Human Avian Influenza A(H5N1)

Executive Summary

Avian influenza A(H5N1) is widespread in wild birds worldwide causing outbreaks in poultry flocks, U.S. dairy cow herds, and humans. Confirmation of the first avian influenza A(H5N1) infections in California dairy cows occurred on August 30, 2024. On October 3, 2024, health officials confirmed the first human cases of avian influenza A(H5N1) infection in California dairy workers.

Exposure criteria include exposure to animals or persons infected with avian influenza A(H5N1) virus or unprotected exposure to the virus in the laboratory. Human infectious period should be from one day before symptom onset date (Day 0) until resolution of any eye infection, including redness (excluding subconjunctival hemorrhage) or drainage; any fever has been gone for 24 hours without the use of fever reducing medication; and other symptoms are mild and improving. Clinicians should immediately notify their local health department (LHD) if they suspect avian influenza in a patient and LHDs should immediately notify the California Department of Public Health (CDPH) of suspect cases. Clinicians and LHDs should follow healthcare facility avian influenza A(H5N1) infection prevention and control recommendations.

Testing should occur within 10 days of last exposure if a person meets the exposure criteria and develops symptoms that could be consistent with avian influenza A(H5N1) infection. Collection of specimens should ideally occur within 24–72 hours of symptom onset and no later than 10 days after symptom onset. Consideration of testing may occur on a case-by-case basis and in discussion with CDPH if more than 10 days have elapsed after symptom onset. Case finding activities should commence if preliminary H5 subtype testing indicates a human infection with avian influenza A(H5N1) virus. Persons with suspected, presumptive or confirmed avian influenza A(H5N1) infection should follow isolation guidance. Clinicians and LHDs should follow recommendations for influenza antiviral treatment and chemoprophylaxis.

Outlined is information about monitoring exposed persons in non-healthcare settings. Employers with workers with exposure to animals with avian influenza A(H5N1), their raw products, fecal material or environments must provide **medical services** for employees per the California Division of Occupational Safety and Health (Cal/OSHA) Aerosol Transmissible Diseases Standard. These services include medical surveillance (health checks) as recommended by CDC, CDPH, or the local health officer. The Cal/OSHA Aerosol Transmissible Diseases-Zoonotic Standard outlines these and other requirements. CDPH recommends active monitoring when exposure occurs in a farm setting as appropriate personal protective equipment use is difficult to verify.

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Background

Avian influenza A(H5N1) is widespread in wild birds worldwide. It is causing outbreaks in poultry flocks and U.S. dairy cow herds, with recent human cases in U.S. dairy, poultry, and wildlife workers with exposure to infected animals as well as sporadic cases in people without known exposure to infected animals. A multi-state outbreak of avian influenza A(H5N1) infection in dairy cows was first reported on March 25, 2024. Confirmation of the first avian influenza A(H5N1) infections in California dairy cows occurred on August 30, 2024. On October 3, 2024, health officials confirmed the first human cases of avian influenza A(H5N1) infection in California dairy workers.

For information about other variant or novel influenza viruses, please see CDPH Variant Influenza Quicksheet (PDF).

Overview of Human Avian Influenza A(H5N1) Infections

Human infections with avian influenza viruses are rare. H5N1 and H7N9 viruses have caused many human avian influenza infections globally. Illnesses in humans from these infections have ranged in severity from no symptoms or mild illness (e.g., eye infection, upper respiratory symptoms) to severe disease (e.g., pneumonia) that sometimes results in death. To date, most U.S. human avian influenza A(H5N1) cases have been mild, although there have been reports of severe cases in Louisiana, Canada and Mexico. There has not been a detection of human-to-human transmission of avian influenza A(H5N1) virus in the United States.

Human infections with avian influenza viruses have occurred most often after close or lengthy unprotected contact (i.e., not wearing eye or respiratory protection or gloves) with infected birds or other animals, their saliva, mucous or feces. In the current outbreak, human infections with avian influenza A(H5N1) viruses have involved contact with infected poultry (generally while culling them) or infected dairy cows and their unpasteurized (raw) milk.

