# Region 7 Special Pathogen Outbreak Situation Report:

# Highly Pathogenic Avian Influenza

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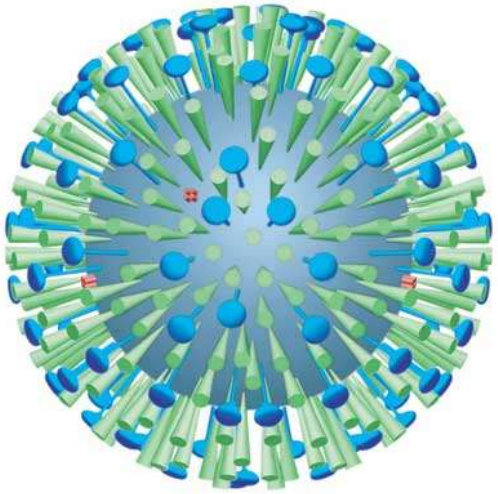
# No relevant disclosures

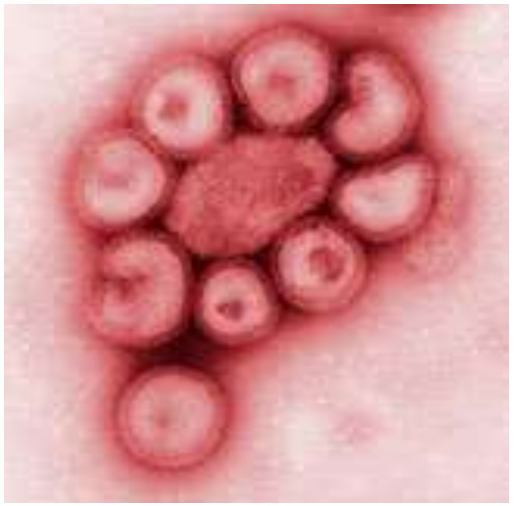
# Objectives

- Identify characteristics and origins of Highly Pathogenic Avian Influenza A(H5N1)
- Detail modes of transmission of HPAI A(H5N1), including animal-to-human transmission, that contribute to spread of disease
- Discuss current guidance for healthcare facilities and clinicians in reference to “Identify, Isolate and Inform”
- Understand where to access available resources, guidelines, and training materials to effectively manage and respond to HPAI A(H5N1) outbreaks

# Influenza: Brief Refresher

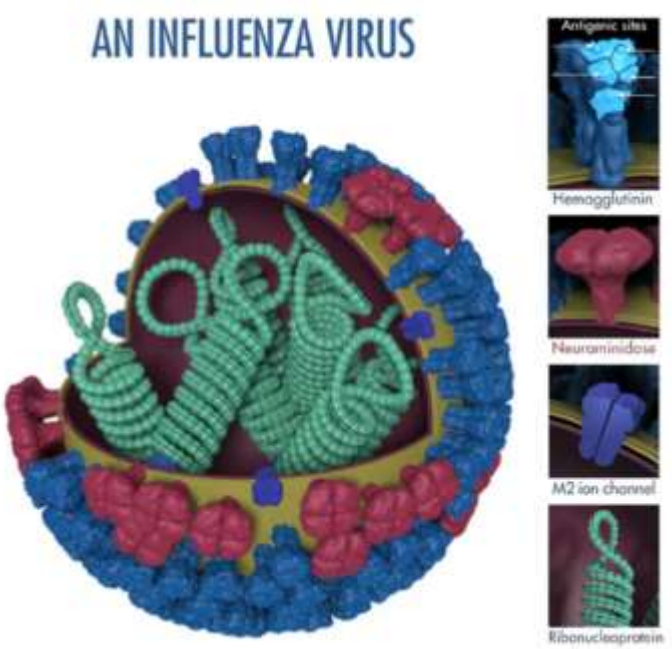
- RNA virus
- Family Orthomyxoviridae
- 4 types of influenza viruses (A, B, C, D)
- Affects birds and mammals





# Influenza: Brief Refresher

- ***H***emagglutinin (HA) protein
  - Allows virus to bind to cells in the respiratory tract in order to initiate infection
- ***N***euraminidase (NA) protein
  - Helps release new virus from cells
- Many different combinations of HA and NA proteins are possible
  - Example: Influenza A(H5N1) is ‘HA 5’ protein and ‘NA 1’ protein
  - There are nine known subtypes of Influenza A(H5) viruses




