AVIAN INFLUENZA A (H5N1) OUTBREAK

This document is evergreen and will be updated as new information becomes available and the situation in New Brunswick and Canada unfolds to reflect changes in guidance as needed.

This guidance is intended for use when human transmission is still limited, and the goals are 1) to minimize opportunities for human transmission and thus prevent/delay progression to sustained human-to-human transmission (containment); and 2) restrict opportunities for viral reassortment.

The recommendations follow a precautionary approach given some uncertainty surrounding the associated public health risk of the rapidly evolving avian influenza A (H5N1) outbreak in birds and mammals. Recommendations are for the management of individuals exposed to infected animals and the management of human cases and contacts (including person under investigation (PUI), probable case, confirmed case) regardless of the source of exposure (avian/animal/environmental/human/unknown) and their human contacts. There is still limited evidence and epidemiological data available to support the public health management of human cases of AI and associated human contacts in Canada.

Response to avian Influenza outbreaks in animals (e.g., poultry farms) and mitigation of the human health concerns requires working across and between Departmental mandates in a "One Health" approach. Public Health New Brunswick [PHNB (DH and JPS)] work closely with the Departments of Agriculture, Aquaculture and Fisheries (DAAF) including the NB Veterinary Laboratory and Pathology Services Unit, the NB Public Health Lab, Environment and Local Government (DELG), and Natural Resources and Energy (DNRED). Federal partners include the Canadian Food Inspection Agency (CFIA), the Public Health Agency of Canada (PHAC), Environment and Climate Change Canada (ECCC) and the Canadian Wildlife Health Cooperative (CWHC).

The CFIA is the lead for avian influenza outbreaks in poultry, DAAF is the lead for outbreaks in livestock, including cattle and swine, DNRED is the lead for outbreaks in wildlife, and DH is the lead for management of humans. Their respective responses plans will be available in separate documents for reference.

Disease Overview

Avian Influenza (AI) is caused by type A strains of influenza virus that circulate in wild bird populations and can infect domestic birds, livestock, wildlife, and people. AI strains are divided into highly pathogenic (HPAI), and low pathogenic (LPAI) viruses based on molecular characteristics and disease severity in domestic poultry. The severity of illness in poultry does not predict severity of illness in humans or other animals. Both HPAI and LPAI strains have caused mild to severe illness and death in humans.

Symptoms

Signs and symptoms of AI include:

- Mild illness: Fever (may not be present in young children, older persons, people who are immunocompromised), cough, sore throat, rhinorrhea, fatigue, myalgia, arthralgia, headache, conjunctivitis. Digestive symptoms like diarrhea, nausea, and vomiting are possible, although less frequent. Clinical manifestations may also include jaundice and mucosal bleeding.

- Moderate to severe illness: Shortness of breath, altered mental status, seizures.
- Respiratory failure is the most common cause of death. Other complications may include pneumonia, acute respiratory distress syndrome, pulmonary hemorrhage, pneumothorax, pancytopenia, shock, multi-organ failure, meningoencephalitis, secondary bacterial or fungal infection.

Reservoir

Aquatic birds are natural reservoirs of influenza A viruses, predominantly ducks, geese, and shorebirds.

Mode of Transmission

Transmission of the virus occurs via inhalation or contact with mucous membranes (e.g., eyes, nose, mouth).

Individuals can be exposed through contact with various sources, including infected animals (e.g., birds, wildlife, livestock, domestic mammals); animal feces, litter, or secretions containing high concentrations of the virus; contaminated surfaces; and contaminated vehicles, equipment, clothing, and footwear used at involved sites (e.g., infected farms, areas with infected wildlife). To date, human infections have been associated with close unprotected contact with infected poultry, contaminated environments, and infected dairy herds.

There have been reports of human cases possibly associated with consumption of raw or undercooked poultry products; however, there are no confirmed cases and evidence to-date indicates that thorough cooking inactivates virus. Pasteurized milk from livestock remains safe to consume, as pasteurization inactivates influenza viruses while retaining the nutritional properties of milk. There is limited information available on whether the A(H5N1) virus is transmitted through consumption of unpasteurized milk or dairy products from infected livestock.

Evidence of limited human-to-human transmission of influenza A(H5N1) (via close physical contact, for example within a household) has been suggested in previous outbreaks. Sustained human-to-human transmission of avian influenza A (H5N1) has not been observed.

During the current global outbreak of avian influenza A (fall 2020 to present), human infections with A (H5N1) reported internationally have been associated with close contact with infected poultry, contaminated environments, and potential exposure to infected cattle. To date, there have been one human cases of A (H5N1) detected in Canada.

Incubation Period

The incubation period in humans is typically between two to five days, seven to ten days is estimated to be the upper limit and 14 days is precautionary.

In poultry, the incubation period can be a few hours to a few days in individual birds, and up to 2 weeks in the overall flock. In dairy cattle, the current evidence indicates that the incubation period is variable and ranges from 12 to 21 days.

Period of Communicability

Not clear from existing evidence. Period of communicability may be similar to seasonal influenza (begins one day before symptom onset and up to five days after symptom onset; children and immune compromised individuals may be infectious up to seven days).