Human infections with avian influenza viruses can happen when virus gets into a person's eyes, nose or mouth, or through inhalation. This can happen when a person touches something that has virus on it and then touches their mouth, eyes or nose, or possibly when virus is in the air (in droplets or possibly dust) and a person breathes it in. The spread of avian influenza viruses from one infected person to a close contact is very rare, and when it has happened, it has not led to sustained spread among people. More information about avian influenza in humans is available at Center for Disease Control and Prevention's (CDC) webpage on Avian Influenza Virus Infections in Humans.

Clinical and Exposure Information

Clinical Criteria

Symptoms of human avian influenza A(H5N1) infection can include:

- Eye redness (conjunctivitis)
- Fever (temperature of >100°F/37.8°C or feeling feverish)
- Cough
- Sore throat
- Runny or stuffy nose
- Muscle or body aches
- Headaches
- Fatigue

- Shortness of breath or difficulty breathing

Less common signs and symptoms include diarrhea, nausea, vomiting, or seizures.

Exposure Criteria

Within the 10 days prior to symptom onset (defined as follows):

Exposure to animals infected with avian influenza A(H5N1) virus:

- Close contact (within six feet) with infected animals. Such exposures can include, but are not limited to handling, slaughtering, defeathering, butchering, culling, caring for, or milking; **Or**
- Preparing or consuming raw animal products, or consuming uncooked or undercooked food or related uncooked food products, including unpasteurized milk, from infected animals; **Or**
- Direct contact with surfaces contaminated with feces, unpasteurized milk or other unpasteurized dairy products, or animal parts (e.g., carcasses, internal organs) from infected animals; **Or**

Exposure to an infected person:

- Close (within six feet), unprotected (without use of respiratory and eye protection) contact with a person who is a symptomatic confirmed, probable, or suspected avian influenza A(H5N1) case (e.g., in a household or healthcare facility); **Or**

Laboratory exposure:

- Unprotected exposure to avian influenza A(H5N1) virus in a laboratory.

Human Infectious Period

Until further data are available, the infectious period should be from one day before symptom onset date (Day 0) until resolution of any eye infection, including redness (excluding subconjunctival hemorrhage) or drainage; any fever has been gone for 24 hours without the use of fever reducing medication; and other symptoms are mild and improving.

Reporting

Clinicians should immediately notify their local health department (LHD) if they suspect avian influenza in a patient. LHDs should immediately notify CDPH of suspect cases by emailing InfluenzaSurveillance@cdph.ca.gov. When reporting hospitalized avian influenza A(H5N1) cases after hours, contact the CDPH Duty Officer at (916) 328-3605. Please enter all suspected, presumptive, and confirmed H5N1 influenza cases into CalREDIE using the "Influenza-Novel Strain" condition.

Complete the CDC Human Infection with Novel Influenza A Virus Case Report Form for all presumptive and confirmed cases of H5N1 influenza infection as soon as possible. Get the CDC Human Infection with Novel Influenza A Virus Case Report Form via the CalREDIE Document Repository or by emailing InfluenzaSurveillance@cdph.ca.gov. Upload completed forms into the patient's record in CalREDIE or email to InfluenzaSurveillance@cdph.ca.gov.

Healthcare Facility Avian Influenza A(H5N1) Infection Prevention and Control Recommendations

If referral of a person with suspected or confirmed avian influenza A(H5N1) infection to a healthcare facility occurs, alert the healthcare facility prior to patient arrival so appropriate infection control

measures planning and implementation can occur immediately. Advise the ill person to wear a facemask on arrival.

If a patient with suspected or confirmed H5N1 influenza infection presents to a healthcare setting, healthcare providers should:

- Immediately mask the patient and place them in an airborne infection isolation room (AIIR) with the door closed. Removal of the patient's mask may occur while in an AIIR.
    - If an AIIR is not available, place the patient in a single-patient room with the door closed and have the patient remain masked.
- Use personal protective equipment (PPE) that includes:
    - Respiratory protection (fit-tested N95 respirator or higher level of protection)
    - Eye protection (goggles or face shield)
    - Gown and gloves
- Use diligent hand hygiene before and after contact with the patient.
- Limit room entry to essential personnel. Limit patient transport outside their room.
- If a non-AIIR room is used, after the patient leaves, the room should not be reused and unprotected individuals should not enter until sufficient time has elapsed for airborne-contaminant removal per CDC guidance.