Antigenic Characterization | CDC

# Influenza A in Birds

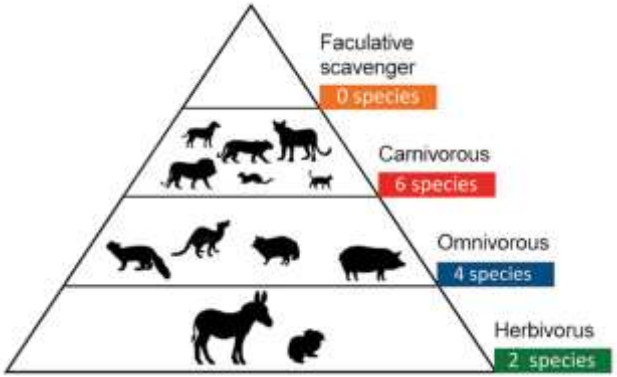
- Low Pathogenic Avian Influenza (LPAI)
  - Asymptomatic or mild disease in birds
  - Can mutate into HPAI
- Highly Pathogenic Avian Influenza (HPAI)
  - Severe disease with high mortality in birds
  - Can affect different birds differently- H5/H7 viruses have close to 100% mortality in chickens, but ducks tend to be asymptomatic
- Rapid spread through poultry flocks
- Over 90,000,000 birds in 48 US states affected since January 2022

H5N1 Bird Flu Detections across the United States (Backyard and Commercial) | Avian Influenza (Flu) (cdc.gov)

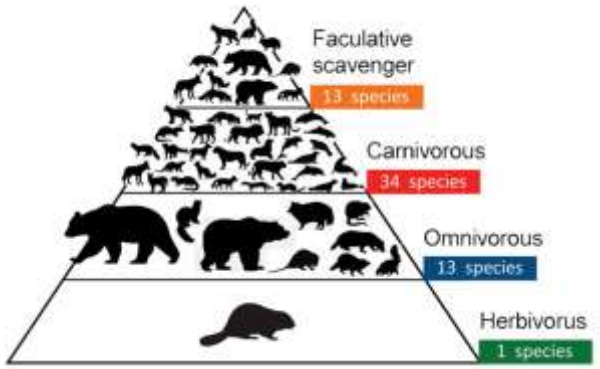
# Influenza A(H5N1) in Mammals

- 26 countries have reported >48 mammal species infected with Influenza A(H5N1)

- Potential sources of infection
  - Close contact with infected birds
  - Mammal to mammal transmission
  - Contaminated equipment




2003-2019




2020-2023

Recent Changes in Patterns of Mammal Infection with Highly Pathogenic Avian Influenza A(H5N1) Virus Worldwide - Volume 30, Number 3—March 2024 - Emerging Infectious Diseases journal – CDC

# Influenza A(H5N1) in Humans

- Human infections with HPAI A(H5N1) virus have been reported in 23 countries since 1997
  - About 900 total cases
  - Severe pneumonia and death in about 50% of cases

- Spillover to humans has been associated with close contact with infected animals, particularly poultry
  - Birds shed the virus in saliva, mucous and feces
  - Humans are exposed through the respiratory tract or mucous membranes

- What is the risk?
  - Sporadic infections, but no sustained human-to-human transmission noted for H5N1 yet
    - If this occurs, there is pandemic potential
    - Historic precedent: 1918 influenza “Spanish Flu” (H1N1) likely had avian origins

Recent Changes in Patterns of Mammal Infection with Highly Pathogenic Avian Influenza A(H5N1) Virus Worldwide - Volume 30, Number 3—March 2024 - Emerging Infectious Diseases journal – CDC
The Deadliest Flu: The Complete Story of the Discovery and Reconstruction of the 1918 Pandemic Virus | Pandemic Influenza (Flu) | CDC