Risk Factors

Increased risk factors for acquiring illness:

- Unprotected direct or indirect close contact (within 2 meters) with presumptive/confirmed positive birds (e.g., poultry) or mammals (e.g., dairy herd).
    - Direct handling of birds or mammals (e.g., culling, slaughtering, defeathering, or milking activities).
- Unprotected direct or indirect close contact (within 2 meters) with contaminated environments.
    - Sharing the same confined airspace.
    - Handling manure or litter.
    - Contact with water or surfaces contaminated with feces, secretions (including raw milk) or animal parts (e.g., carcasses, organs) from infected birds or mammals.
    - Contact with contaminated vehicles, equipment, clothing, and footwear at infected farms.
    - Consuming unpasteurized (raw) milk and unpasteurized dairy products, undercooked or uncooked meat, egg products, from infected birds or mammals.
    - Close contact with a probable or confirmed human case.

Increased risk factors for severe illness:

- Children younger than 5.
- Adults 65 and older.
- Pregnant women.
- Individuals with chronic conditions (e.g., heart, lung, or other chronic conditions).
- Individuals with a weakened immune system (e.g., cancer or certain medications).

Management of Individuals Exposed to Infected Animals

DAAF will inform JPS Health Protection Branch offices during working hours or through the after-hours system of both preliminary positive (i.e., non-negative results) and confirmed positive results in domestic birds (backyard flocks and commercial poultry operations) or livestock (e.g., dairy herds).

Regional Medical Officer of Health

As part of the response to avian Influenza outbreaks in animals the RMOH (or delegate) will:

- Join response as PHNB representative and communicate situational updates to other PHNB members (e.g., CFIA led response for poultry outbreaks and DAAF led response for livestock).
- Assess antiviral prophylaxis for Asymptomatic Exposed Individuals and antiviral treatment for Symptomatic Exposed Individuals. Depending on assessment, PH will help coordinate access to prophylaxis based on risk assessment below.
- Assess human health risk and the extent of public health measures needed. Depending on the risk assessment, more active monitoring by PH might be necessary and could include daily phone inquiries from public health staff and/or requests for daily temperature recording.
- Consider need to inform physicians of the risk, recognition and reporting of patients with Severe Acute Respiratory Illness and need to implement enhanced passive surveillance through physician reminders.

PH Inspector

- **Inform** Regional Medical Officer of Health.

- **Complete CD Urgent Notification** for initial notification of a person under Investigation, probable, or Confirmed Positive Avian Influenza in Birds or Mammals (e.g. infected farm premise).

For poultry: Contact farm owner (or another respondent) of either preliminary or confirmed positive farms to identify individuals who may have been exposed, who are at risk of being exposed, and who may have symptoms in the **21 days** prior to identification of infected farm (and onset of clinical signs in animals).

For other livestock: Contact farm owner (or another respondent) of either preliminary or confirmed positive farms to identify individuals entering the livestock premise since the onset of clinical signs in the given livestock herd and throughout the duration of the outbreak in the herd. Based on the animal species affected and what is known about the incubation period and transmission dynamics in the species, further traceback of contacts may be required.

- Complete *Risk Assessment Individuals Exposed to Suspect or Confirmed Positive Avian Influenza in Birds and Mammals* form and provide to PH nurses.
- Advise to self-monitor for fever (greater than 37.8 degrees C or 100 degrees F), respiratory symptoms and or conjunctivitis (eye infection) for **ten days after last exposure** to a known or suspected source of AI virus or a contaminated environment (Table 2).
    - Individuals should avoid the use of fever-reducing medications (e.g., acetaminophen, ibuprofen) as much as possible as it may mask onset of fever.
    - Instruct that if symptoms develop, individuals should immediately isolate away from others and contact Public Health for assessment of testing and treatment.
- Advise symptomatic individuals with exposures to immediately isolate away from others and public health will contact them to further assess if testing is required and identify eligibility for chemoprophylaxis or treatment (See Appendix A).
- Advise individuals at higher risk for severe illness to avoid all contact with potentially infected birds/mammals/humans or contaminated environments.
- Advise asymptomatic individuals with exposures to avoid interactions with individuals at higher risk for severe illness, high risk settings, and large gatherings for 10 days following last exposure.
- Provide Mental Health Resources. In situations where depopulation of birds or mammals is required, it can be very upsetting and traumatic for those having to deal with the loss of animals and potential livelihoods. Provide information to support individuals and families, as necessary. Community Addictions and Mental Health (gnb.ca).
- Advise individuals to follow all measures provided by DAAF or CFIA to reduce spread on farms including recommendations not to visit other farms (to avoid vehicle being a source of spread of contaminated materials).
    - **Hand hygiene, Respiratory Disease Precautions** and **Cough/Sneeze Etiquette**
    - **Provide advice on minimizing further exposure**. Those involved in the care, culling, or cleaning up of infected animals or their environments should wear personal protective equipment (PPE). Recommended PPE in a farm setting:
        - Disposable face masks or respirators (e.g., N-95, KN-95, FFP2 or equivalent).
            - Disposable half-face N-95 respirators or other half-face/full-face respirators (with appropriate filters/cartridges) are recommended for individuals working in heavily contaminated environments (e.g., poultry barns) and must be fit-tested prior to use.

    - eye protection (goggles, face shields).
    - disposable gloves that are impervious to water (disposable nitrile, PVC, rubber gloves).
    - disposable outer garment or coveralls or garment that are washed and worn again and that are impervious to water.
    - disposable protective shoe/boot covers or rubber or polyurethane boots that are impervious to mud and water and are easily cleaned and disinfected.
    - 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. If using reusable protective clothing, it must be washed immediately after use and only used on one site to avoid spreading the virus to other locations.
- Recommend seasonal influenza immunization.

