reporting requirements, CFIA is proposing changes to reportable diseases regulations. Revisions to the immediately notifiable list will also make it mandatory for laboratories to report any subtype of avian influenza diagnosed in Canada.

Between 1997 and 2003, the National Centre for Foreign Animal Diseases (NCFAD) in Winnipeg characterized avian influenza viruses based on 19 reports involving turkeys, chickens, ducks, gulls, pelicans, finches, pet birds and imported caged birds. In each incident either the pathogenicity of the virus was not determined or low pathogenicity was determined. Subtypes identified from these 19 reports included: H1N1, H3N2, H3N8, H4N6, H6N1, H7N1, H10N7, and H13N6¹¹. (15)

Animal influenza surveillance data has also been collected from swine and equine sources. In Canada, influenza is endemic in swine. There are very few reported outbreaks, and therefore few submissions for laboratory testing. Laboratory findings have indicated however, that the predominant subtypes in recent outbreaks are H1N1 and H3N2. In equine specimens the predominant subtype has been H3N8, which tends to cause a mild respiratory infection that is difficult to differentiate clinically from other equine rhinoviruses and herpes viruses.

As previously indicated, as part of pandemic preparedness each P/T should have a working relationship with their respective veterinary counterparts. This will minimize notification delays when avian influenza is detected in their jurisdiction and facilitate prompt implementation of any necessary public health measures for the protection of human health. A list of Chief Veterinary Officers is provided in Appendix E.

6 Human Surveillance

Surveillance activities are critical for characterizing and monitoring the impact of the outbreak on human health, guiding public health actions and providing data necessary for national and international reporting of the event.

¹⁰ The "site" would be defined at the time by the authority involved in the animal side of the response. It would depend on the specific situation but the affected site would not involve entire flight paths of wild birds.

¹¹ An H3 and H6 were also reported with no N information available.

6.1 General Recommendations

Surveillance activities should include:

- i. Development of an outbreak case definition that includes details regarding specific symptoms, incubation period, exposures and locations of concern in addition to laboratory test results that are associated with confirmed cases. The case definitions found in appendices A and B can be modified and used by the affected P/T at the time of the outbreak to address the unique characteristics of the outbreak.
- ii. Dissemination of the outbreak case definition to all relevant stakeholders including the public health outbreak investigators, occupational health authorities responsible for persons involved in controlling the outbreak (e.g. EC or CFIA employees), the national Pandemic Influenza Committee (i.e., all other P/Ts and surveillance working group members including VPRIS) and other stakeholders who might be involved in case detection (e.g. local physicians or hospitals).
- iii. Development and dissemination of an outbreak reporting questionnaire to public health outbreak investigators. The form used in the 2004 BC outbreak is provided in Appendix F.
- iv. Consideration of database and reporting tools that will be used to store and summarize the collected data and assist with case/ information management.
- v. Identification of potential human cases and contacts and administration of the outbreak questionnaire to collect epidemiological information and implement the appropriate investigation and public health measures. This will involve communication with a designated person(s) at the affected site/farm(s) and enquiring about any farmers, families, employees, crews, visitors or others who may have had contact with avian influenza infected/contaminated or potentially infected/contaminated birds, people or material at the affected site/farm. Through this process, the number of ill persons (potential cases) and potentially exposed persons (contacts) can be identified and follow-up initiated. Further follow-up and communication will be required for all individuals identified as potential cases and the contacts. This process can also be used to ensure that educational materials, including public health recommendations, have been received and that any questions are addressed.
- vi. Ongoing surveillance for human illness linked to affected sites/farms (see details in section 8.2 re. surveillance of contacts of an avian source of virus)
- vii. Ongoing timely reporting on any human cases and control measures put in place, through the normal reporting channels (i.e., local public health to P/T authority to the Public Health Agency of Canada). As this information will dictate the pandemic phase for the country, it will also be shared with the Pandemic Influenza Committee and the World Health Organization.

- viii. Notification¹² of any P/Ts that would be receiving ill individuals linked to the outbreak (e.g. workers who have come to assist in clean-up or culling activities and who are now symptomatic and returning to their home P/T) by the affected P/T public health authority¹³.
- ix. Notification of asymptomatic individuals linked to the outbreak who are leaving the affected P/T that they should be aware of the possibility of symptom development up to 10 days after last exposure. Should symptoms develop, they should be instructed to both see a physician and report their symptoms and link to the outbreak to a local public health authority. They should also be asked to restrict their activities as a precaution until a diagnosis can be made. (Note: These individuals may also be provided with contact information for public health individuals in the affected P/T and asked to contact them in order to facilitate further follow-up).
- x. An assessment for evidence of human influenza strains currently circulating in or near the affected area(s).
- xi. Consideration of any special studies (e.g., serosurveys for evidence of asymptomatic infection) that might require data or laboratory specimen collection during or following the outbreak.

Jurisdictions not involved in the outbreak should ensure that the identification of any individuals with compatible illness within their jurisdiction and with a link to the outbreak, are notified to the P/T public health authorities in the P/T with the outbreak. These individuals should be managed as per the recommendations in this document for management of cases.

7 Public Health Risk Assessment

A risk assessment should be conducted from a population perspective in order to inform the public health response and specifically the need for the implementation of any community based measures (e.g., quarantine, cancellation of animal-oriented events). The management of individual contacts of a source of avian influenza virus should be based on the virus-specific risk, an individual exposure assessment and consideration of other factors specific to the situation or individual. This risk-focused strategy is also suggested for decisions regarding antiviral prophylaxis (see section 10).

7.1 Virus-specific risk

Influenza viruses are characterized into subtypes based on the surface glycoproteins. There are 16 hemagglutinin subtypes (H1-16) and nine neuraminidase sub-types (N1-9) for influenza A viruses. Not all potential combinations are known to exist and of the

¹² This notification should occur directly between P/Ts to avoid delays and should include (as permitted by P/T legislation) the individual's name and contact information as well as the status of the individual with respect to their clinical illness and any required ongoing treatment and monitoring.

¹³ Similarly if contacts are being actively managed (e.g. daily active surveillance) as part of the outbreak response, these individuals should also be notified to their respective jurisdiction if the monitoring period has not been completed by the time the individual is leaving the outbreak jurisdiction.

sixteen hemagglutinin subtypes to date only H1, H2, H3, H5, H7, H9, H10 and H11 have been shown to infect humans (5,16).

When an AI virus is detected in Canada, a risk assessment should be immediately carried out by analyzing the existing data (if any) on the occurrence and severity of human disease from the identified hemagglutinin (H) subtype and the specific (H and N) subtype/strain detected. The H type will likely be the first available laboratory result and many decisions may need to be made based on this preliminary finding, together with initial animal laboratory and clinical data. It is important to review these decisions and update the risk assessment as more information becomes available.

To facilitate a consistent approach to the management of these occurrences from a human health perspective the AI virus should first be classified based on the following four designations:

- No data is available on the human illness risk of the subtype
- Subtype has previously been identified and is not known to have caused human illness (e.g., H3N8, H6N1, H13N6)
- Subtype is known to cause predominantly mild human illness (e.g., H7N3, H7N7, H9N2)
- Subtype is known to cause predominantly severe human illness (e.g., H5N1 Asian strain)

This designation together with the exposure assessment should be used to guide the management of contacts of a source of avian influenza virus. The designation of the virus could change if confirmed (human) cases occur during the course of the outbreak; in which case the risk assessment and recommended management of contacts may also change.

7.2 Exposure risk

The World Health Organization (WHO) has stratified exposure risk into three categories; low, medium and high in the context of the H5N1 Asian strain epizootic (12). In developing the recommendations for this document these categories were reviewed and modified to reflect not only the H5N1 experience in Asia but experience with other AI viruses and the Canadian context. In addition, exposures to wild or non-commercial birds have been incorporated into these categories to facilitate use of this document beyond the commercial poultry outbreak setting. To be consistent with the WHO document the word “animal” is intended to include all avian species in the following context.

As the Canadian situation unfolds, the exposure risk groups might be modified based on experience and illness outcomes. Individuals who have exposures falling into more than one risk group should be managed based on their highest risk exposure.

High exposure risk groups:

- Individuals with unprotected and very close exposure to a flock or group of sick or dead animals infected with AI or to particular birds that have been directly implicated in human cases (e.g., farm family member or worker who handled sick animals)

- Personnel involved in handling sick animals or decontaminating affected environments (including animal disposal) as part of outbreak control efforts (e.g., cullers)

Moderate exposure risk groups:

- Individuals who handle single or small groups of sick or dead animals infected with AI in an open air environment which is not densely populated by animals of the same species as the infected animal (e.g., single wild bird in a park)
- Household/family contacts of a suspected or confirmed human AI patient (defined as living under the same roof as the index case for ≥ 24 hrs within the period when the case is presumed to be contagious)
- HCWs (i.e., those working in a setting where health care is being provided) who had no, or insufficient, PPE in place when 1) in close contact (i.e., within 1 meter) of a strongly suspected or confirmed human AI case, or 2) in direct contact with respiratory secretions or other potentially infectious specimens from the case.
- HCWs or laboratory personnel who might have unprotected contact (i.e., did not have or was wearing insufficient PPE) with specimens/secretions which may contain virus or with laboratory isolates.

Low exposure risk groups:

- Personnel involved in culling non-infected or likely non-infected animal populations as a control measure (e.g., those exclusively culling asymptomatic animals in a control area outside of the infected and restricted zones)
- Individuals who handle (i.e., have direct contact with) asymptomatic animals that may be infected with AI based on species and possibly proximity to a geographic area where AI has recently been identified (e.g., bird banders).
- HCWs who used appropriate PPE during contact with human AI cases (i.e., in the absence of significant human to human transmission)
- HCWs not in close contact (i.e., distance greater than 1 metre) with suspected or confirmed human AI cases and having no direct or indirect contact with infectious material from that case(s)
- Laboratory personnel working with the influenza virus using appropriate laboratory procedures and infection control precautions.