For additional infection control guidance, such as management of exposed healthcare workers, visitor policies, environmental cleaning, and caution with aerosol-generating procedures, please refer to:

- CDC Interim Guidance for Infection Control Within Healthcare Settings When Caring for Confirmed Cases, Probable Cases, and Cases Under Investigation for Infection with Novel Influenza A Viruses Associated with Severe Disease
- CDC Interim Guidance for Follow-up of Close Contacts of Persons Infected with Novel Influenza A Viruses Associated with Severe Human Disease or with Potential to Cause Severe Human Disease, and Use of Antiviral Medications for Post-exposure Prophylaxis
- For applicable Cal/OSHA requirements in healthcare settings, please see California's Aerosol Transmissible Diseases standard.

Testing

Testing should occur within 10 days of last exposure if a person meets the exposure criteria and develops symptoms that could be consistent with avian influenza A(H5N1) infection.

It is extremely helpful if referrals of suspect cases are to healthcare facilities that are prepared to accept such patients. Notification of the facility that a suspected avian influenza A(H5N1) case will be coming should occur ahead of time so appropriate precautions can be in place.

Instruct referred suspected cases for testing at a healthcare facility to call ahead to alert the facility that they have been exposed to "bird flu" and have symptoms, or to alert the facility immediately upon arrival. Suspected cases should wear a mask when entering a healthcare facility.

The recommendation of testing for asymptomatic exposed people does not routinely occur but consideration on a case-by-case basis can take place. For example, offering testing to those with discrete high-risk exposures such as an unprotected splash of raw milk from an infected cow into the eyes should occur.

Collection of specimens should ideally occur within 24–72 hours of symptom onset and no later than 10 days after symptom onset. If more than 10 days have elapsed after symptom onset, consideration of testing may occur on a case-by-case basis and in discussion with CDPH.

Polymerase chain reaction (PCR) subtype testing for H5N1 influenza is available at some local California public health laboratories (PHL), the Viral and Rickettsial Disease Laboratory (VRDL) at CDPH, some commercial, academic and hospital laboratories, and CDC. If a PHL is conducting testing, notification of CDPH VRDL about the testing should occur.

- CDPH recommends testing via a PHL for persons who meet the symptom and exposure criteria for avian influenza A(H5N1) to expedite public health response.
- CDPH recommends testing at a commercial, academic or hospital laboratory that can perform H5 subtyping only for low suspicion cases with no known or likely exposure to infected animals or humans.
- In symptomatic people unlikely to have H5N1 infection using commercial or clinical laboratory PCR tests for influenza to rule out influenza A (and therefore H5N1) can occur.

Laboratories should **not** attempt to perform viral culture on specimens from patients with suspected or laboratory-confirmed H5N1 influenza infection.

For additional testing guidance, see the VRDL Test Page – Novel/Avian Influenza Virus (human) PCR (ca.gov).

Specimen collection and specimen types

- For symptomatic patients with suspected H5N1 infection being tested at a public health laboratory,[†] collect the following specimens:
  - Conjunctival swab specimens[‡] from patients with conjunctivitis.
  - Respiratory specimens from patients with respiratory symptoms.
    - Separate oropharyngeal (throat) and anterior nares (nasal) swab specimens are preferred but can be combined in one tube.
    - Nasopharyngeal swabs are also acceptable, but to date have had lower yield for positive test results in cases than oropharyngeal or anterior nares swabs.
- Collect specimens using swabs with synthetic tips (e.g., polyester or Dacron®) and an aluminum or plastic shaft. CDPH does not recommend using swabs with cotton tips and a wooden shaft.
- Specimens collected with swabs made of calcium alginate are **not** acceptable.
- Place swab(s) in specimen collection vial containing 2–3 mL of viral transport media (VTM) or universal transport media (UTM). Tighten cap to prevent leakage.
- In consultation with CDPH, a request for stool specimens from patients who have ingested raw dairy products and have gastrointestinal symptoms may be made.

[†] If a commercial laboratory performs the testing, healthcare providers must collect respiratory specimens in addition to conjunctival swab(s) even if the patient does not have respiratory symptoms.

[‡] If conjunctivitis is present in both eyes, collect separate swabs from each eye and combine the swabs in in a single transport media vial. To date, conjunctival specimens from patients with conjunctivitis have been more sensitive for detection of H5 than other specimens in the current outbreak.