Inform PH nurses and provide completed forms (*Risk Assessment People Exposed to Suspect or Confirmed Positive Avian Influenza in Birds and Mammals*).

PH Nurses

Consult with Regional Medical Officer of Health (RMOH) regarding testing and antiviral prophylaxis/treatment for all potentially exposed asymptomatic/symptomatic individuals; and arrange as needed. See Appendix A: Antiviral Recommendations Treatment and Prophylaxis.

Complete SARI form and submit as per reporting requirements.

Symptomatic individuals with exposures should immediately isolate away from others and contact Public Health. Public Health will arrange for testing, including referral to primary care, as necessary.

- Inform individual to go to the Emergency Room.
- Call local Emergency Room to advise that an individual will be arriving for avian influenza testing. Please inform staff to take proper infection and control precautions.
- Inform Laboratory of request for AI testing so proper precautions can be taken and to indicate on the lab requisition that the specimen is suspect for avian influenza.

Influenza Antiviral Prescription Acquisition Process

If antiviral treatment/prophylaxis is recommended by MOH, Public Health will arrange access to medication at no cost to eligible New Brunswick residents (See Appendix A).

Eligibility

In addition to a valid prescription, the prescriber must document on the prescription that the medication is for the treatment of AI. The prescriber will consult with the Regional Medical Officer of Health to determine if the cause of the illness is believed to be due to AI.

Pharmacists must ensure that each prescription submitted for coverage under the Avian Flu Drug Therapy program has documentation from the prescriber that confirms the medication is for the treatment of AI.

Eligible Drug Therapies

Patients are eligible to receive oseltamivir (Tamiflu) for the treatment or prevention of AI. Refer to the NB Drug Plans Formulary for a complete list of available Tamiflu products and formulations (Oseltamivir (Tamiflu) Product Monograph).

Anti-viral Prophylaxis

Recommend 75 mg of oseltamivir twice daily for seven days after last direct contact with infected animals or the contaminated environment, or as recommended by a physician or nurse practitioner. The recommended dose for prophylaxis following AI exposures is twice daily medication, instead of the once daily approach used for seasonal influenza.

Management of Human Cases and Contacts

Once a case (PUI, probable or confirmed) is identified, consider initiating contact tracing, based on a risk assessment, using available epidemiological and clinical information. For additional information see Public health management of human cases of avian influenza and associated human contacts - Canada.ca (gnb.ca)

Surveillance Case Definition

The following are based on available national case definitions. These are subject to change with ongoing monitoring and evolving information.

Person under investigation (PUI):

A person meeting the exposure criteria with or without symptoms that are compatible with illness criteria, who is positive for influenza A and for whom subtyping laboratory test results are unknown or pending.

***Note**: The surveillance mechanisms and systems for identifying a PUI may vary by jurisdiction according to perceived risk, resources, supporting structures, approach to asymptomatic individuals, and other context.*

Limited data suggest that A(H5N1) can present as a co-infection with other viral as well as bacterial pathogens. The identification of one causal agent should not exclude A(H5N1) where the index of suspicion may be high. In the context of high community circulation of other respiratory pathogens, such as in the ongoing COVID-19 pandemic, an individual positive for another viral pathogen (e.g., SARS-CoV-2, seasonal influenza) in the absence of unusual disease does not comprise a situation where suspicion of A(H5N1) infection is high.

Probable Case:

A person who has influenza A results suggestive of a non-seasonal influenza strain pending confirmatory test results by the NML and/or the provincial/territorial public health laboratory

AND

- meets the exposure criteria, regardless of symptoms,

OR

- has symptoms compatible with illness criteria

***Note:** A positive non-seasonal influenza A test is appropriate when there is no alternative etiologic hypothesis. For example, an individual who meets the exposure and/or illness criteria and is positive for influenza A and is negative for A(H1) and A(H3) should be included in this definition of a probable case. However, an individual who tests positive for influenza A and an H3 infection is not a probable case.*

Note: *Efforts to obtain additional specimens to clarify case status may be warranted.*

Confirmed Case:

- A person with laboratory confirmation of influenza A(H5N1) infection at Canada's National Microbiology Laboratory (NML).

Note: *The NML can confirm detection of the virus using H5N1 specific reverse transcription polymerase chain reaction (RT-PCR) and/or further genetic analysis.*

Exposure and Illness Criteria

- **Exposure criteria:** Exposure within the previous ten (10) days to any of the following: direct or indirect close contact (within 2 metres) to presumptive/confirmed infected birds or mammals (e.g., visiting a live market, touching or handling infected mammals, under- or uncooked poultry or egg) close contact (within 2 metres) with a PUI, probable, or confirmed human case, unprotected exposure to biological material (e.g., primary clinical specimens, virus culture isolates) known to contain avian influenza virus in a laboratory setting, or unprotected, direct or close contact (within 2 metres) to contaminated environments.
    - **Incubation period** for H5N1 has been reported as one to five days, and up to seven days. Longer incubation periods have been suggested. This is considered prolonged compared to typical human influenza viruses (average 1 to 4 days). The available evidence supports exposure criteria based on 10 days for the purpose of case identification and public health follow up of contacts within Canada. This is considered a reasonable approximation with some loss of surveillance sensitivity balanced against the consideration of local public health capacity to conduct public health investigation and follow-up of cases and contacts.
    - Exposure to **contaminated environments** includes: direct contact with surfaces contaminated with mammal parts (e.g., carcasses, internal organs) or feces from A(H5N1) infected mammals or settings in which there have been mass mammal die offs in the previous six weeks due to A(H5N1). This period is based on limited evidence from experimental studies. There is insufficient evidence regarding other factors potentially affecting virus survivability, such as temperature, airflow, type of surface material and fallow period.