Initially, it is expected that those most likely to be exposed would include external employees (e.g. CFIA or Environment Canada workers) who are involved in outbreak control, culling of infected flocks or euthanasia of birds, disposal of carcasses, or cleaning of involved sites, as well as persons living and working on affected farms who have such contact.

If human illness is observed, the exposure history of these individuals should be documented and used to evaluate implemented infection control precautions. Close contacts of these cases should be managed as described in section 8.2. If human-to-human transmission is suspected, then a complete contact investigation should be conducted. This investigation will help inform the risk assessment of other settings where human cases are residing.

7.3 Other considerations

In order to target recommendations for contacts of an avian source or human source of avian influenza virus, it is important to consider other factors in addition to the epidemiology of the outbreak. Other factors that would likely influence recommendations for contacts include:

- Degree of certainty that the bird population/domestic flock has been infected with the avian virus
- Observation of human illness linked to the current outbreak and severity of illness
- Timing of implementation of control measures
- Individual risk factors in the exposed person (e.g. immunocompromising conditions)
- Confidence that public health recommendations (e.g., for personal protective equipment, immunization, antiviral prophylaxis) are being or will be followed¹⁴
- Number of cases/contacts (e.g., as numbers increase may advise self monitoring/quarantine rather than public health or health care system involvement)

8 Public Health Measures

Upon notification of an avian/animal influenza outbreak with human health implications, public health authorities should initiate an investigation and implement appropriate public health measures to protect human health. These measures will include primary prevention (e.g., infection control measures and antiviral prophylaxis), case finding and management activities. Investigations would also include identification, understanding and containing sources of human infection. Public health measures (to be implemented by the local public health authority with the support of the province/territory) will largely depend on the initial findings from the epidemiologic assessment of the outbreak.

Risk communication and the provision of educational materials are public health measures that should be started immediately with key messages updated as the event unfolds. These measures may play an important role in facilitating compliance with other public health actions.

8.1 General Recommendations

Public health measures should include:

- i. Rapid completion of a preliminary risk assessment for human health including examination of the available epidemiological data, a review of historical experience and current scientific knowledge regarding the specific avian virus subtype, and exposure assessments. This task could be completed by P/T public health authorities or PHAC as part of supportive activities. Process for ongoing review and, if necessary, updating of the risk assessment should be established.

¹⁴ During the outbreak of H7N7 in the Netherlands in 2003, only 6% of farmers reported consistent use of facial masks and 1% reported consistent use of goggles while working with infected poultry. In cullers, compliance was only slightly better; 25% consistently used facial masks and 13% used goggles. (17)

- ii. Confirmation of roles and responsibilities with respect to the human health response including the provision/delivery of occupational health services, and similar services to those with no occupational health resources.
- iii. The provision of information on avian influenza, which highlights the potential human health risk and appropriate infection control measures. A sample “Dear Farmer letter” is provided in Appendix G. See also section 9 for Infection Control recommendations.
- iv. Investigation and management of ill individuals/cases (see recommendations in section 8.3 below)
- v. Investigation and management of potential or known contacts based on human illness risk for the avian influenza virus subtype and the exposure risk attributed to the contact (see recommendations in section 8.2 below).
- vi. Activities to ensure the local availability of antiviral drugs (see section 10). This may include overseeing delivery from a central supplier to the appropriate location(s) for distribution and establishment of a centralized prescription and dispensing clinic.
- vii. Provision of the current human influenza vaccine for the purposes identified in section 11.

8.2 Management of Contacts

As contacts are identified through the surveillance activities in the outbreak investigation, it is essential that they receive clear recommendations from public health¹⁵. A sample information letter for contacts of an avian source of virus is provided in Appendix H and a letter for physicians that may be seeing these individuals is provided in Appendix I.

Recommendations should be provided in a format that is appropriate for the reading/educational level and language of the intended recipients. Modifications and translation may be necessary for foreign workers employed on the affected site/farm. It is recommended that contacts at a minimum:

- be instructed to self-monitor for the development of fever, respiratory symptoms, and/or conjunctivitis (eye infection) for 10 days after the last exposure to a known or suspected source of avian influenza virus¹⁶
- be evaluated for antiviral prophylaxis as indicated in section 10
- be immunized with the current human influenza vaccine if they have not received it already (see section 11)
- strictly adhere to all infection control precautions described in section 9 below.

¹⁵ Contacting of individuals exposed to an avian source of virus, may be indirect through staff supervisors or occupational health authorities. The necessity of individual contact should be determined by the local public health authority depending on the epidemiology of the outbreak and efficient human resource allocation.

¹⁶ List of possible sources can be found in the Terminology section of this document (section 4.2)

Potentially exposed children in an affected farm setting (i.e., child contacts) should be monitored by an adult who has received information on what symptoms to look for and how to take a temperature, should fever be suspected.

The local public health authority may decide on more active monitoring depending on:

- the epidemiology of the outbreak (e.g., if the avian virus is highly pathogenic or is currently or previously known to cause severe illness in humans),
- if there was a significant delay in the implementation of control measures,
- familiarity with the strain causing the outbreak, and
- level of confidence that public health recommendations are being followed.

More active monitoring might include:

- implementation of active surveillance in which there will be some form of individual consultation with exposed individuals initiated or overseen by the local public health authority. (The frequency, format and implementation of such interactions should be determined at the time by the local public health authority. It should include identifying any symptoms of AI-compatible illness in the individual, and for individuals receiving antiviral prophylaxis, compliance monitoring and adverse drug reactions.)
- requests for daily temperature recording, especially if fever has been identified as an early symptom,
- restriction of movement of contacts -this would initially involve recommendations not to visit other farms or unaffected locations, to avoid serving as a vehicle for the spread of contaminated materials (see infection control recommendations in section 9.1),
- more strict quarantine measures would be considered if the outbreak involved a virus that was causing severe illness in humans or there was evidence that it could be spread efficiently from person to person.

The guidance provided in this document is intended for use when AI is detected in Canada during Pandemic Phases 1, 2, or 3, that is, in the absence of more than sporadic human to human transmission (which occurs in WHO Pandemic Phase 4, 5 and 6). Once an AI virus is transmitting efficiently between humans, the exposure risk from contact with human cases will be increased and therefore the contact management recommendations for the appropriate phase in the Canadian Pandemic Influenza Plan for the Health Sector should be used.

8.3 Management of Cases in the Community

If the illness requires hospitalization, then the infection control measures should consist of droplet and contact precautions as recommended in Section 9.1 (bullet v). The need for public health follow-up upon discharge from hospital will depend on whether the illness has completely resolved at discharge, and any other individual risk factors that may influence the period of communicability.

Public health authorities, as part of surveillance activities should ensure that hospitalized cases are reported and may also facilitate appropriate laboratory testing and access to antiviral drugs for hospitalized patients. The following recommendations, however, are mainly intended for individuals with mild illness that are residing in the community or for cases that remain symptomatic following discharge from hospital.

Upon receipt of a report of an ill person, it is recommended that the local public health authority:

- contacts the ill person and completes a case report form (classifying them as a suspect or confirmed case for surveillance purposes)
- facilitates collection of appropriate laboratory specimens (see Appendix C)
- facilitates access to early antiviral treatment (which should be offered regardless of viral sub-type)
- reports the person as “under investigation/ probable case/ confirmed case” as per previously established protocol
- provides information to the ill individual and/or their family members about their illness and who to call and where to go if their illness becomes more severe
- instructs the ill individual (in the community) to self-isolate¹⁷ for 24 hours after symptom resolution
- provides information on infection control measures (i.e., respiratory and hand hygiene etc.)
- conducts active surveillance¹⁸ and documents course of illness
- Identifies any close contacts

Note: Employees should notify their health and safety representative of their illness and these activities should be conducted in collaboration with the respective occupational health services.

9 Infection Control

The following recommendations have been developed by the Blood Safety and Surveillance, Health-Care Acquired Infections Division, PHAC and the Workplace Health and Public Safety Programme, Health Canada, for application to avian outbreak situations.

Strict adherence to infection control precautions is essential for the control of the avian influenza outbreak and prevention of possible human infection. This information should be conveyed to all workers, residents and visitors to affected sites as soon as possible when the outbreak is first identified. It is important that these messages be consistent regardless of the source, that is, whether public health or occupational health authorities are involved in developing and distributing educational materials. In this regard, P/T or local public health authorities would be responsible for conveying this information to farm families and other non-CFIA employees, and CFIA would be responsible for their employees including contracted staff and potentially visitors to the work site. Measures to monitor compliance should also be considered.

9.1 General Recommendations/Precautions

- i. If an avian influenza strain that is known to be of risk to human health (e.g., H5N1 Asian strain) is confirmed in the wild bird population in a specific location, individuals should avoid exposure to known or potential sources of avian influenza virus (e.g. wild birds, bird manure or potentially avian influenza-contaminated environmental surfaces)

¹⁷ With the exception of visiting a health care provider, individuals recommended to be on self-isolation should stay home for 24 hours after symptom resolution and avoid close contact with unexposed household members, unless an alternative diagnosis is established.

¹⁸ Frequency of active surveillance should be determined by the public health authority with consideration given to reasonable resource allocation and severity of the illness (especially if the outbreak is large).