- Patients with severe respiratory disease should have multiple respiratory tract specimens obtained from additional sites (e.g., endotracheal aspirate, bronchoalveolar lavage, sputum) to increase the potential for avian influenza A(H5N1) virus detection.

Specimen storage and handling

- Freeze or refrigerate specimens after collection. Ship refrigerated specimens to VRDL on cold packs. Ship frozen specimens to VRDL on dry ice.
- Specimens submitted to local PHLs should follow specimen submission procedures for those laboratories.
- Specimens submitted to VRDL must be accompanied by a hard copy of the completed form generated in the VRDL Lab Web Portal.

Suspected case information to collect and submit

When testing for avian influenza A(H5N1) in symptomatic people with exposure risk factors, obtain the information below. When shipping the specimen to a PHL capable of performing H5 subtyping, provide this information to CDPH and VRDL.

- Basic demographic information
  - Symptom onset date, date reported to public health, signs and symptoms, illness severity, and specimen collection date
- Contact with known or possibly infected animals, their products, or their environments and a description of contact
- Contact with human avian influenza A(H5N1) case
- If there has been workplace exposure:
  - CalCONNECT exposure ID or Farm ID
  - PPE use – and if used, the specific PPE used, particularly:
    - Type of eye protection (googles or face shield)
    - Type of respiratory protection (medical/surgical mask vs. N95 or other type of respirator)
- Influenza A testing results (including subtyping results), if performed and available
- If laboratory case confirmation occurs, will also need:
  - If case received antiviral treatment prescription
  - Household member information
    - Number and ages
    - If household member(s) received antiviral post-exposure prophylaxis (PEP) prescription

Home Isolation for Persons with Suspected, Presumptive or Confirmed Avian Influenza A(H5N1) Infection

To date, there have been no documented instances of human-to-human transmission of the avian influenza A(H5N1) virus (clade 2.3.4.4b) currently circulating in US poultry and dairy cows. In other countries, limited human-to-human transmission of other avian influenza A(H5N1) strains has occurred rarely. In addition, animal studies suggest this virus is not capable of spreading efficiently among people via respiratory aerosols compared to seasonal influenza viruses. Based on currently available information, CDPH recommends that suspected non-hospitalized cases isolate at home until health

officials rule out avian influenza A(H5N1) infection and that non-hospitalized presumptive, probable, or confirmed cases remain in isolation until health officials release them.

Isolation at home

- Stay home unless it is necessary to see a healthcare provider or go to work if the LHD has not recommended work exclusion.
- If taking influenza antiviral medication, the ill person and their household contacts should continue to take it as prescribed unless instructed to stop.
- If living with other people (or pets), the ill person should:
    - Avoid contact with other household members and pets to the extent possible.
        - Wear a well-fitting mask for source control when avoiding indoor contact with other household members is not possible.
        - Cover any coughs or sneezes and clean hands with soap and water afterwards.
        - Try to take extra care to avoid contact with people at increased risk for complications from seasonal influenza virus infections.
    - Clean hands with soap and water frequently, particularly before contact with other household members.
        - If soap and water are not available, use a 60% alcohol-based hand sanitizer to clean hands.
        - Other household members should also clean their hands frequently.
    - Avoid touching eyes if conjunctivitis is present.
    - Clean and disinfect frequently touched items and surfaces at least daily using household disinfectant or wipes.
    - Avoid sharing bedding, towels and wash cloths with others, particularly if there has been contact with the eyes, and launder such items before use by others.
    - Avoid sharing personal items with others, particularly items that have had contact with the eyes.

When to discontinue isolation

Discontinue isolation if a documented negative test result for influenza A and, ideally for A(H5), rules out avian influenza A(H5N1) for persons with previously documented avian influenza A(H5N1) infection, as determined by rRT-PCR testing at a PHL.

If health authorities confirm avian influenza A(H5N1), isolation should continue until all the following are true:

- Any eye infection, including redness (excluding subconjunctival hemorrhage) or drainage, resolves.
- Any fever (temperature of 100°F/37.8°C or higher) has been gone for at least 24 hours without the use of fever reducing medication.
- Other symptoms are mild and improving.

Modified workplace isolation in non-healthcare settings

If individuals feel well enough to work, suspected, presumptive, probable, and confirmed cases may work if they and their coworkers:

- Wear appropriate recommended PPE while working.