      Note: *Where procedures or presentations are more likely to be associated with virus-laden aerosolization (e.g., CPR, intubation, ventilation, suction, sputum induction, nebulization, bronchoscopy, BiPAP) the time and distance considered in defining the sharing of a confined air space may be extended.*

      Note: *Current evidence related to seasonal influenza indicates that viral loads in the 24 hours prior to symptom onset are substantially lower than once symptoms begin, peaking with symptom intensity. Effective transmission cannot be directly inferred from viral shedding, but transmission is also anticipated to be greater during the peak symptomatic period, particularly in association with projectile or aerosolizing symptoms such as cough or sneeze. Extension of the relevant exposure period for contacts to include one day prior to symptom onset in the case is thus intended to be a cautious approach for the purpose of emerging pathogen response. Asymptomatic or very mild H5N1 virus infections have occurred, mainly in children but also adults, and have been reported in the literature; however, studies have not conclusively established transmission from asymptomatic individuals. The full duration of the infectious period for influenza A(H5N1) is unknown and may vary with factors such as age, immuno-suppression, or other comorbidity or with the intensity/closeness of contact. In that context, it is reasonable to consider a typical exposure period for contacts spanning one day prior and through the symptomatic period of the case while*

recognizing the need for judgment and adjustment to these guidelines under some scenarios or based on additional local/practical considerations.

- **Illness criteria**: Illness onset is defined by the earliest start of SARI or ILI. SARI symptoms are fever (over 38 degrees Celsius), and new onset of (or exacerbation of chronic) cough or breathing difficulty and evidence of severe illness progression. ILI is defined as acute onset of respiratory illness with fever and cough and one or more of the following: sore throat, arthralgia, myalgia, or prostration, which could be due to influenza virus. In children under 5, gastrointestinal symptoms may also be present. In patients under 5 or 65 and older, fever may not be prominent. If the index of suspicion is high and depending on clinical judgement, individuals with the following signs and symptoms may also be considered among illness criteria: rhinorrhea, fatigue, headache, conjunctivitis, shortness of breath or difficulty breathing, pneumonia, diarrhea, respiratory failure, acute respiratory distress syndrome, neurologic symptoms, or multi-organ failure. The variation in spectrum of illness ranges from mild, atypical to severe.

Many infectious diseases present with a spectrum of illness, including mild or asymptomatic infection. Clinician and public health judgment should be used in assessing patients with milder or atypical presentations, where, based on contact, comorbidity or cluster history, the index of suspicion may be raised.

All positive samples must be shared with NML to fulfill their obligations as a National Influenza Centre and Canada's obligations under the International Health Regulations and other agreements. For more information on appropriate specimens or targets for laboratory testing, refer to the Protocol for Microbiological Investigations of Severe Acute Respiratory Infections (SARI).

Diagnosis and Laboratory Guidelines

Clinicians should have a low threshold for seasonal and avian influenza virus testing of individuals with clinically compatible symptoms who report sick bird or other exposures of concern within the ten days prior to onset.

The following specimens are suitable for avian influenza A testing:

1. Respiratory tract samples. A nasopharyngeal swab and a nasal swab combined with an oropharyngeal swab (e.g., two swabs combined into one viral transport media vial) should be taken. The nasopharyngeal swab and the combined nasal-throat swabs should be tested separately. If these specimens cannot be collected, a single nasal or oropharyngeal swab is also acceptable. While nasopharyngeal swabs are the primary specimen type for seasonal influenza viruses, multiple specimen types should be collected here.
2. Patients with severe respiratory disease should also have lower respiratory tract specimens (e.g., an endotracheal aspirate or bronchoalveolar lavage fluid) collected, if possible. For severely ill persons, multiple respiratory tract specimens from different sites should be obtained on at least two consecutive days to increase the potential for virus detection.
3. A viral throat swab in viral transport media should also be collected on all hospitalized patients.
4. If the person has conjunctivitis (with or without respiratory symptoms), both a conjunctival swab and nasopharyngeal swab should be collected.
5. Lung tissue, if obtained (e.g., biopsy, post-mortem).

The laboratory test (PCR) will detect an influenza virus and type it as a type A. The New Brunswick Public Health Laboratory can do a PCR specific for detection of Influenza H5 or H7, but it not done on every isolate and the laboratory should be notified if an avian influenza is suspected. The laboratory should be notified before shipping the sample.

Further confirmation can be done at the NBPHL by whole genome sequencing. Additional typing is done at the National Microbiology Laboratory in Winnipeg.

Guidance relevant to the diagnosis of avian influenza in humans can be found in the Protocol for Microbiological Investigations of Severe Acute Respiratory Infections (SARI). Technical information on certain avian influenza A virus subtypes can be found in *Influenza A virus subtypes H5, H7, and H9: Infectious substances pathogen safety data sheet*.