- ii. Farm workers or owners who are not directly involved in culling activities should avoid exposure to known or potential sources of avian influenza virus (e.g. infected birds, bird manure or potentially avian influenza-contaminated environmental surfaces)
- iii. Other individuals residing on the farm (e.g. family members) should also avoid exposure to known or potential sources of avian influenza virus
- iv. Workers involved in environmental clean-up and/or culling activities or who are otherwise expected to be exposed to known or potential sources of avian influenza virus, should wear personal protective equipment as indicated in section 9.2 below.
- v. Current evidence indicates that human-to-human transmission of avian influenza virus is inefficient and occurs through exposure to large respiratory droplets or indirectly through contact with contaminated surfaces. Thus, droplet and contact infection control precautions are recommended for providing care for a patient with avian influenza. Droplet/contact precautions include the use of a good quality surgical or procedure mask, eye protection, gown and gloves.

Contacts of known or potential sources of animal sources avian influenza are advised to take the following precautions.

- Avoid touching their faces and mucous membranes, including their eyes, with their hands (whether they have been wearing gloves or not).
- Wash hands frequently¹⁹ (including before putting on and after removing personal protective equipment).
- Hand hygiene should consist of washing with soap and running water for a minimum of 15-20 seconds or the use of alcohol based hand sanitizer (containing between 60-90% alcohol) if hands are not visibly soiled.

9.2 Personal Protective Equipment for contacts of an avian/animal source of virus

The wearing of personal protective equipment (PPE) is important to minimize an individual's risk of infection and is highly recommended for persons who may be exposed to an avian/animal source of avian influenza. Workers involved in the clean-up and/or culling of infected birds and others involved in the outbreak control efforts must strictly adhere to recommended PPE.

This equipment includes:

- Disposable fit-tested half-face N-95 or better respirator²⁰.

¹⁹ Hand hygiene is the most important measure in preventing the spread of infection after contact with infected or potentially infected birds, contact with contaminated surfaces, or after removing gloves. Workers or other persons at risk of exposure should be educated on the importance of strict adherence to and proper use of hand hygiene.

²⁰ Fit testing and training is necessary prior to use of a N-95 or better respirator. This type of respirator is being recommended for these individuals since the process of culling or environmental decontamination (e.g. in affected barns) may cause contaminated materials (e.g. sawdust soiled with manure) to be suspended in the air, creating a risk potentially akin to an aerosol generating procedure in a hospital setting.

- Safety goggles (to protect the mucous membranes of eyes)
- Gloves that are impervious (nitrile, PVC, rubber, hospital gloves).
 - They should not be reused or washed. If heavy-duty rubber work gloves are used they should be disinfected after use or discarded.
 - Gloves should be removed immediately after use to avoid touching non-contaminated articles and surfaces.
- Coveralls that are impervious to water.
 - If using reusable protective clothing it must be washed immediately after use. If this is not possible, disposable coveralls (as recommended by CFIA) should be used.
- Disposable protective shoe/boot covers or rubber or polyurethane boots that are impervious to mud and water and are easily cleaned and disinfected should be worn. (Use of foot baths)
- Disposable head or hair cover to keep hair clean

Disposable PPE must be properly discarded (sealed plastic bags) and reusable or non-disposable PPE should be cleaned and disinfected as specified by public health authorities.

Training in proper techniques of donning, removing and disposing of PPE without contaminating oneself should be provided. Hand hygiene must be performed after removing PPE. The training should be similar to that provided to health care workers by hospital occupational or infection control programs. Workers involved in environmental clean-up and/or culling activities should be trained by their employer. Others who may be exposed to infected birds (e.g. farm families) should be trained by public health.

10 Antivirals

The following recommendations have been developed by the National Antivirals Working Group and Public Health Measures Working Group of the Pandemic Influenza Committee, for application to avian influenza outbreaks and other situations in which AI is identified in Canada²¹. Both of these working groups have also been involved in the development of antiviral recommendations for pandemic planning purposes. The recommendations have been reviewed and approved by the Pandemic Influenza Committee.

The use of antiviral drugs during an outbreak of avian influenza is a relatively new indication. Every effort should be made to evaluate the effectiveness of preventive measures implemented in response to an AI event, including the use of antiviral drugs. It is recommended that national systems be developed or enhanced in order to monitor antiviral susceptibility and to monitor adverse drug reactions to antivirals, under these circumstances. In addition local procedures should be put into place to maximize compliance with antiviral prophylaxis and to ensure that antiviral treatment can be initiated as soon as possible. (A sample information sheet on oseltamivir is provided in Appendix J).

The recommendations for antiviral use should be reviewed and modified as necessary at the time of the outbreak in light of the epidemiology of the specific avian influenza incident/strain. As more information about the epidemiology of avian influenza or the efficacy/safety of antiviral

²¹ It is expected that similar recommendations would be made if the source of the outbreak was in pigs/swine as opposed to in poultry/avian, however this would need to be re-visited based on the epidemiology of the outbreak.

medications becomes available, the recommendations provided in this document may change. Additional information on antiviral drugs for influenza is available in the Antivirals Annex of the *Canadian Pandemic Influenza Plan*.

10.1 Background information

Neuraminidase inhibitors prevent the replication of both type A and B influenza viruses by inhibiting influenza virus neuraminidase. (Neuraminidase promotes the release of virus from infected cells.) This class of drug has a good safety profile with few side effects and is not likely to be problematic with respect to drug interactions. The protective efficacy of neuraminidase inhibitors in preventing laboratory confirmed clinical human influenza is between 60-90%. The efficacy of neuraminidase inhibitors in preventing avian influenza in humans has not been established.

Oseltamivir is a neuraminidase inhibitor that is approved for use in Canada for treatment of influenza A and B in persons 1 year of age and older. It is also approved for post-exposure prophylaxis against influenza in persons ≥ 1 year of age, following close contact with an infected individual (index case), for a duration of up to 14 days. Oseltamivir is contraindicated in children less than one year of age and in persons with known hypersensitivity to any components of the product. Zanamivir, the other neuraminidase inhibitor, could be used as an alternative to oseltamivir; however it is not currently approved for prophylactic indications in Canada (it has been approved in other countries).

There is evidence for and experience with prophylactic use of oseltamivir for up to 8 weeks, but beyond this time frame experience is limited. Therefore, when developing these recommendations including off-label uses²², a risk benefit approach was taken examining the individual risk to the worker, the risk to public health, and the risk/benefit of the medication. Individuals who are being prescribed an antiviral in a way that constitutes an off-label use should be informed of that fact as part of the consent process.

10.2 Antiviral Recommendations

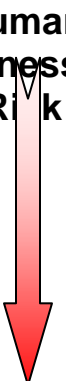
Since published research is lacking in the field of AI, the management of any occurrences in Canada should be used to further the knowledge base, for example through conducting serological surveys and monitoring the impact of antiviral drug use. The current objective for antiviral use is to minimize the direct risk and impact of zoonotic infection. In conjunction with other measure, antiviral prophylaxis may also reduce the risk of the emergence of a virus with pandemic potential.

10.2.1 Prophylaxis

The specific recommendations for the management of contacts, based on the human illness risk and the exposure risk, are summarized in the table 1 below. Additional recommendations follow the table. In making these recommendations it is assumed that antivirals will also be available for early treatment.

Antiviral recommendations should be guided by a risk assessment focusing on the exposure risk and the human illness risk for the specific AI virus (see section 7 for more details). If there

²² Since oseltamivir is only approved for post-exposure prophylaxis, “seasonal” or “pre-exposure” use would be considered an off-label use.

See section 7.2 for details regarding these risk categories.		Exposure Risk		
		Low risk groups	Moderate risk groups	High risk groups
Human Illness Risk 	Subtype has previously been identified and is not known to have caused human illness	- no prophylaxis	- no prophylaxis	- no prophylaxis (see note below table re. cullers*)
	Subtype is known to cause predominantly mild human illness	- no prophylaxis	- consider prophylaxis	- prophylaxis
	Subtype is known to cause predominantly severe human illness	- no prophylaxis (see note below table re. cullers**)	- prophylaxis	- prophylaxis

are no data available on the human illness risk for the strain/subtype for the virus identified, antiviral prophylaxis is not recommended unless implementation of an early antiviral treatment cannot be ensured (e.g. if the worker may not be accessible or able to access medical services in the 10 days following their last exposure). The need for antiviral prophylaxis could be reassessed if culling was indicated.

Table 1: Summary Recommendations for Antiviral Use for AI virus exposures

(Note: As the situation evolves and additional information becomes available the recommendations for individuals may change i.e., they may move between the cells in this table)

Specific considerations for cullers:

* If culling is implemented, given the potentially high concentration of virus and unique situation of a mass cull, prophylaxis may be considered for the cullers in this situation.

** With respect to cullers of asymptomatic presumably non-infected birds, this recommendation for “no prophylaxis” is intended for the situation in which a pro-active cull has been ordered in out lying areas (i.e., not within the infected zone) and is dependent on this designation being made based on a thorough risk assessment with ongoing monitoring of indicators of viral spread. Any illness in presumably non-infected flocks should prompt an immediate repeat risk assessment with concurrent (repeat) exposure assessments for the individuals involved. Post-exposure prophylaxis should be considered for individuals identified “retrospectively” as potentially belonging to a moderate or high risk group.

Additional prophylaxis recommendations:

- a. When indicated oseltamivir prophylaxis should continue for the duration of exposure plus an additional 7 days. The maximum duration of time for continuous prophylactic should be 8 weeks. Consideration may be given to extending oseltamivir prophylaxis beyond 8 weeks on a case-by-case basis after consultation with a physician.
- b. For persons not on continuous prophylaxis, post-exposure prophylaxis (7-10 day course) may be recommended based on the specific exposure risk category (see section 7). Post-exposure prophylaxis should only be offered to household and other close contacts of human cases of avian influenza, if the risk assessment suggested that it is prudent²³.
- c. Zanamivir should be considered a suitable alternative to oseltamivir, especially for pregnant women.
- d. Amantadine could be considered for prophylaxis if the virus is known to be susceptible, however oseltamivir is preferable.
- e. Prophylaxis of infants less than 1 year of age should only be considered after a thorough risk assessment and consultation with a physician as there are limited data on this age group and this would constitute an off-label use.