## Cumulative number of confirmed human cases† for avian influenza A(H5N1) reported to WHO, 2003-2024

| Country | 2003-2009* | | 2010-2014* | | 2015-2019* | | 2020 | | 2021 | | 2022 | | 2023 | | 2024 | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | cases | deaths | cases | deaths | cases | deaths | cases | deaths | cases | deaths | cases | deaths | cases | deaths | cases | deaths | cases | deaths |
| Azerbaijan | 8 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 5 |
| Bangladesh | 1 | 0 | 6 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 1 |
| Cambodia | 9 | 7 | 47 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 4 | 5 | 1 | 67 | 42 |
| Canada | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Chile | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| China | 38 | 25 | 9 | 5 | 6 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 55 | 32 |
| Djibouti | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Ecuador | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Egypt | 90 | 27 | 120 | 50 | 149 | 43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 359 | 120 |
| India | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Indonesia | 162 | 134 | 35 | 31 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 200 | 168 |
| Iraq | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 |
| Lao People's Democratic Republic | 2 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 |
| Myanmar | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Nepal | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Nigeria | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Pakistan | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 |
| Spain | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Thailand | 25 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 17 |
| Turkey | 12 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 4 |
| United Kingdom | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 5 | 0 |
| United States of America | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Viet Nam | 112 | 57 | 15 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 128 | 64 |
| Total | 468 | 282 | 233 | 125 | 160 | 48 | 1 | 0 | 2 | 1 | 6 | 1 | 12 | 4 | 5 | 1 | 887 | 462 |

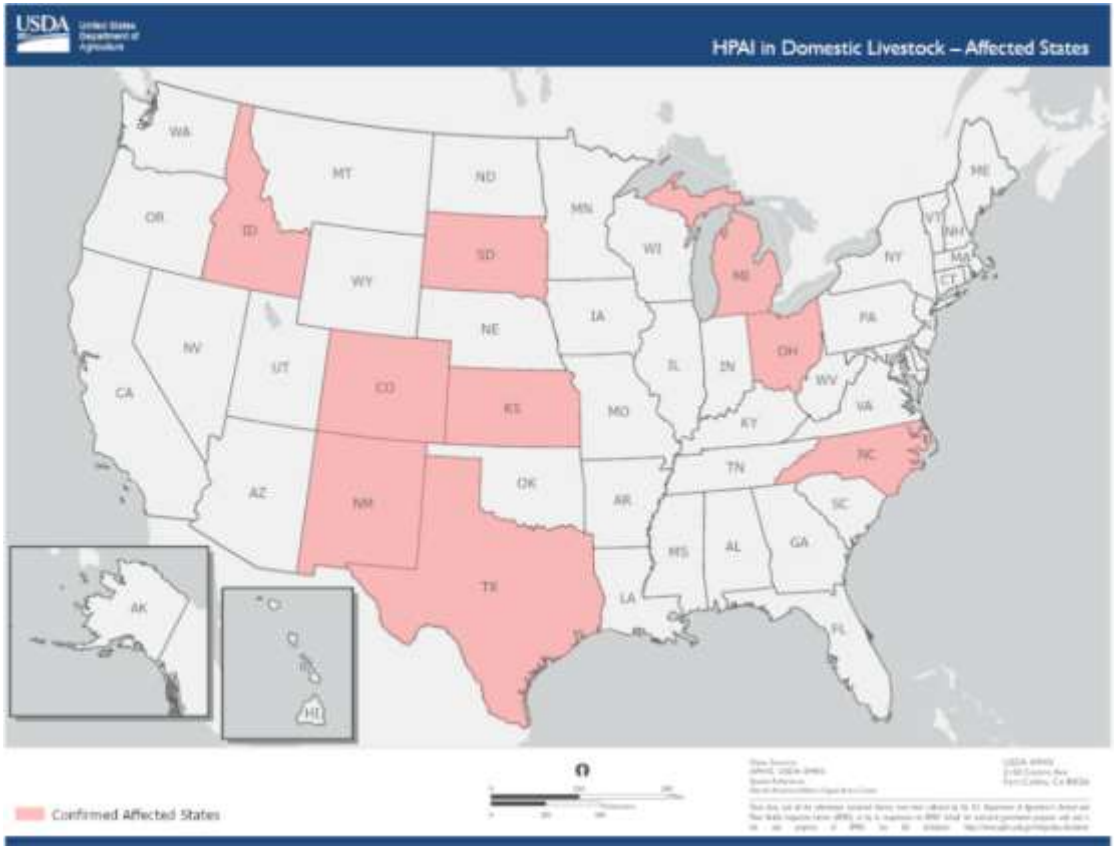
*2003-2009, 2010-2014 and 2015-2019 total figures. Breakdowns by year available on subsequent tables.
†This count includes reported detections in asymptomatic individuals. In some cases, the confirmation of infection versus transient contamination of the nasopharynx/oropharynx with virus particles after exposure to infected birds or contaminated environment remains inconclusive. Total number of cases includes number of deaths.
WHO reports only laboratory-confirmed cases. All dates refer to onset of illness.
Source: WHO/GIP, data in HQ as of 26 February 2024.