Figure 1: Laboratory testing timelines

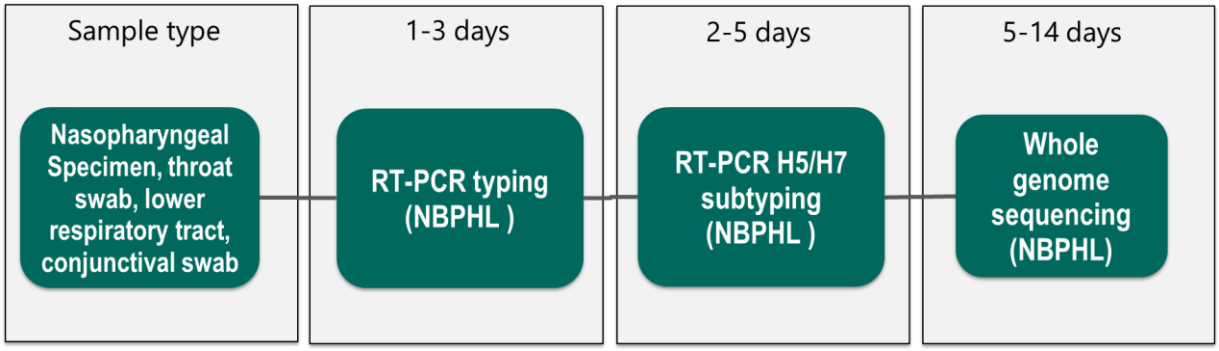

Table 1: Specimen collection and handling

Specimen	Collection	Storage	Transport
NP Swab	Collection tube with universal transport media	Refrigerate sample where appropriate	Send to your regional laboratory
Throat Swab	Collection tube with universal transport media	Refrigerate sample where appropriate	Send to your regional laboratory
Lower respiratory tract specimen	Collect 1-4 ml of secretions in a sterile container (screw cap test tube or jar)	Refrigerate sample where appropriate	Send to your regional laboratory
Conjunctival swab	Collection tube with universal transport media	Refrigerate sample where appropriate	Send to your regional laboratory
Lung tissue	Collect at least 0.3 cm3 of tissue in a sterile screw cap jar	Refrigerate sample where appropriate	Send to your regional laboratory

Reporting

Per Policy 2.2 Disease and Event Notification to OCMOH-E and Disease and Event Reporting section.

- CD Urgent Notification for all confirmed, probable and persons under investigation for human cases of AI (e.g., H5N1)
- Regional Public health authorities should report probable or confirmed cases of AI (e.g., H5N1) within 24 hours irrespective of illness severity using SARI form. The completed form must be sent to OCMOH-E promptly after the case interview*
- Routine surveillance (RDSS) for all confirmed cases.

***Note:** DH PHNB (OCMOH-E) must report confirmed and probable human cases of AI (e.g., H5N1) nationally within 24 hours as per the Emerging Respiratory Pathogens and Severe Acute Respiratory Infection protocols, irrespective of illness severity. Persons under investigation are not required to be reported nationally. See the Emerging respiratory pathogens and Severe Acute Respiratory Infection (SARI) case report form - Canada.ca. DH will request One Health Coordinating Center (OHCC) to be convened.*

Case Management

Education

- **Nature of infection, length of communicable period, mode of transmission and the nature of the evolving virus.**
- **Frequent Handwashing**. Hand hygiene should consist of washing with soap and running water for a minimum of 20 seconds, or if hands are not visibly soiled, the use of alcohol-based hand sanitizer (containing at least 60% alcohol). It is important to practice frequent and appropriate hand hygiene after touching mammals or mammal by-products.
    - Avoid touching face and mucous membranes (eyes, nose, and mouth) with hands before washing hands or using alcohol-based hand sanitizer.
- **Respiratory Disease Precautions** and **Cough/Sneeze Etiquette**
- Advise case to self-monitor or consider active monitoring of case for development of or progression/worsening of signs and symptoms of avian influenza infection for **14 days after exposure**, including daily temperature taking.
    - Recommend avoiding the use of fever-reducing medication (e.g., acetaminophen, ibuprofen) as much as possible as it may mask the onset or progression/worsening of signs and symptoms of avian influenza (and advise Public Health if taken).
    - Provide instruction on self-care.
    - Provide information on the steps to take if symptoms worsen, and how/when to seek medical care.
    - Ensure that the case, caregiver, or PH informs any first responders and/or receiving facility staff of the exposure or diagnosis of AI.

To further reduce the risk of spread, cases should implement the following additional public health and personal protective measures (which are also applicable to contacts):

- Avoid direct contact with domestic or wild birds and other susceptible animals (e.g., wild mammals, swine, farmed fur animals).
- Avoid sharing personal items with other humans and animals (e.g., unwashed towels, bed linen, eating utensils).
- Practise respiratory etiquette, including covering coughs and sneezes.

- Take steps to improve indoor ventilation by:
    - opening windows and doors to the outside, if possible, depending on weather, outdoor air quality, and safety (e.g., no fall hazards), especially in shared spaces (e.g., dining areas, hallway, kitchen, particularly), regardless of others being present.
    - for shared washrooms, also turning on the exhaust fan and closing the toilet lid before flushing.
    - ensuring the mechanical ventilation system (e.g., heating, ventilation, and air conditioning (HVAC) system) is functioning properly and continuously on, if possible.
- Clean and disinfect high-touch surfaces and objects (e.g., toilets, taps, kitchen countertops) frequently with household cleaner followed by household disinfectant with efficacy against influenza.
  Wash clothes and bed linen with regular laundry soap and water.

Exclusion/Social distancing

Isolation of case with appropriate isolation protocols (and infection control measures). Assess and facilitate ability to adhere to recommended public health measures. Consider health equity and psychosocial implications when implementing public health measures to minimize human transmission of avian influenza.

When care in a hospital is not required, cases should isolate for **14 days from onset of first sign(s)/symptom(s) or until AI infection is ruled out by laboratory testing** (for PUIs).