10.2.2 Treatment

- a. Oseltamivir treatment is recommended for persons one year of age and over, who develop compatible illness following avian exposure. For H7 this can include conjunctivitis and/or influenza-like illness (ILI), specifically fever and cough.
- b. Zanamivir may be considered for treatment of pregnant women if viral replication is believed to be confined to the respiratory tract (as with typical annual influenza). Zanamivir is not indicated if the virus is replicating outside of the respiratory tract (i.e., systemic infection)
- c. Treatment of infants less than 1 year of age should only be considered after a thorough risk assessment and consultation with a physician as there are limited data on this age group and this would constitute an off-label use.
- d. Clinical benefit has been shown when treatment with neuraminidase inhibitors has been initiated as late as 48 hours after onset of symptoms; however, in light of evidence showing continuing replication of avian influenza virus beyond 48 hours (2) after onset of symptoms and therefore a potentially beneficial treatment effect with antivirals, consideration should be given to treating individuals presenting at any point during their illness (i.e., not just during the first 48 hours).²⁴

²³ As per the Canadian Pandemic Influenza Plan the recommended usage may be more broad for Pandemic Phases 4 and 5 where prophylaxis of household contacts may be implemented as part of containment activities.

²⁴ This recommendation is meant to apply specifically to the avian influenza situation where relatively small numbers of human cases are expected and there is evidence of prolonged viral replication suggesting that the use of antivirals is therefore potentially beneficial.

Oseltamivir Dosage²⁵:

	Treatment	Prophylaxis ²⁶
Adults	75 mg bid x 5 days	75 mg daily
Children		
weight ≤ 15 kg	30 mg bid x 5 days	30 mg daily
(≥ 1 year of age) > 15 -23 kg	45 mg bid x 5 days	45 mg daily
> 23 -40 kg	60 mg bid x 5 days	60 mg daily
> 40 kg	75 mg bid x 5 days	75 mg daily

11 Vaccine Programs

During periods of human influenza activity, contacts of known or potential sources of avian influenza virus who have not received the most recent annual influenza vaccine should be offered this vaccine immediately. Receipt of the vaccine should be mandatory for any workers involved in the control of the avian outbreak and ideally should be administered two weeks prior to the potential exposure.

The current human influenza vaccines do not protect the individual against avian influenza; however, the vaccine can potentially reduce the possibility of dual infection with avian and human influenza viruses. There is a theoretical risk that dual infection could occur and result in reassortment. The resultant hybrid virus could be more easily transmitted from person to person and therefore have pandemic potential.

While vaccines against the Asian sub-type of H5N1 avian influenza are under development, recommendations regarding the potential use of this type of vaccine in an avian outbreak situation will not be developed until a product has been approved for use in Canada.

²⁵ Dose adjustment may be necessary with renal impairment

²⁶ For a maximum duration of 6 weeks

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16. Gill, J. et al. Avian Influenza among Waterfowl Hunters and Wildlife Professionals. *Emerging Infectious Diseases*, Vol 12, No. 8, August 2006.
17. Bosman A, Meijer A, Koopmans M. Final analysis of Netherlands avian influenza outbreaks reveals much higher levels of transmission to humans than previously thought. *Euro Surveill* 2005;10(1):E050106.2.

Appendix A: Sample Avian Influenza (H7N3) Outbreak Case Definitions for Investigation of Human Cases Associated with Domestic Avian Influenza Outbreaks

[based on BC Avian Influenza (H7N3) Outbreak Case Definitions, 2004]

The following definitions were developed by the national Respiratory Infections Surveillance Committee (RISC) and the BC Centre for Disease Control to assist with the identification of human influenza A (H7) cases and infections associated with the avian influenza A (H7N3) poultry outbreak in Fraser Valley, British Columbia, which began in February 2004. It is expected that these definitions, which were last updated April 22, 2004, will be modified relative to specific information is obtained specific to the virus strain and the epidemiology and clinical presentation of cases. These sample case definitions are intended to serve as a starting point for jurisdictions dealing with an outbreak of avian influenza and planning an investigation of possible human cases which may arise from an outbreak in birds. Other jurisdictions, not directly affected by the outbreak, are encouraged to refer to the sections of the Canadian Pandemic Influenza Plan that correspond to the pandemic phase (e.g., Canadian Phase 1.0 or 2.0) as indicated by the epidemiological findings from the outbreak.

Suspect Case

An individual presenting with onset of two or more of conjunctivitis* and/or H7N3 related influenza-like illness (ILI) symptoms** occurring between 1 day after first exposure/ contact and 7 days after last exposure/ contact inclusive, to a potential source of avian influenza virus*** in the <geographic area>, <P/T>. Symptoms should not be fully attributable to another known etiology.

*Conjunctivitis Symptoms:

- red eye, eyelid/ conjunctiva inflammation (swelling), tearful eye, itching eye, painful eye, burning eye, discharge from eye, or sensitivity to light.

**H7N3 related ILI Symptoms:

- fever (if measured, greater than 38C), cough, rhinorrhea, sore throat, myalgia/arthralgia, or headache

***Potential source of avian influenza can be:

- infected or potentially infected poultry
- infected or potentially infected raw or under-cooked poultry products
- infected poultry manure
- contaminated surfaces
- contaminated vehicles, equipment, clothing and footwear at involved sites
- contaminated air space
- other infected or potentially infected animals (e.g., wild fowl, swine, etc.)
- individuals known to be infected

Confirmed Case

An individual who fulfills the criteria of a suspect case and has laboratory confirmation of influenza A (H7) virus in any specimen(s) from the eye (conjunctival swab), respiratory tract (nasal or nasopharyngeal swab or nasal wash) and/or serology by at least one of the following:

- 1) Virus isolation in cell culture
- 2) RT-PCR (confirmed by another RT-PCR test on a second specimen sample)
- 3) Evidence of sero-conversion from acute and convalescent sera, taken at a 2 week interval, with a four-fold rise in antibody titre.

Asymptomatic or Atypical Infection:

An individual who either has no clinical symptoms or has a clinical presentation unique from that of a suspect case yet has laboratory confirmation (i.e. as detailed above for a confirmed case) of an infection with influenza A (H7).

Notes:

- Swab or nasal wash samples not to be taken immediately after exposure (> 12 hours recommended) to avoid positive tests due to surface contamination of mucous membranes as opposed to infection of mucous membranes.
- When only convalescent sera are available, control sera can be used as a baseline to assess titre rise. Details on testing are to follow from the National Microbiology Laboratory (NML).
- Due to its higher reported sensitivity, microneutralization techniques are recommended over HI techniques. Specifics on use of microneutralization testing are to follow from the NML.
- Primary Case/Infection: Direct contact with infected or potentially infected poultry, material or poultry products.
- Secondary Case/Infection: Direct contact with an individual who is identified as a confirmed case, a suspect primary case or a person with asymptomatic/ atypical infection.

Appendix B: WHO Case Definitions for Influenza A/H5

Reference: WHO Guidelines for Global Surveillance of Influenza A/H5. February 6, 2004 (from WHO website: http://www.who.int/csr/disease/avian_influenza/guidelines/global_surveillance.pdf)

Confirmed case definition for influenza A/H5

A confirmed case of influenza A/H5 infection is an individual, alive or deceased, in whom laboratory testing demonstrates one or more of the following:

- Positive viral culture for influenza A/H5;
- Positive polymerase chain reaction (PCR) for influenza A/H5;
- Positive immunofluorescence antibody (IFA) test for H5 antigen using H5 monoclonal antibodies;
- 4-fold rise in H5 specific antibody titre in paired serum samples.

The laboratory tests for the diagnosis of influenza A/H5 infection included in the case definition are considered the standard for the identification of these viruses.

Appendix C: Sample Avian Influenza (H7N3) Outbreak Laboratory Testing Recommendations for Investigation of Human Cases Associated with Domestic Avian Influenza Outbreaks

[based on BC Avian Influenza (H7N3) Outbreak Laboratory Recommendations, 2004]

These sample recommendations are intended to serve as a starting point for jurisdictions dealing with an outbreak of avian influenza and planning an investigation of possible human cases which may arise from the domestic outbreak in birds. Other jurisdictions, not directly affected by the outbreak, are encouraged to refer to the sections of the Canadian Pandemic Influenza Plan that correspond to the pandemic phase (e.g., Canadian Phase 1.0 or 2.0) as indicated by the epidemiological findings from the outbreak.

Recommendations from the Respiratory Infections Surveillance Committee, 2004 (RISC²⁷):

1. Persons with a history of exposure to infected poultry, potentially infected poultry or contaminated surfaces who develop a fever, conjunctivitis or respiratory symptoms should have a respiratory sample (e.g., nasopharyngeal swab or aspirate) collected and forwarded to the provincial laboratory.
2. Conjunctival swabs in addition to NP (nasopharyngeal) swabs should be collected on all symptomatic individuals even if eye-related symptoms are absent at the time of presentation.²⁸
3. Swab or nasal wash samples should not be taken immediately after exposure. Waiting at least 12 hours is recommended to avoid positive tests due to contamination of mucous membranes as opposed to infection of mucous membranes.
4. Optimally, an acute- (within 1 week of illness onset) and convalescent-phase (2 weeks after collection of acute specimen) serum sample should be collected and stored locally in case testing for antibody to the avian influenza virus should be needed.
5. When only convalescent sera is available, control sera can be used as a baseline to assess titre rise. Details on testing are available from the National Microbiology Laboratory (NML).
6. Due to its higher reported sensitivity, microneutralization techniques are recommended over hemagglutination inhibition techniques. Specifics on use of microneutralization testing are available from the NML.