World Health Organization

**Case fatality rate = 52%**

# Influenza A(H5N1) in Cattle

- Currently 9 US States have Influenza A(H5N1) outbreaks in dairy cattle
  - Spread between herds, into nearby poultry flocks, and barn cats




Highly Pathogenic Avian Influenza (HPAI) Detections in Livestock | Animal and Plant Health Inspection Service (usda.gov)

# Situation Report: Human cases of Avian Influenza in the US

- A person tested positive for Influenza A(H5N1) in 2022 in Colorado
  - Direct exposure to infected poultry
  - Symptoms included fatigue
  - Treated with oseltamivir, recovered

- Thus far, one human case has been reported (April 1st) resulting from the outbreak in dairy cattle
  - Individual with occupational exposure to dairy cattle in Texas
  - Presented with conjunctivitis
  - Treated with oseltamivir, recovered
  - Household members received oseltamivir as post-exposure prophylaxis


The New York Times

*Person Infected With Bird Flu in Texas After Contact With Cattle*

The case adds another worrying wrinkle to a global outbreak that has devastated bird and marine mammal populations, and recently appeared in cattle herds.

Share full article 164

# Influenza A(H5N1): Investigation

- CDC/USDA/FDA/other agencies are working together
  - Various public health teams are on the ground investigating the outbreak
  - Routine testing of dairy farm workers in order to understand occupational risk factors
  - Routine testing of cows and milk supply
  - Surveillance of other species (wild and farm)
  - Viral sequencing
    - No major changes were identified in patient vs cattle specimens
    - No markers of antiviral resistance
    - Virus closely related to the 2 candidate vaccine viruses
  - Monitoring of Influenza-Like Illness (ILI) diagnoses and diagnostic test utilization (in humans)- no uptick noted yet

# Influenza A(H5N1): Guidance and Outreach

- Development of guidance and outreach
  - Messaging to farm owners, producers, workers
  - Meetings with agriculture groups, requests to partner with public health
  - Considerations for veterinarians
  - Evaluating utility of wastewater surveillance

- USDA Federal Order (Issued April 24th, effective today):
  - Mandatory testing for interstate movement of dairy cattle
  - Laboratories and state veterinarians must report positive influenza A tests to USDA/APHIS


USDA Animal and Plant Health Inspection Service
U.S. DEPARTMENT OF AGRICULTURE

**Federal Order to Assist with Developing a Baseline of Critical Information and Limiting the Spread of H5N1 in Dairy Cattle: Frequently Asked Questions**

*April 25, 2024*


https://www.aphis.usda.gov/sites/default/files/dairy-federal-order.pdf

# What is in the Strategic National Stockpile (SNS)?

- Antiviral medication
  - Mostly Oseltamivir (also Zanamivir, Baloxavir, Peramivir)
  - Preliminary analysis of A(H5N1) viruses did not find changes that would make these viruses resistant to current FDA-approved flu antiviral medications
- Candidate vaccine viruses are available for vaccine manufacturing if necessary
  - No current large vaccine stockpile, but the antigens are available
  - Seasonal flu vaccines do not provide protection against these viruses.
- Personal Protective Equipment
  - No current supply shortages reported

Highly Pathogenic Avian Influenza A (H5N1) Virus Infection Reported in a Person in the U.S. | CDC Online Newsroom | CDC
Strategic National Stockpile | SNS | HHS/ASPR
ASPR presentation at CDC HPAI A(H5N1) webinar 4/24/24