- Not go to school, work, or other public places
- Convalesce in a suitable environment where effective isolation can be maintained and not leave unless directed by Public Health or urgent medical care is required.
- Have their own room (separate from household members or companion mammals) with access to a separate washroom, if possible.

While in isolation, cases should:

- Avoid close contact/activities (e.g., watching television, dining (e.g., family meals), playing games together) and sharing indoor/outdoor spaces with others, including household members and mammals (including domestic pets); unless required for assistance (e.g., human caregivers, service/support/therapy mammals).
- If sharing a space with others is unavoidable, maintain physical distance (and separate with dividers such as curtains, if possible) and wear a well-fitting respirator or medical mask , regardless of whether others are present at the time, and especially when around others who are at risk of more severe disease or outcomes (e.g., individuals who are immunocompromised, individuals who are pregnant, young children) and/or in a crowded or poorly ventilated setting
    - others in the same space as the case should also maintain physical distance and wear a well-fitting respirator or medical mask, especially if they are: at risk of more severe disease or outcomes (e.g., individuals who are immunocompromised, individuals who are pregnant, young children).

Treatment

Facilitate access to early antiviral treatment, if not already started, as per usual process (Appendix A).

Antiviral treatment is recommended as soon as possible for any patient with suspected or confirmed influenza. Decisions about starting antiviral treatment for patients with suspected influenza should not wait for laboratory confirmation of influenza virus infection. If test results are delayed more than 24 hours, treat with antivirals as soon as possible in the following priority groups:

- hospitalized patients;
- have signs of severe, complicated, or progressive illness; or
- at higher risk group for influenza complications.

Clinicians can consider early empiric antiviral treatment of non-high-risk outpatients with suspected influenza [e.g., influenza-like illness (fever with either cough or sore throat)] based upon clinical judgement, if treatment can be initiated within 48 hours of illness onset. Antivirals can reduce the duration and severity of illness if given within 48 hours of symptom onset. Treatment duration should be for 5 days but may be longer if clinically indicated (See Appendix A).

Immunization

Currently, there is no vaccine for avian influenza, however, the seasonal influenza vaccine may reduce the likelihood of being simultaneously infected with both avian and seasonal influenza viruses.

A seasonal influenza vaccine should not be scheduled until ten days after last contact with potentially infected or confirmed to be infected livestock, birds, contaminated environments or if individual has symptoms.

Contact Management

Contacts can be considered cases (and should be managed as such) upon sign(s)/symptom(s) development.

Education

The contact or relevant care giver should be informed to:

- Self-monitor for symptoms, including daily temperature checks, for **ten** days after their last exposure.
    - Monitor for development of fever (daily monitoring of temperature), respiratory symptoms (e.g., cough, sore throat, wheezing, gastroenteritis, malaise) and/or conjunctivitis (eye infection).
    - Avoid the use of fever-reducing medication (e.g., acetaminophen, ibuprofen) as much as possible as it may mask early symptoms of avian influenza.
    - Isolate away from others if symptoms develop. Contact Public Health to arrange for further assessment or testing.

To further reduce the risk of spread, cases should implement the following additional public health and personal protective measures (which are also applicable to cases):

- Avoid direct contact with domestic or wild birds and other susceptible animals (e.g., wild mammals, swine, farmed fur animals)
- Avoid sharing personal items with other humans and animals (e.g., unwashed towels, bed linen, eating utensils)
- Practise respiratory etiquette, including covering coughs and sneezes.
- Take steps to improve indoor ventilation by:

    - opening windows and doors to the outside, if possible, depending on weather, outdoor air quality, and safety (e.g., no fall hazards), especially in shared spaces (e.g., dining areas, hallway, kitchen, particularly), regardless of whether others are present.
    - for shared washrooms, also turning on the exhaust fan and closing the toilet lid before flushing.
    - ensuring the mechanical ventilation system (e.g., heating, ventilation, and air conditioning (HVAC) system) is functioning properly and continuously on, if possible.
- Clean and disinfect high-touch surfaces and objects (e.g., toilets, taps, kitchen countertops) frequently with household cleaner followed by household disinfectant with efficacy against influenza.
- Wash clothes and bed linen with regular laundry soap and water.

Determine exposure risk level (High, Moderate, Low) of contacts and follow additional recommendations.

Table 2: Classification of contacts by exposure risk level

Exposure risk	Description	Possible examples	Recommendations

High	• Direct and/or intimate physical contact (e.g., hugging, kissing) with the case without personal protective measures/personal protective equipment (PPM/PPE) use.
	• Being within 2 metres of the case without PPM/PPE use.
	• Contact with items and surfaces contaminated with bodily fluids of the case without PPM/PPE use.
	• Being in a poorly ventilated enclosed space with the case without PPM/PPE use.
		• Household members who shared a living space with the case.
		• Individuals, including caregivers, who had unprotected direct or indirect contact with the case and/or their contaminated environment, and/or their bodily fluids (e.g., respiratory secretions).
		• Individuals who had a face-to-face interaction with the case.
		• Individuals who sat next to the case on a plane or other mode of transportation.
		• Other contacts of a case based on a risk assessment completed by the local PHA.
			• Active monitoring by the local public health authority (PHA) for 10 days after last exposure to the case.
			• Follow recommended PHMs/PPMs for all contacts.
			• Wear a well-fitted respirator or mask when in shared spaces with others, especially:
			  ○ in public settings,
			  ○ around people who are at risk of severe disease or outcomes (e.g., individuals who are immunocompromised, individuals who are pregnant, young children).
			• Follow advice from local PHA and/or HCP. regarding post-exposure antiviral prophylaxis.
			• Maintain a record of all individuals with which the contact is in near proximity during the monitoring period.