²⁷ RISC includes F/P/T epidemiologists and representatives from the National Microbiology Laboratory and the Canadian Public Health Laboratory Network.

²⁸ During the H7 outbreak in the Netherlands in 2003, it was found that conjunctival swabs, even from individuals with no eye-related symptoms, had a superior yield of H7 viruses and therefore were an important specimen to collect for virus isolation.

Appendix D: Example of Lead Agency Responsibilities – BC Outbreak

Type of Person Potentially Exposed	Designated Lead Agency:		
	Enhanced Surveillance Recommendations	Public Health Recommendations	Clinical Occupational Health
Infected Farms Identified for Special Culling			
1. Farmer/producer & farm employees who report unusual illness on farm	LPHA	LPHA	WCB
2. Feeding crews may be visiting farm to provide feed for poultry during process	LPHA	LPHA	WCB
3. Veterinarian visits farm and CFIA hired crew collect swabs from ill or dead birds	CFIA	CFIA	WPHSP
4. Laboratory workers do PCR testing on poultry swabs sent to CFIA Winnipeg laboratory	CFIA	CFIA	WPHSP
5. CFIA hired crew prepare barn for culling	CFIA	CFIA	WPHSP
6. CO2 technicians deliver CO2 to the farm	LPHA	LPHA	WCB
7. CFIA hired crew administer CO2 gas to the barn	CFIA	CFIA	WPHSP
8. “Sniffer” crews ensure CO2 gas has dissipated next day	LPHA	LPHA	WCB
9. CFIA hired crew load bird carcasses into biosafety containers and onto trucks, perform on farm composting of carcasses and monitor sites.	CFIA	CFIA	WPHSP
10. Truckers transport carcasses (still contained in biosafety units) to incinerator	LPHA	LPHA	WCB
11. Incineration workers (note: containers still sealed) unload biosafety containers at incineration site & incinerate	LPHA	LPHA	WCB
12. CFIA hired crew dispose of manure in the barns	CFIA	CFIA	WPHSP
13. CFIA hired crew clean and disinfect barns	CFIA	CFIA	WPHSP
Non-Infected Farms Identified for Regular Slaughter			
1. Farmer/producer & farm employees or families caring for birds on farm.	LPHA	LPHA	WCB
2. Feeding crews visiting farm to provide feed for poultry.	LPHA	LPHA	WCB
3. Crews changing poultry bedding in barns.	LPHA	LPHA	WCB
4. CFIA crews collecting birds for testing.	CFIA	CFIA	WPHSP
5. Veterinarian taking swabs for testing.	CFIA	CFIA	WPHSP
6. Laboratory technicians doing PCR testing.	CFIA	CFIA	WPHSP
7. Catching crews helping to move birds from one farm to another or one barn to another.	LPHA	LPHA	WCB
8. Catching crews loading poultry onto trucks for transport.	LPHA	LPHA	WCB
9. Truck drivers transporting poultry to slaughter facility.	LPHA	LPHA	WCB
10. Slaughterhouse/processing plant employees.	LPHA	LPHA	WCB
11. Pre-slaughter inspectors at slaughter facility	CFIA	CFIA	WPHSP
12. Crew disposing of manure in barns	LPHA	LPHA	WCB
13. Crew cleaning barns	LPHA	LPHA	WCB

Acronyms: LPHA= Local Public Health Authority; CFIA=Canadian Food Inspection Agency; WCB=Workers’ Compensation Board; WPHSP=Work Place Health and Safety Program

NOTE: The mandate of WCB varies between P/Ts specifically with respect to their involvement in prevention-focused activities. Another authority might have to assume the prevention functions for workers in P/Ts where this is not the mandate of WCB.

NOTE: P/T Public Health Authority provides technical support to Local Public Health Authority (LPHA)

NOTE: The Public Health Agency of Canada provides technical support to Canadian Food Inspection Agency (CFIA) and to P/T public health authorities.

Appendix E: Canadian Animal Health Network Contacts for Chief Veterinary Officers for Animal Influenza Surveillance

Organization	Prov	Member	Telephone/Fax	Email
CFIA, CVO of Canada's Office	C-CVO	Brian Evans	P-613-225-2342 F-613-228-6126	bevans@inspection.gc.ca
Newfoundland Dept. Of Forest Resources & Agri-foods	NF	Hugh Whitney	P-709-729-6879 F-709-729-4857	hughwhitney@mail.gov.nf.ca
PEI Department of Agriculture, Fisheries and Aquaculture	PEI	Bob Morrison	P-902-368-5087 F-902-368-4857	wrmorrison@gov.pe.ca
Nova Scotia Dept. of Agriculture	NS	Gord Finley	P-902-893-3491 F-902-895-6684	finleygg@gov.ns.ca
New Brunswick Dept. Of Agriculture and Rural Development	NB	Jim Goltz	P-506-453-2219 F-506-453-7918	jim.goltz@qnb.ca
MAPAQ	PQ	Michel Major	P-418-380-2100 poste 3123 F-418-380-2169	mmajor@agr.gouv.qc.ca
	PQ	Martine Dubuc	P-418-380-2100 poste 3121, F-418-380-2169	martine.dubuc.@mapaq.gouv.qc.ca
Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA)	ON	Deb Stark	P-519-826-3528 F-519-826-7819	deb.stark@omafra.gov.on.ca
Manitoba Agriculture, Food & Rural Initiatives (MAFRI)	MB	Wayne Lees	P-204-945-7685 F-204-945-4327	wlees@gov.mb.ca
Saskatchewan Agriculture and Food (SAF)	SK	Robert Kerr	P-306-787-5547 F-306-787-1315	rkerr@agr.gov.sk.ca
Alberta Agriculture, Food and Rural Development	AB	Gerald Ollis	P-780-427-6406 F-780-415-0810	gerald.ollis@gov.ab.ca
British Columbia Ministry of Agriculture, Fisheries and Food	BC	Ronald Lewis	P-604-556-3010 F-604-556-3010	ron.lewis@gov.bc.ca
North West Territories Resources, Wildlife & Economic Development	NWT	Brett Elkin	P-867-873-7761 F-867-873-0293	brett_elkin@gov.nt.ca

Appendix F: BC Outbreak Reporting Questionnaire - April 2004

The questionnaire that follows was developed by the BC Centre for Disease Control (BCCDC) for use during the 2004 avian influenza H7N3 outbreak in British Columbia with input from scientists who were previously involved in the response to an avian influenza H7N7 outbreak in the Netherlands in 2003.



Avian Influenza in British Columbia Initial Report Surveillance Form, 2004

When completed, please fax to the attention of: Dr. _____, BCCDC, 604-_____

SUGGESTED OPENING SCRIPT:

Hello. My name is: _____. I am a public health nurse from _____ (health unit).

As part of our duties under the Health Act, we are following-up with people who may have been exposed to avian influenza, otherwise known as "bird flu". The avian influenza virus causing outbreaks in poultry in British Columbia may have caused some illness in people who have had contact with infected birds. This form of influenza virus has never before been known to cause illness in humans.

For this reason, it is very important that we collect detailed information about this outbreak and any possible illness in people. All identifying information that is collected will be kept private and confidential and shared only with public health officials who need to know in order to understand and contain this outbreak. Depending on the information we collect, this may take up to 20 minutes. Are you ready to begin? **If no**, when would be a better time? _____

[If interview not proceeding well] Is there someone else that I should speak to instead in your home (or farm etc) related to this outbreak? If so, who? _____ (name/contact information)

Please use back of page for additional notes, including commentary on relevant details & dates (e.g., direct exposures, incidents, personal protection equipment, etc.).

Section I. HEALTH AUTHORITY INFORMATION	
Is this a NEW report or an UPDATE ?	Date of report (dd/mm/yyyy): ____/____/____
PHN/Person Reporting: _____	Health Unit Reporting: _____
Phone: _____	Province Reporting: _____
Section II. PERSONAL INFORMATION	
Assigned ID: ____/____/____ (Initial of last name, Initial of first name, age in years)	
[NOTE: All symptomatic workers from outside of BC will be reported to the applicable provincial epidemiologist by the BC Centre for Disease Control & vice-versa]	
Last name: _____	First name: _____
Home Address: _____	Home City: _____
Province of Residence: _____	Postal Code: _____
Phone Numbers in Province of Residence: _____ (home, office &/or, cell)	
Address while in BC if different from above: _____	
Phone Number(s) while in BC if different from above: _____	
Planned date of return to Province of Residence (if applicable): (dd/mm/yyyy): ____/____/____	
What is your occupation? _____	Employer: _____
Public health please indicate appropriate relationship based on occupation/employer:	
Relationship to Farm: <input type="checkbox"/> Farm owner	<input type="checkbox"/> Family member of owner <input type="checkbox"/> Farm employee
<input type="checkbox"/> CFIA worker	<input type="checkbox"/> Other (specify): _____
Date of Birth (dd/mm/yyyy): ____/____/____ or Age: ____yrs Gender: <input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> Unknown	

Section III. SYMPTOMS

1. Have any of the following eye symptoms started or become worse than usual since February 06, 2004? (*Tick all that apply. Please record only NEW or WORSE symptoms*)