# How safe is the milk supply?

- Viral genetic material found in retail milk (raw as well as pasteurized)
  - ‘Genetic material’ does not mean “live virus”
  - Analysis is underway (viral culture)
  - FDA/USDA are ‘confident in the pasteurization process’
    - Previous investigations with influenza and other viruses have been conducted on pasteurized dairy products
    - Preliminary testing on pasteurized milk is ‘reassuring’ according to FDA

- What does this mean?
  - The virus is likely more widespread than initially thought
  - Nationwide surveillance is being conducted, looking at all stages of milk production
  - 99% of milk produced on dairy farms and sold in stores undergoes pasteurization

abc NEWS

What to know about the bird flu outbreak in the US after virus fragments found in milk samples

# Guidance for Healthcare Facilities and Clinicians

# Identify, Isolate and Inform

- Avian Influenza can present like any other viral illness with acute respiratory illness and/or conjunctivitis
  - Mild illness: (e.g., cough, sore throat, conjunctivitis, fever, rhinorrhea, fatigue, myalgia, arthralgia, headache, gastrointestinal manifestations)
  - Moderate to severe illness: (e.g., shortness of breath, altered mental status, seizures, other severe symptoms)

- Key Steps:
  - Suspicion of a viral syndrome
  - Ask about epidemiologic risk



Health Alert Network (HAN) - 00506 | Highly Pathogenic Avian Influenza A(H5N1) Virus: Identification of Human Infection and Recommendations for Investigations and Response (cdc.gov)

# Identify, Isolate and Inform

**CDC**: Consider the possibility of infection with novel influenza A viruses with the potential to cause severe disease in humans in patients who present with influenza-like illness (ILI) or acute respiratory infection (ARI)

**AND**

- Persons who have had contact with potentially infected sick or dead birds, livestock, or other animals within the week before symptom onset
  - Handling, slaughtering, defeathering, butchering, culling, preparing for consumption or consuming uncooked or undercooked food or related uncooked food products, including unpasteurized (raw) milk or other unpasteurized dairy products
- Direct contact with water or surfaces contaminated with feces, unpasteurized (raw) milk or unpasteurized dairy products, or parts (carcasses, internal organs, etc.) of potentially infected animals
- Persons who have had prolonged exposure to potentially infected birds or other animals in a confined space
- Exposure to a person who is a confirmed, probable, or symptomatic suspected case of human infection with H5N1

Health Alert Network (HAN) - 00506 | Highly Pathogenic Avian Influenza A(H5N1) Virus: Identification of Human Infection and Recommendations for Investigations and Response (cdc.gov)
Highly Pathogenic Avian Influenza A(H5N1) Virus in Animals: Interim Recommendations for Prevention, Monitoring, and Public Health Investigations | Avian Influenza (Flu) (cdc.gov)

# Identify, Isolate and Inform

- Our approach at Nebraska Medicine
  - Caveat: this is not a ‘one size fits all’ situation
  - We assess ‘fever, cough, or rash’ as well as history of travel at intake on all patients
    - If a patient answers ‘yes’ to the symptom questions, a mask is provided and the patient is triaged according to symptoms and severity of illness
  - Further assessment (by provider)
    - “Do you or a household member have direct contact with cows, poultry, or wild birds?”
    - We will consider adding additional questions if circumstances or risk factors change
      - More human cases, sustained transmission, local cases
      - Cases linked to consumption of raw milk or other products
      - Other factors…

# Identify, Isolate and Inform

- Place a mask on the patient
- Isolate the patient and utilize appropriate PPE
  - Standard, contact, and airborne precautions
    - Gown, N95 respirator, eye protection, gloves
    - Meticulous hand hygiene
  - Preference for an airborne infection isolation room (AIIR) if available
    - If AIIR is not available, place the patient in a private room with the door closed, and the patient should continue to wear a mask
- Environmental infection control considerations
  - Standard cleaning and disinfection
  - Standard medical waste management

Health Alert Network (HAN) - 00506 | Highly Pathogenic Avian Influenza A(H5N1) Virus: Identification of Human Infection and Recommendations for Investigations and Response (cdc.gov)

Highly Pathogenic Avian Influenza A(H5N1) Virus in Animals: Interim Recommendations for Prevention, Monitoring, and Public Health Investigations | Avian Influenza (Flu) (cdc.gov)