Intermediate	• Limited or intermittent exposure to a case without proper and adequate PPM/PPE (i.e., PPE proportionate to the activity/care being performed/provided to the case).	• Individuals, including caregivers, who had improper and/or inadequate, or breach in, PPM/PPE use when in direct or indirect contact with the case and/or their contaminated environment, and/or their bodily fluids (e.g., respiratory secretions) • Individuals who shared a living space where interactions with the case and their personal items were limited. • Individuals who had brief social interactions with the case	• Active monitoring by the local PHA for 10 days after last exposure to the case • Follow recommended PHMs/PPMs for all contacts • Wear a well-fitted respirator or mask when: o around others who are at risk of more severe disease or outcomes (e.g., individuals who are immunocompromised, individuals who are pregnant, young children) o in a crowded or poorly ventilated setting • Follow advice from local PHA and/or HCP regarding post-exposure antiviral prophylaxis • Maintain a record of all individuals with which the contact is in near proximity during the monitoring period.
Low	• Limited exposure to a case in a shared enclosed space with proper and adequate PPM/PPE use. • Providing direct care to a case with proper and adequate PPM/PPE use.	• Individuals, including caregivers, who had proper and adequate PPM/PPE use when in direct or indirect contact with the case and/or their contaminated environment, and/or their bodily fluids (e.g., respiratory secretions). • Individuals who shared a well-ventilated enclosed space with a case while practising physical distancing and wearing a well-fitted respirator or medical mask.	• Passive monitoring for 10 days after last exposure to the case. • Local PHA should inform all contacts of their exposure and follow up at the end of the monitoring period (day 10). • Follow recommended PHMs/PPMs for all contacts. • Consider wearing a well-fitted respirator or mask when: • around others who are at risk of more severe disease or outcomes (e.g., individuals who are immunocompromised, individuals who are pregnant, young children). • in a crowded or poorly ventilated setting.
Acronyms: **personal protective equipment (PPE), personal protective measures (PPMs) public health authority (PHA), public health measures (PHMs).**			

Appendix A: Antiviral Recommendations Treatment and Prophylaxis

Treatment

There are no data from randomized clinical trials (RCTs) of antiviral treatment of outpatients or hospitalized patients with novel influenza A virus infection. In healthy individuals with acute, uncomplicated seasonal influenza virus infection, RCTs demonstrated decreased time to symptom improvement with antiviral treatment, when treatment is begun within the first few days of illness. RCTs also showed that antiviral treatment of outpatients reduced complications associated with seasonal influenza. Studies on seasonal influenza patients reported that clinical benefits were greatest when antiviral treatment was administered within 48 hours of illness onset. Among patients hospitalized with seasonal influenza A or B, pandemic 2009 influenza A (H1N1), or highly pathogenic avian influenza A(H5N1) virus infections, observational studies suggested that early treatment reduces disease severity and mortality. Moreover, observational studies supported the use of antiviral treatment in hospitalized patients with seasonal influenza even when started after 48 hours of illness. Neuraminidase inhibitors (e.g., oseltamivir, peramivir, or zanamivir) have been used for severely ill persons infected with A(H7N9) viruses, but their effectiveness for treatment of severe disease caused by avian influenza A virus infections has not been determined. Most avian influenza A(H7N9), A(H5N1), and A(H5N6) viruses are susceptible to the neuraminidase inhibitors (oseltamivir, peramivir and zanamivir).

Health and age factors known to increase risk of serious complications from influenza:

- Adults 65 years and older;
- Children younger than 2 years old. (Although all children younger than 5 years old are considered at higher risk of serious flu complications, the highest risk is for those younger than 2 years old, with the highest hospitalization and death rates among infants younger than 6 months old);
- Asthma;
- Neurologic and neurodevelopment conditions;
- Blood disorders (such as sickle cell disease);
- Chronic lung disease (such as chronic obstructive pulmonary disease [COPD] and cystic fibrosis);
- Endocrine disorders (such as diabetes mellitus);
- Heart disease (such as congenital heart disease, congestive heart failure and coronary artery disease);
- Kidney diseases;
- Liver disorders;
- Metabolic disorders (such as inherited metabolic disorders and mitochondrial disorders);
- People who are obese with a body mass index [BMI] of 40 or higher;
- People younger than 19 years old on long-term aspirin- or salicylate-containing medications;

- People with a weakened immune system due to disease (such as people with HIV or AIDS, or some cancers such as leukemia) or medications (such as those receiving chemotherapy or radiation treatment for cancer, or persons.

Other people at higher risk of severe outcomes from influenza:

- Pregnant people and people up to 2 weeks after the end of pregnancy;
- People who live in nursing homes and other long-term care facilities;
- People from certain racial and ethnic minority groups are at increased risk for hospitalization with flu, including non-Hispanic Black persons, Hispanic or Latino persons, and American Indian or Alaska Native persons;
- Children younger than 5 years old;
- People with chronic conditions requiring chronic corticosteroids or other drugs that suppress the immune system);
- People who have had a stroke.