- | | | | | | |
|----------------------|----------------------------------|------------------------------------|----------------|----------------------------------|------------------------------------|
| Red eye(s) | <input type="checkbox"/> One eye | <input type="checkbox"/> Both eyes | Tearful eye(s) | <input type="checkbox"/> One eye | <input type="checkbox"/> Both eyes |
| Burning eye(s) | <input type="checkbox"/> One eye | <input type="checkbox"/> Both eyes | Painful eye(s) | <input type="checkbox"/> One eye | <input type="checkbox"/> Both eyes |
| Itching eye(s) | <input type="checkbox"/> One eye | <input type="checkbox"/> Both eyes | Pus in eye(s) | <input type="checkbox"/> One eye | <input type="checkbox"/> Both eyes |
| Sensitivity to light | <input type="checkbox"/> One eye | <input type="checkbox"/> Both eyes | | | |

If yes, what day did the first of these symptoms start (dd/mm/yyyy)? ____/____/____

If yes, how would you rate these symptoms? Mild Moderate Severe Unknown

If yes, did these symptoms start suddenly or gradually? Suddenly Gradually Unknown

2. Have any of the following influenza-like symptoms started or become worse than usual since February 06, 2004? (*Tick all that apply. Please record only NEW or WORSE symptoms*)

- | | | |
|--|-----------------------------------|---------------------------------------|
| <input type="checkbox"/> Fever → Temperature _____ | <input type="checkbox"/> Cough | <input type="checkbox"/> Runny Nose |
| <input type="checkbox"/> Sore Throat | <input type="checkbox"/> Headache | <input type="checkbox"/> Muscle Aches |
| <input type="checkbox"/> Fatigue | <input type="checkbox"/> Diarrhea | <input type="checkbox"/> Joint Aches |
| <input type="checkbox"/> Chills | <input type="checkbox"/> Sweats | |

If yes, what day did these symptoms start (dd/mm/yyyy)? ____/____/____

If yes, how would you rate these symptoms? Mild Moderate Severe Unknown

If yes, did these symptoms start suddenly or gradually? Suddenly Gradually Unknown

3. Did you have any other symptoms that started or became worse than usual since February 06 2004 that you think may have resulted from contact with poultry? Yes No Unknown

If yes, please describe your symptoms:

If yes, what day did these symptoms start (dd/mm/yyyy)? ____/____/____

If respondent reports any of the symptoms mentioned above, please make arrangements to collect serum, eye swabs and nasopharyngeal swabs for laboratory testing.

Section IV. CONTACTS

- How many people live in the same house as you (not including yourself)? _____
- Besides other people living in your household, with how many people do you have close personal contact? This may include family members, intimate partners, etc. _____
- Have any of your household members or other personal close contacts told you that they have had any of the symptoms I mentioned earlier? Yes No Unknown
- If yes**, what is/are their name(s), what symptoms did they experience, and how may we contact them?

Name	Relationship	Symptoms	Onset (dd/mm/yyyy)	Contact Number
			/ /	
			/ /	
			/ /	
			/ /	

For public health completion: Are these ill contacts potential products of person-to-person transmission?

- Yes No Unknown Please explain (yes or no): _____

If the respondent did not have any symptoms please continue with Section VII, « Other People Exposed » on page 5.

Section V. CLINICAL INFORMATION

1. Did you see a physician for your symptoms? Yes No Unknown
If yes, was the physician a (tick all that apply): General Practitioner or a Specialist
If yes, what was the diagnosis? _____

Physician Name

Physician Address/Phone Number

2. Did you go to an Emergency Room for these symptoms? Yes No Unknown
If yes, where: _____ If yes, when (dd/mm/yyyy) ____/____/_____

3. Were you hospitalized overnight for these symptoms? Yes No Unknown
If yes, where: _____ If yes, when (dd/mm/yyyy) ____/____/_____

4. Did you have a chest X-ray taken because of these symptoms? Yes No Unknown
If yes, where: _____ If yes, when (dd/mm/yyyy) ____/____/_____
- If yes**, what was the result: _____

5. How are you feeling today? The Same Better Worse Completely Recovered
If recovered, what was the first day that you no longer had any symptoms? (dd/mm/yyyy) ____/____/_____

6. Have you received influenza vaccination since September 2003? Yes No Unknown
If yes, date? (dd/mm/yyyy) ____/____/_____

If yes, why?

- | | |
|---|--|
| <input type="checkbox"/> Age over 65 | <input type="checkbox"/> Lung disease (e.g. asthma, emphysema, COPD) |
| <input type="checkbox"/> Diabetes | <input type="checkbox"/> Immune deficiency |
| <input type="checkbox"/> At my own request | <input type="checkbox"/> Because of avian influenza (after Feb 06, 2004) |
| <input type="checkbox"/> Offered through work before Feb 06, 2004 | <input type="checkbox"/> Other (specify) _____ |

7. Have you taken anti-viral medications (e.g. Tamiflu or Amantadine) since February 06, 2004?
- | | |
|--|----------------------------------|
| <input type="checkbox"/> Yes, as a treatment for eye/influenza symptoms | <input type="checkbox"/> No |
| <input type="checkbox"/> Yes, as a preventative measure due to exposure to poultry | <input type="checkbox"/> Unknown |
| <input type="checkbox"/> Yes, for another reason (specify) _____ | |

If yes, specify name (e.g. Tamiflu or Amantadine): _____

If yes, how many tablets did you take each day? _____

Start date: ____/____/_____ Stop date: ____/____/_____

8. Are you currently a smoker? Yes No **If yes**, how many packs do you smoke each day? _____
For how many years have you smoked? _____

Section VI. EXPOSURE INFORMATION

1. Since February 6, 2004 have you had contact with poultry, poultry products, or poultry manure?
 Yes No Unknown **If yes**, When was your first contact/exposure? (dd/mm/yyyy) ____/____/____
 When was your last contact/exposure? (dd/mm/yyyy) ____/____/____
2. Do any of these statements apply to you (tick **all** that apply)?
- | | | | |
|--|------------------------------|-----------------------------|----------------------------------|
| a) I own a poultry farm | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| b) I live on a poultry farm | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| c) I am a family member or household contact of a poultry farmer | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| d) I am employed by a poultry farm | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| e) I am a veterinarian | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| f) I have been helping cull poultry | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| g) I have been transporting poultry carcasses | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| h) I have been working at an incinerator | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| i) Other (please specify): _____ | | | |
3. What poultry farm(s) have you visited or worked on since Feb 6, 2004? Were these infected with avian influenza? *(Last 4 columns to be completed by public health staff with information from CFIA.)*
- | Name of Farm | Farm Location | Infected? | Date Positive
<small>(dd/mm/yyyy)</small> | Date Culled
<small>(dd/mm/yyyy)</small> | Date Clean
<small>(dd/mm/yyyy)</small> |
|--------------|---------------|--|--|--|---|
| _____ | _____ | <input type="checkbox"/> Yes <input type="checkbox"/> No | | | |
| _____ | _____ | <input type="checkbox"/> Yes <input type="checkbox"/> No | | | |
| _____ | _____ | <input type="checkbox"/> Yes <input type="checkbox"/> No | | | |
4. Have you participated in any of the following activities *(Please tick all that apply)*?
- | | | | |
|---|------------------------------|-----------------------------|----------------------------------|
| a) I have not been directly involved with poultry | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| b) I worked at an incinerator | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| c) I worked in a slaughter house | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| d) I brought equipment to farms (e.g. equipment to gas flocks) | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| e) I worked with carbon dioxide gas to euthanize the birds | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| f) I collected eggs | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| g) I was in direct contact with surfaces that may have been contaminated by poultry | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| h) I was in direct contact with manure from the poultry | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| i) I shared a confined air space with infected or potentially infected poultry | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| j) I assessed the health of poultry | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| k) I caught live poultry | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| l) I had other contact with live poultry (specify) _____ | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| m) I collected dead poultry | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| n) I had other contact with dead poultry (specify) _____ | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| o) I loaded / unloaded poultry carcasses into / out of trucks | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Unknown |
| p) Other (please specify): _____ | | | |
5. Do you wash your hands after such exposure/activities? Yes No Unknown
 If yes, is this: Always Usually Sometimes Rarely
6. **If you have been exposed to potentially infected poultry**, were you wearing any of the following during your exposure? (tick all that apply)
- | | | | |
|--|---|--|---|
| <input type="checkbox"/> Gloves | <input type="checkbox"/> Mask (Type _____) | <input type="checkbox"/> Goggles | <input type="checkbox"/> Safety glasses |
| <input type="checkbox"/> Impermeable Coveralls | <input type="checkbox"/> Disposable shoes or shoe covers | <input type="checkbox"/> Head and hair cover | |
| <input type="checkbox"/> Disposable Outer garments | <input type="checkbox"/> Boots that you clean and disinfect after exposure and wear again | | |
| <input type="checkbox"/> Outer garments that you wash and wear again | | | |

Section VI. EXPOSURE INFORMATION cont.

7. Can you remember any concerning incidents in terms of exposure? Please describe. Please keep in mind that all of this information will be kept confidential (use space overleaf if necessary).

8. Have you had close contact with a person who lives/works on a poultry farm and who has/had respiratory or eye symptoms? Yes No Unknown

By close contact, we mean family members, roommates, intimate partners, etc.

If yes, who (and relationship to you)? _____

If yes, date of first exposure (dd/mm/yyyy): ____/____/____ Date of last exposure (dd/mm/yyyy): ____/____/____

People at increased risk:

9. Are there any children in your household? Yes No Unknown

10. Are there any elderly people in your household? Yes No Unknown

11. Do you have a heart or lung condition? Yes No Unknown

12. Do you have any other chronic conditions? Yes No Unknown

If yes to any other chronic conditions, specify: _____

13. Have you been told that you have a weak immune system? Yes No Unknown

This could be due to a health condition (e.g. cancer, HIV) or medications that you may be taking.