# Identify, Isolate and Inform

- ✓ Notify Infection Control and follow available local guidance
- ✓ Notify appropriate medical teams who will care for the patient
- ✓ Notify appropriate hospital/departmental leaders
- ✓ Notify state and local health departments to discuss the scenario and arrange for testing for influenza A(H5N1)

Health Alert Network (HAN) - 00506 | Highly Pathogenic Avian Influenza A(H5N1) Virus: Identification of Human Infection and Recommendations for Investigations and Response (cdc.gov)

# Patient Management: Testing

- Available at CDC/Public Health Labs
- No currently available commercial lab assays
  - This may change

- Consult your local lab for guidance on testing algorithm
  - Antigen tests and some PCR tests will not differentiate subtypes

*Local Example: On the respiratory pathogen panel (RPP) **at our institution**, there are four possible results for influenza A:

Influenza A (no subtype)
Influenza A H1
Influenza A H1-2009
Influenza A H3
***Avian Influenza will come back as Influenza A (no subtype), which should trigger further evaluation**

# Patient Management: Testing

- Discuss the specifics of specimen collection with the health department to ensure appropriate specimens are collected, packaged and transported
  - Recommend: (i) a nasopharyngeal swab, or (ii) a nasal aspirate or wash, or (iii) two swabs combined into one viral transport media vial (e.g., a nasal or nasopharyngeal swab combined with an oropharyngeal swab).
  - A single nasal or oropharyngeal swab is also acceptable.
  - For patients with severe lower respiratory tract illness, a lower respiratory tract specimen (e.g., an endotracheal aspirate or bronchoalveolar lavage fluid) should be collected
  - Specimens should be placed into sterile viral transport media and immediately placed on refrigerant gel-packs or at 4°C (refrigerator) for transport to the laboratory.
  - If the patient has conjunctivitis (with or without respiratory symptoms) collect a conjunctival swab for testing

Health Alert Network (HAN) - 00506 | Highly Pathogenic Avian Influenza A(H5N1) Virus: Identification of Human Infection and Recommendations for Investigations and Response (cdc.gov)

Interim Guidance on Testing and Specimen Collection for Patients with Suspected Infection with Novel Influenza A Viruses with the Potential to Cause Severe Disease in Humans | Avian Influenza (Flu) (cdc.gov)

# Patient Management: Treatment

- If there is a high suspicion for influenza A(H5N1), initiate empiric antiviral treatment
  - Do not delay treatment while awaiting laboratory results
  - Treat regardless of duration of illness
  - Oseltamivir 75 mg po twice daily x 5 days
    - Longer treatment courses can be considered for severely ill patients
    - Prophylaxis dose for close contacts is the same as the treatment dose


Highly Pathogenic Avian Influenza A(H5N1) Virus in Animals: Interim Recommendations for Prevention, Monitoring, and Public Health Investigations | Avian Influenza (Flu) (cdc.gov)

# Resources

## Resources on Current H5N1 Outbreak:

- Health Alert Network (HAN) - 00506 | Highly Pathogenic Avian Influenza A(H5N1) Virus: Identification of Human Infection and Recommendations for Investigations and Response (cdc.gov)
- NETEC: Identify, Isolate, and Inform
- Introduction to the 2024 Joint Commission Standards for Infection Control
- The Transmission – Unofficial H5N1 Map
- PPE from A to Z: PAPRs for Respiratory Protection

## Special Pathogen Outbreak Information:

- The Program for Monitoring Emerging Diseases (ProMED)
- The Transmission (UNMC Global Center for Health Security) - Subscribe to weekly email!
- CDC Health Alert Network – Sign up for Email Updates

## NETEC Educational Resources (Educate and Train your team):

- NETEC Repository - Many resources available with a quick search.
- NETEC Training and Education
- Request a training or ask a question

## NETEC Consultation Resources (Assess your readiness):

- NETEC SPORSA - Hospitals
- NETEC SPORSA - EMS
- NETEC Long Term Care Workbook

## Region 7 RESPTC:

- Request a Training from the RESPTC Team
- Questions for the RESPTC or send us an email at Jgruber@nebraskamed.com