Role of on Anti-viral Medications for Treatment of Cases

Initiation of antiviral treatment with a neuraminidase inhibitor (oseltamivir, zanamivir) is recommended as early as possible for **symptomatic** outpatients who are confirmed, probable, or suspected/cases under investigation of novel influenza A virus infection associated with severe human disease.

Treatment is not currently recommended for uncomplicated illness in people whose exposure criteria consists only of travel to an area (e.g., country, province, city) with human cases of novel influenza A virus infection associated with severe human disease, or where these viruses are known to be circulating in mammals.

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 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).

Individual treatment decisions remain the responsibility of the health care provider, in consultation with infectious diseases specialists as required.

Prophylaxis

The efficacy of neuraminidase inhibitors in preventing avian influenza in humans has not been established. Oseltamivir 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 uses, a risk benefit approach need to be 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.

Human Exposure Risk

Chemoprophylaxis with antiviral medications should be considered for exposed persons. Decisions to initiate post-exposure antiviral should be based on clinical judgment, with consideration given to:

- the type of exposure (e.g., without use of respiratory and eye protection),
- duration of exposure,
- time since exposure (e.g., less than 2 days),
- known infection status of the birds the person was exposed to, or
- to whether the exposed person is at higher risk for complications from seasonal influenza (see box *Health and age factors known to increase risk of serious complications from influenza***)**.

The World Health Organization (WHO) has stratified exposure risk into three categories; low, medium, and high in the context of the H5N1 Asian strain; however, it can be used for other strains of the virus. Oral oseltamivir or inhaled zanamivir chemoprophylaxis should be provided to close contacts of a confirmed or probable novel influenza A case-patient according to risk of exposure described below. Individuals who have exposures falling into more than one risk group should be managed based on their highest risk exposure.

High-risk exposure groups:

- Individuals with unprotected and very close exposure to a flock or group of sick or dead mammals 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 mammals)
- Personnel involved in handling sick mammals or decontaminating affected environments (including mammal disposal) as part of outbreak control efforts (e.g., cullers)
- Household or close family contacts[1] of a strongly suspected or confirmed patient, because of potential exposure to a common environmental or poultry source as well as exposure to the index case.

Moderate-risk exposure groups:

- Individuals who handle single or small groups of sick or dead mammals infected with AI in an open-air environment which is not densely populated by mammals of the same species as the infected mammal (e.g., single wild bird in a park).

[1] A close contact may be defined as an individual sharing a household with or remaining unprotected while within speaking distance (<2 m) of, or in the care of, a patient with confirmed or strongly suspected H5N1 infection.

- Individuals with unprotected and very close direct exposure[2] to sick or dead infected mammals or to poultry that have been implicated directly in human cases.
- Persons involved in handling sick mammals or decontaminating known infected mammals or environments if personal protective equipment might not have been used properly.
- Health-care personnel in close contact with strongly suspected or confirmed patients, for example during intubation or performing tracheal suctioning, or delivering nebulized drugs, or handling inadequately screened/sealed body fluids without any, or with insufficient, personal protective equipment. This also includes laboratory personnel who might have an unprotected exposure to virus-containing samples[3].

Low risk exposure groups:

- Personnel involved in culling non-infected or non-infected mammal populations as a control measure to prevent viral spread (e.g., those exclusively culling asymptomatic mammals in a control area outside of the infected and restricted zones).
- Personnel involved in culling non-infected or non-infected mammal populations to prevent viral spread.
- Personnel involved in handling sick mammals or decontaminating known infected mammals or environments, who used proper personal protective equipment.
- Individuals who handle (i.e., have direct contact with) asymptomatic mammals 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).
- Health-care workers not in close contact (distance greater than 1 m or no direct contact with infectious material) with a strongly suspected or confirmed H5N1 patient.
- Health-care workers who used appropriate personal protective equipment during exposure to H5N1 patients.

In the absence of sustained human-to-human transmission, the general population is currently considered at low risk.

Recommendations for Usage of Post-Exposure Chemoprophylaxis:

In high-risk exposure groups, chemoprophylaxis should be administered.

In moderate-risk exposure groups, chemoprophylaxis could be considered.

In low-risk exposure groups, chemoprophylaxis is not routinely recommended.

Prophylaxis of infants less than 1 year of age should only be considered after a thorough risk assessment and consultation with appropriate specialist as there are limited data on this age group and this would constitute an off-label use.

Chemoprophylaxis is not routinely recommended for personnel involved in culling non-infected or likely non-infected bird populations as a control measure for personnel involved in handling

[2] Examples of high-risk exposure based on confirmed transmission to humans include: unprotected exposure to infected mammal products such as consumption of blood from H5N1 infected ducks, preparation of food from infected mammals (eg, plucking feathers), or prolonged exposure to infected birds in a confined space, such as playing with pets.

[3] Because circumstances could change rapidly, it would be reasonable to consider the moderate and high-risk groups together for prophylaxis decisions in widespread outbreaks. If a particular patient has been implicated in possible human-to-human transmission, then the examples of moderate exposures could be defined as high risk.

sick birds or decontaminating affected environments (including mammal disposal) who used proper personal protective equipment.

Chemoprophylaxis recommendations by AI subtype and risk exposure

	Exposure Risk		
	Low risk	**Moderate risk**	**High-risk**
Subtype previously identified and not known to have caused human illness	No	No	Consider prophylaxis if a pre-existing medical condition puts individual at higher risk for severe disease
Subtype known to cause predominantly mild human illness	No	For consideration	Yes
Subtype known to cause predominantly severe human illness	No	Yes	Yes

Appendix B: Process Maps-Avian Influenza