If yes to a weak immune system, specify: _____

14. Do you have a chronic eye condition? Yes No Unknown

If yes to a chronic eye condition, specify: _____

15. Do you have any allergies? Yes No Unknown

If yes, to any allergies: Food Dust, dander, pollen Medication Other, sp: _____

If any elderly people, children or persons with weak immune systems or chronic conditions are in the household, these persons should be strongly encouraged to avoid any contact with poultry that may be infected.

Section VII. OTHER PEOPLE EXPOSED

If exposed at a farm: Have any other people had close contact with infected birds at the same farm as yourself (direct handling of birds or manure or shared the same confined airspace as infected birds)?

Yes No Unknown; If yes, how many people? _____

If yes, what are their names? What symptoms did they experience? What are their phone numbers?

Name	Symptoms (specify, or indicate none or unknown)	Contact Number
------	---	----------------

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Thank you very much for taking the time to answer our questions. This is the first time this form of avian influenza virus has caused illness in people. There may be other questions we need to ask you as part of our public health follow-up and if so we may call you back. You are also free to call us anytime if you have any questions at:_____.

Finally, if special studies are set up in the future to understand avian influenza viruses, would you be interested in hearing about these? Yes No

NOTE TO INTERVIEWER: Conclude with relevant public health recommendations and offer to send "Dear Poultry Farmer" letter or other information if appropriate and not already received.

Appendix G: Sample Farmer Information Letter

Dear Poultry Farmer –

Please also share this information with your family, crew, co-workers & employees -

Avian Influenza – Important Health Information for Poultry Farmers, their Families and Employees

I. What is avian influenza?

Influenza (“flu”) viruses that infect birds are called avian influenza viruses. These viruses are related to but different from human influenza viruses. Some avian influenza viruses are called “highly pathogenic” because they can cause severe outbreaks of “bird flu” or “chicken flu” in poultry that can spread quickly between flocks.

II. What is the cause of avian influenza outbreaks in BC in 2004?

A “highly pathogenic” avian influenza virus is currently causing illness in poultry flocks in the Fraser Valley. This virus belongs to the H7 subtype of influenza virus and is called H7N3. H7 subtypes of avian influenza have caused serious outbreaks in poultry before. In the Netherlands, an outbreak of a “highly pathogenic” H7N7 avian influenza virus led to the depopulation of 30 million birds during the spring and summer 2003.

It is likely that wild waterfowl such as ducks or geese are the original source of outbreaks of avian influenza in poultry. Waterfowl are known to be infected with many different avian influenza viruses and they can shed these viruses in their feces even if they are not ill. Commercial and domestic farms may be contaminated as waterfowl migrate. The spread of the avian influenza virus from farm-to-farm thereafter may occur in many different ways including contaminated vehicles, equipment or surfaces (such as boots or clothing) or by infected people.

III. Can avian influenza viruses cause infections in humans?

Only a few avian influenza viruses have been known to cause illness in people. This likely occurs by direct contamination of the eyes, nose or mouth or by contaminated hands, or by breathing in virus released into the air of a confined space. Such infections have been reported with “highly pathogenic” H5 and H7 subtypes of avian influenza viruses. H5 avian influenza viruses have caused widespread poultry outbreaks in Asia and people have died from severe illness as a result of close contact with infected birds.

Human illness due to H7 occurred in the Netherlands in 2003 in people who had close contact with infected birds. In some cases, infected people also passed it on to their household or other close personal contacts. Most people who got avian influenza due to H7 in the Netherlands had mild illness, but one person died. The H7 strain of avian influenza affecting birds in the Fraser Valley has also caused mild illness, such as red eyes, cough, sore throat and runny nose in people who have had close contact with infected birds.

IV. Why is it so important to prevent avian influenza infections in people?

It is very important to prevent infections due to avian influenza viruses in people, even if it seems like it is only a mild illness. The reason for this is because influenza viruses are very changeable. Sudden mutations in the virus can lead to severe illness, even if the virus only caused mild symptoms initially. Also, if a person is infected with an avian influenza virus and with a human influenza virus at the same time, the two viruses can mix and exchange information so that the bird virus can learn how to spread easily from person to person. When these changes occur, there is a risk that large scale outbreaks (or “pandemics”) of severe disease in people could get started. For this reason it is very important to prevent any infection due to avian influenza virus in people. Poultry farm operators, their families or their employees are of greatest concern to us, because they might have close unprotected contact with infected birds and can then be the link between poultry outbreaks and outbreaks in people.

Avian Influenza – Protect Your Farm and Your Family

1. Follow strict hygiene measures after contact with poultry, manure or contaminated surfaces. Wash your hands frequently with soap and water for at least 30 seconds and avoid touching your eyes, nose or mouth with your hands.

2. Reduce the amount of time you spend in close contact with potentially infected poultry or manure. By close contact, we mean minimize direct handling or sharing the same confined airspace as the birds or manure. Elderly people, children, & persons with chronic or immune-compromising conditions should avoid any contact with potentially infected poultry or manure. Persons with flu-like symptoms should avoid contact so as to minimize the chance that human and bird influenza viruses could mix.

3. When in close contact with potentially infected poultry or manure, wear protective equipment:

- Disposable gloves or heavy duty rubber work gloves that can be disinfected should be worn. Remove gloves promptly after use and before touching non-contaminated items or surfaces and wash your hands immediately with soap and water for at least 30 seconds.
- Protective clothing, preferably disposable and impermeable outer garments or coveralls should be worn.
- Open wounds or sores should be covered.
- Disposable head or hair cover should be worn.
- Disposable protective shoe covers are preferred but if not available, wear rubber or polyurethane boots that can be cleaned & disinfected.
- Disposable masks (N-95, fit-tested) should be worn. Safety goggles should be worn to protect the eyes.
- After use, disposable personal protective equipment should be double-sealed in plastic bags and discarded as directed by the Canadian Food Inspection Agency.
- Non-disposable equipment or apparel should be cleaned of any soil, manure or other organic matter and then disinfected before being introduced into a non-contaminated environment. Utmost caution should be followed during the cleaning or disinfecting procedure including wearing of gloves, outer garment and goggles to prevent splash of infected material.

4. Farmers, families, crews, employees or visitors should restrict their movement between avian influenza infected and non-infected farms. Shoes or other potentially contaminated clothing worn near or in barns with infected (confirmed or where there has been unusual bird illness or die-off) poultry, manure or products should ideally not be worn off that immediate site, and if so, only after thorough cleaning and disinfection. Farmers, employees or crews from infected farms should not visit, travel to or from or work on non-infected farms and any visitors to infected farms should be restricted until the farm is officially cleared. A process for cleaning & disinfecting shoes of unexpected visitors should be in place for when they leave the premises.

5. During this outbreak, poultry farm workers, their families and employees who may have close contact with any poultry should receive this year's influenza vaccine as soon as possible. This is to prevent infection with human influenza viruses that are still known to be circulating in BC as of April 2004. This vaccine is free to you and can be obtained through the local health unit for this outbreak. This vaccine is available free of charge. To find out how to obtain the vaccine, phone Public Health at 1-866-854-5255.

6. Farmers or other persons with close contact with known avian influenza infected poultry or manure (or on a poultry farm in the control zone where there have been unusual illness or die-off amongst birds) should receive a drug called Tamiflu® during their exposure to prevent infection with avian influenza. This drug is available free of charge during this outbreak if you present this letter and a prescription from your doctor. Phone Public Health at 1-866-854-5255 to find out how to obtain this medication. The drug should be continued until the poultry have been removed, barns have been cleaned and manure has been covered for compost or else removed. Other people on poultry farms in

the control area who do not have close contact with infected or ill birds or possibly contaminated manure should watch closely for flu-like symptoms in themselves and seek immediate medical care should they occur. If you are uncertain about your own risk or possible exposure, please contact Public Health at 1-866-854-5255 for advice.

7. Watch for red, itchy or burning eyes or flu-like symptoms (i.e., cough, runny nose, sore throat, feverishness or aches) starting within one week of exposure to poultry, manure or contaminated surfaces or contact with other ill persons who may have had this kind of exposure. If these symptoms develop seek medical care immediately and notify the health care provider of your possible exposure before arriving at his/her office so he/she can take proper precautions. Take this letter with you and request that he/she contact the local Medical Health Officer for detailed information on testing and early treatment with Tamiflu®. You should also report your symptoms to Public Health at 1-866-854-5255 directly. You will receive instructions on how to limit the risk to your household or other close personal contacts. Except for visiting your physician, stay home and minimize contact with others until you are advised by Public Health that you can resume normal activities (usually until 24 hours after symptoms have completely cleared).

Appendix H: Sample Letter for Contacts of Avian Influenza Virus

Dear Sir / Madam,

Re: Avian Influenza – Important Information to Protect Yourself and Your Community

You have received this letter because you may be exposed to avian influenza virus in chickens (Chicken Flu). If you have any questions after reading this letter, please contact your local health unit or workplace health services.

What is avian influenza?

Influenza viruses that infect birds are called avian influenza viruses. These are related to but different from human influenza viruses. Most avian influenza viruses do not cause illness in humans and most are not passed from person-to-person. Only a few avian influenza viruses have been known to cause illness in people.

What is the risk to me?

It is possible that people could become infected with an avian influenza virus if they have contact with a living or dead infected bird or its feces, respiratory secretions, products or contaminated surfaces or by breathing in virus released into the air of a confined space. Such infections have been reported with H7 and H5 subtypes of avian influenza viruses. Human illness due to H7 has mostly been mild, with only one death reported in the Netherlands in 2003, but human illness due to H5 has been severe with several deaths being reported in people in Asia.

What are the risks to others?