- Wash hands frequently with soap and water or if soap and water aren't available, a 60% alcohol-based hand sanitizer to clean hands.
- Wear well-fitting facemasks while together in breakrooms or other areas where workers typically do not wear PPE, including shared transportation to and from work.

General recommendations

- Ill persons should monitor their symptoms and seek prompt medical attention if their illness worsens (e.g., difficulty breathing).
- If ill persons need healthcare, they should inform healthcare providers that they have or are receiving evaluation for avian influenza A(H5N1) and wear a respirator or facemask when entering any healthcare facility.

Recommendations for Influenza Antiviral Treatment

For detailed guidance on dosing and treatment duration, see CDC Interim Guidance on the Use of Antiviral Medications for the Treatment of Human Infection with Novel Influenza A Viruses Associated with Severe Human Disease and the CDC-issued Emergency Use Instructions (EUI) for Oseltamivir.

Symptomatic persons with avian influenza A(H5N1) exposure

Persons with potential exposure to avian influenza A(H5N1) who develop compatible signs and symptoms should receive empiric influenza antiviral treatment with oseltamivir as soon as possible. Clinical benefit is greatest when administration of antiviral treatment occurs early, especially within 48 hours of illness onset.

Hospitalized patients

Hospitalized patients who have confirmed, probable, presumptive, or suspected infection with avian influenza A(H5N1):

- Should receive antiviral treatment with oral or enterically administered oseltamivir as soon as possible regardless of time since illness onset.
    - Do not delay antiviral treatment while waiting for laboratory testing results.
    - Pending further data, consider longer courses of treatment (e.g., 10 days) for severely ill hospitalized patients with novel, including avian influenza A(H5N1) virus infections.

Additional recommendations

The CDC-issued EUI for oseltamivir that differs from those for oseltamivir treatment of seasonal influenza include:

- Initiation of treatment beyond 48 hours following symptom onset.
- Treatment and dosing regimens for term neonates under 2 weeks of age and preterm neonates and infants.

Recommendations for Influenza Antiviral Chemoprophylaxis

Antiviral chemoprophylaxis should be based on clinical and public health considerations, including type of exposure, duration of exposure, time since exposure, infection status of the animals the exposed person, and whether the exposed person is at increased risk for complications with seasonal influenza.

- Health authorities do **not** routinely recommend antiviral chemoprophylaxis for workers who use proper PPE and experience no breaches in recommended PPE while handling sick or

potentially infected animals as well as the raw products or contaminated environments (e.g., decontaminating infected environments, disposing of infected animal carcasses).
- Consider antiviral chemoprophylaxis for persons meeting exposure criteria, particularly those with unprotected discrete high-risk exposures such as a splash of raw milk from an infected cow into the eyes.
- Public health officials recommend antiviral chemoprophylaxis for household contacts of presumptive, probable, and confirmed human cases, as well as for neonates and infants less than one year of age exposed to avian influenza A(H5N1).

If initiation of antiviral chemoprophylaxis occurs

The recommendation is treatment dosing for the neuraminidase inhibitor oseltamivir (one dose twice daily) instead of the typical antiviral chemoprophylaxis regimen. For specific treatment dosage recommendations by age group, see CDC Influenza Antiviral Medications: Summary for Clinicians. Healthcare providers should consult the manufacturer's package insert (PDF) for dosing, limitations of populations studied, contraindications, and adverse effects.

Dosing

If exposure was time-limited and not ongoing

- The recommendation is for five days of medication (one dose twice daily) from the last known exposure.

If the exposure is likely to be ongoing (e.g., household setting)

- The recommendation is for a duration of 10 days because of the potential for prolonged infectiousness from the avian influenza A(H5N1) case-patient.

Close contacts of a person with avian influenza A(H5N1) infection

- The recommendation is for oseltamivir twice daily (treatment dosing) instead of the once daily pre-exposure prophylaxis dosing.
- For detailed guidance, see CDC Interim Guidance on Follow-up of Close Contacts of Persons Infected with Novel Influenza A Viruses, Use of Antiviral Medications for Chemoprophylaxis.