Influenza viruses are very changeable. If a person is infected with an avian influenza virus and with a human influenza virus at the same time, the two viruses can exchange information so that the avian influenza virus can then spread easily between people. Mutations in the virus can also cause severe illness in others, even if it only causes mild symptoms in people who are first infected. When these changes occur, there is the risk that large scale outbreaks (or “pandemics”) could get started. It is important for everyone that strict public health and workplace safety recommendations are followed to help prevent such pandemics when working with poultry outbreaks of avian influenza.

How do I protect myself and others when exposed to an avian influenza outbreak?

The following safety guidelines should be strictly followed when working at an avian influenza outbreak:

- a. You should receive the current season’s **influenza vaccine as soon as possible** and ideally two weeks before planned work or other exposure. Although the vaccine will not protect you from avian influenza, it will prevent dual infections with avian and human influenza viruses at the same time. The vaccine can be obtained free from your physician, local health unit or workplace health service when you present this letter.
- b. You should receive Oseltamivir (Tamiflu®), an anti-influenza drug, daily during your exposure and for seven days after your last exposure to living or dead infected poultry, products, secretions or contaminated surfaces. **This is to protect you from avian influenza.** To obtain a prescription, contact your personal physician. Always take this letter with you. The drug is available free to you from your local health unit when you present the prescription AND this letter or you can buy it at a pharmacy with your prescription.
- c. Follow **strict personal protective measures** while exposed including: the wearing of disposable gloves, protective clothing and shoes, safety goggles and disposable fit-tested masks (particulate respirators, N95 type). After contact with living or dead infected poultry, products or contaminated surfaces and after removal of gloves, wash your hands thoroughly for 30 seconds. Full safety precautions should be reviewed with your supervisor and/or workplace health and safety representative before entering the site.
- d. **Watch for signs of illness** such as fever, respiratory symptoms (cough, sore throat, runny nose etc), eye infections (redness or discharge) or other flu-like symptoms for **one week** after your last exposure to live or dead avian influenza-infected birds, products, secretions or contaminated surfaces.
- e. **If symptoms develop**, seek immediate medical care. Notify the health care provider of your exposure to avian influenza and take this letter with you so he/she can take proper precautions and prescribe appropriate testing and treatment. Treatment is most effective if given within 48 hours of onset of symptoms so see your physician right away.
- f. **If symptoms develop**, also notify the local health unit, and your workplace health and safety representative immediately. Except for visiting your physician, stay home and minimize contact with others until you are advised by the local health unit that you can resume normal activities (usually 24 hours after symptoms have cleared).

Appendix I: Sample Letter for Physicians seeing Contacts of Avian Influenza Virus

Dear Doctor,

Re: Exposure to Avian Influenza: Vaccination, Prophylaxis or Testing & Treatment

This patient is presenting because of possible exposure to avian influenza for one of three reasons: (1) to receive influenza vaccine pre-exposure; (2) to receive a prescription for prophylaxis with an antiviral drug during exposure or (3) for testing and treatment because of flu-like symptoms that have developed following exposure. The information below may assist you in managing this patient appropriately. For more information or if you have any questions, please contact the local health unit.

I. Vaccination to Prevent Illness Pre-Exposure

All poultry workers who will be exposed to live or dead avian influenza infected birds, bird products, secretions or contaminated surfaces should receive the current season's influenza vaccine at no charge to them and as early as possible before exposure (preferably, at least two weeks prior). If exposure has already occurred, vaccination is still encouraged in order to protect against future re-exposures.

Such vaccination will not protect the worker from avian influenza but will help guard against genetic reassortment between avian influenza and human influenza virus strains as a result of dual infection. This is an important public health measure to guard against introduction of novel subtypes of influenza viruses into the human population and to help avert potential pandemics. Please provide this vaccine from the publicly funded supply of influenza vaccine to patients presenting with this letter who have not already been vaccinated this season. If vaccine is unavailable in your office, please arrange for provision via the local health unit. Again, this vaccine should be provided at no charge to the patient.

II. Prophylaxis to Prevent Illness During Exposure

Antiviral prophylaxis to prevent illness during exposure is recommended for all workers. This should be taken daily during exposure and for seven days after last exposure with living or dead avian influenza infected poultry, products, secretions or contaminated surfaces. A neuraminidase inhibitor (Oseltamivir) is the first choice since the likelihood is smaller that the virus will be resistant to this class of antiviral drugs than to amantadine.

Review contraindications with the patient and if appropriate, provide a prescription for Oseltamivir for this patient. If you have concerns, consult with the local Medical Health Officer. Oseltamivir is available in limited quantities for purchase from a local pharmacy. During this outbreak, it is also available free of charge from the local health unit for poultry workers when accompanied by a doctor's prescription and this letter.

The recommended dose of Oseltamivir for anti-influenza prophylaxis is 75 mg once daily for the period of exposure and for seven days after the last exposure.

III. Testing and Treatment Post-Exposure if Symptoms Develop

If the patient is presenting with fever, respiratory symptoms, conjunctivitis or other influenza-like illness with onset within 10 days of last exposure to live or dead avian influenza infected poultry, products, secretions or contaminated surfaces, please do the following:

- 1) Take personal protective measures including respiratory precautions when handling the patient (isolation, mask, gloves, handwashing).
- 2) Notify the local Medical Health Officer immediately.
- 3) In consultation with the local Medical Health Officer, obtain appropriate specimens (nasal, nasopharyngeal, conjunctival swabs) in a virus specimen collection kit as well as a clotted blood specimen for acute serology followed by a second blood specimen at least two weeks later for convalescent serology.
- 4) Review contraindications and if appropriate, prescribe treatment. Treatment with anti-influenza drugs is most effective if given within 48 hours of onset, but more delayed treatment may be considered if the patient presents late, in consultation with the health unit. A neuraminidase inhibitor (Oseltamivir) is the first choice.
- 5) Dosage for treatment with Oseltamivir is: 75 mg bid for five days.
- 6) Oseltamivir is available in limited quantities for purchase from a local pharmacy. During this outbreak, it is also available free of charge from the local health unit for poultry workers. The worker must have a doctor's prescription and should bring this letter with him/her.

Please keep a copy of this letter on file and ensure the patient also retains a copy.

Appendix J: Sample Oseltamivir Information Sheet

OSELTAMIVIR PHOSPHATE (Tamiflu®):

Oseltamivir is a drug which prevents the spread of the influenza virus in an infected person. It is a neuraminidase inhibitor which inhibits the enzyme responsible for cleaving the viral load from the host cell thus preventing it from further dissemination. It is active against both influenza A and B viruses.

Oseltamivir is indicated both as a chemoprophylactic and treatment agent. It is most effective in uncomplicated influenza cases.

Indications:

Oseltamivir is indicated for the treatment of influenza in patients 1 year of age and older within 2 days (48 hours) of onset of symptoms. The efficacy for oseltamivir has not been established for those patients beginning treatment after this 2 day period. It can be also used as a chemoprophylactic agent in persons 13 years of age and older. Oseltamivir is prescribed as an adjunct to influenza vaccination but is not a substitute for the vaccine. Oseltamivir is not indicated in children < 1 year of age.

Contraindications:

Hypersensitivity to the drug or any of its excipients. The drug formulation contains pregelatinized starch, talc, povidone K 30, croscarmellose sodium, and sodium stearyl fumarate. The capsule shell contains gelatin, titanium dioxide, yellow iron oxide, black iron oxide, red iron oxide, and FD&C Blue No. 2 colourant.

Pharmacokinetics:

Oseltamivir is administered orally. Oseltamivir is a prodrug that is hepatically metabolized extensively to oseltamivir carboxylate by hepatic esterases. Oseltamivir and oseltamivir carboxylate have low protein binding. Neither oseltamivir nor oseltamivir carboxylate are substrates, nor inhibitors of the cytochrome P450 isoenzymes.

Oseltamivir carboxylate is eliminated renally by excretion into the urine. Dosage adjustments are recommended in patients with renal impairment and with serum creatinine clearance < 30 mL/min.

Precautions:

Safety in hepatic impairment has not been established. Adjust dosing if serum creatinine < 30 mL/min. Pregnancy category C: crosses the placenta and secreted into breast milk but no human data on safety; use in pregnancy and lactation only if potential benefits outweigh the risks.

Drug Interactions:

No significant drug interactions. Co-administration with probenecid may result in a 2-fold increase in exposure to oseltamivir carboxylate, however this does not compromise the safety margin of the oseltamivir carboxylate.

Adverse Effects:

Nausea and vomiting are reported most commonly and are generally mild to moderate, occurring during the first 2 days of therapy.

Other less common effects include diarrhea, abdominal pain, otitis media/ear disorder, asthma, epistaxis, pneumonia, sinusitis, bronchitis, conjunctivitis, dermatitis, lymphadenopathy, and tympanic membrane disorder.

Observed effects (post-marketing): rash, swelling of the face or tongue, toxic epidermal necrolysis, dermatitis, rash, eczema, urticaria, erythema multiforme, Stevens-Johnson-Syndrome, hepatitis, abnormal liver function tests, arrhythmia, seizure, confusion, anaphylactic reactions, and aggravation of diabetes. The causal relationship of these adverse effects to the drug has not been established.

Dosage:

Body Weight, Age, or Serum Creatinine	Treatment	Prophylaxis
Body Weight ≤ 15 kg (≤ 33 lbs)	30 mg bid x 5 days	
> 15 to 23 kg (> 33 to 51 lbs)	45 mg bid x 5 days	
> 23 to 40 kg (> 51 to 88 lbs)	60 mg bid x 5 days	
> 40 kg (> 88 lbs)	75 mg bid x 5 days	
Age: > 13 years and older	75 mg bid x 5 days	75 mg od x 7 days
Serum Creatinine: 10 to 30 mL/min	75 mg od x 5 days	75 mg every other day x 7 days or 30 mg od (suspension) x 7 days