Monitoring Exposed People in Non-Healthcare Settings

Employers with workers with exposure to animals with avian influenza A(H5N1), their raw products, fecal material or environments must provide **medical services** for employees per the California Division of Occupational Safety and Health (Cal/OSHA) Aerosol Transmissible Diseases Standard. These services include medical surveillance (health checks) as recommended by CDC, CDPH, or the local health officer. The Cal/OSHA Aerosol Transmissible Diseases-Zoonotic Standard outlines these and other requirements. For more detailed CDPH monitoring information, email InfluenzaSurveillance@cdph.ca.gov.

Persons with exposure to infected humans or animals

Monitor all persons in close, unprotected contact with humans or animals infected with avian influenza A(H5N1) as well as the raw products or contaminated environments of infected animals for 10 days after last exposure. Discontinue monitoring for dairy workers when the authorities release the affected farm from quarantine.

Close Contacts

Monitor close contacts of persons with presumptive, probable, or confirmed avian influenza A(H5N1) infection daily for 10 days after their last known exposure to the case (prior to the case's release from isolation).

Fever and symptom monitoring

Monitor exposed people for the following symptoms: fever/feeling feverish; chills; cough; sore throat; runny/stuffy nose; eye tearing, eye redness, irritation or discharge; sneezing; difficulty breathing; shortness of breath; fatigue; muscle/body aches; headache; nausea; vomiting; diarrhea; seizure; rash.

Active monitoring

CDPH recommends active monitoring when exposure occurs in a farm setting as appropriate PPE use is difficult to verify.

Assessment of exposed people for the signs and symptoms described above occurs at least once daily until 10 days after their last known exposure, or at a frequency or duration recommended by CDPH or the LHD. In a farm setting, monitoring should continue until the authorities release the farm from quarantine. Perform monitoring in any of the following ways:

- The LHD conducts daily health checks; or
- The farm conducts daily health checks, notifies the LHD immediately about symptomatic workers or workers who call in sick, and helps facilitate testing of ill workers.

Actively monitor United States Department of Agriculture (USDA) responders

It is acceptable to conduct monitoring on business days for USDA responders, only for those who report wearing all appropriate PPE during their exposure.

Passive monitoring

Inform each exposed person at the beginning of their monitoring period about the monitoring process, the symptoms and signs of concern, and when and how to contact the LHD symptoms develop, including after hours and on weekends. LHDs may recommend more frequent contact with exposed workers.

Case Finding

Case finding activities should commence if preliminary H5 subtype testing indicates a human infection with avian influenza A(H5N1) virus.

At a minimum:

- Identify close contacts (e.g., household contacts) of presumptive, probable, or confirmed cases. See Clinical and Exposure Information section for more information.
- Conduct daily active monitoring of close contacts of cases for symptoms associated with avian influenza A(H5N1) infection for 10 days from their last known exposure to a presumptive, probable, or confirmed case (until 10 days following release of case from isolation for household members).
- If a close contact develops symptoms or signs consistent with avian influenza A(H5N1) infection within 10 days of their last known exposure, promptly collect specimens for testing at a PHL.
    - See Testing section for additional information.

- Advise healthcare providers to collect specimens from patients meeting the symptoms and exposure criteria for influenza testing at a PHL.

Additional Information on Avian Influenza A(H5N1)

CDPH

- Bird Flu webpage
- Raw Milk and Raw Dairy Products
- Avian Influenza A(H5N1) Information for Health Professionals
- CAHAN April 2, 2025: Updated Guidance on Recommended Specimens for Human Avian Influenza A(H5N1) Testing
- CAHAN February 7, 2025: Subtyping of Influenza A in Hospitalized Patients
- CAHAN December 6, 2024: Evaluation and Testing for Human Avian Influenza A H5N1 Infection
- CAHAN October 4, 2024: First Cases of Human Avian Influenza A(H5N1) in California & Preparation for CDPH Respiratory Virus Season (COVID-19, Influenza and RSV)
- Avian Influenza A(H5N1) Information for Local Health Departments
- VRDL Novel/Avian Influenza Virus (Human) PCR

CDC

- General Information on Avian Influenza
- Avian Influenza Information for Health Professionals and Laboratorians

USDA

- HPAI in Livestock

World Health Organization (WHO)

- WHO Influenza (Avian and other zoonotic)

World Organisation for Animal Health (WOAH, previously Office International des Epizooties)

- Avian Influenza