



# Update on Highly Pathogenic Avian Influenza A(H5N1) Virus for Clinicians and Healthcare Centers

Clinician Outreach and Communication Activity (COCA) Call

Tuesday, July 16, 2024

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- Content will not include any discussion of the unlabeled use of a product or a product under investigational use with the exception of Dr. Tim Uyeki who will discuss using oseltamivir at higher dosing for post-exposure prophylaxis than for controlling seasonal influenza.
- CDC did not accept financial or in-kind support from ineligible companies for this continuing education.

# Objectives

At the conclusion of today's session, the participant will be able to accomplish the following:

1. Discuss the epidemiology and clinical features of human cases of HPAI A(H5N1) virus infection.
2. Describe risk of human infection with HPAI A(H5N1) viruses, identify higher risk populations, and what to assess in clinical settings.
3. Describe testing, using antivirals, and infection prevention and control recommendations for patients with HPAI A(H5N1) virus infection.

# To Ask a Question

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- If you are a member of the media, please direct your questions to CDC Media Relations at 404-639-3286 or email [media@cdc.gov](mailto:media@cdc.gov).

# Today's Presenters



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# Highly Pathogenic Avian Influenza A(H5N1) Virus

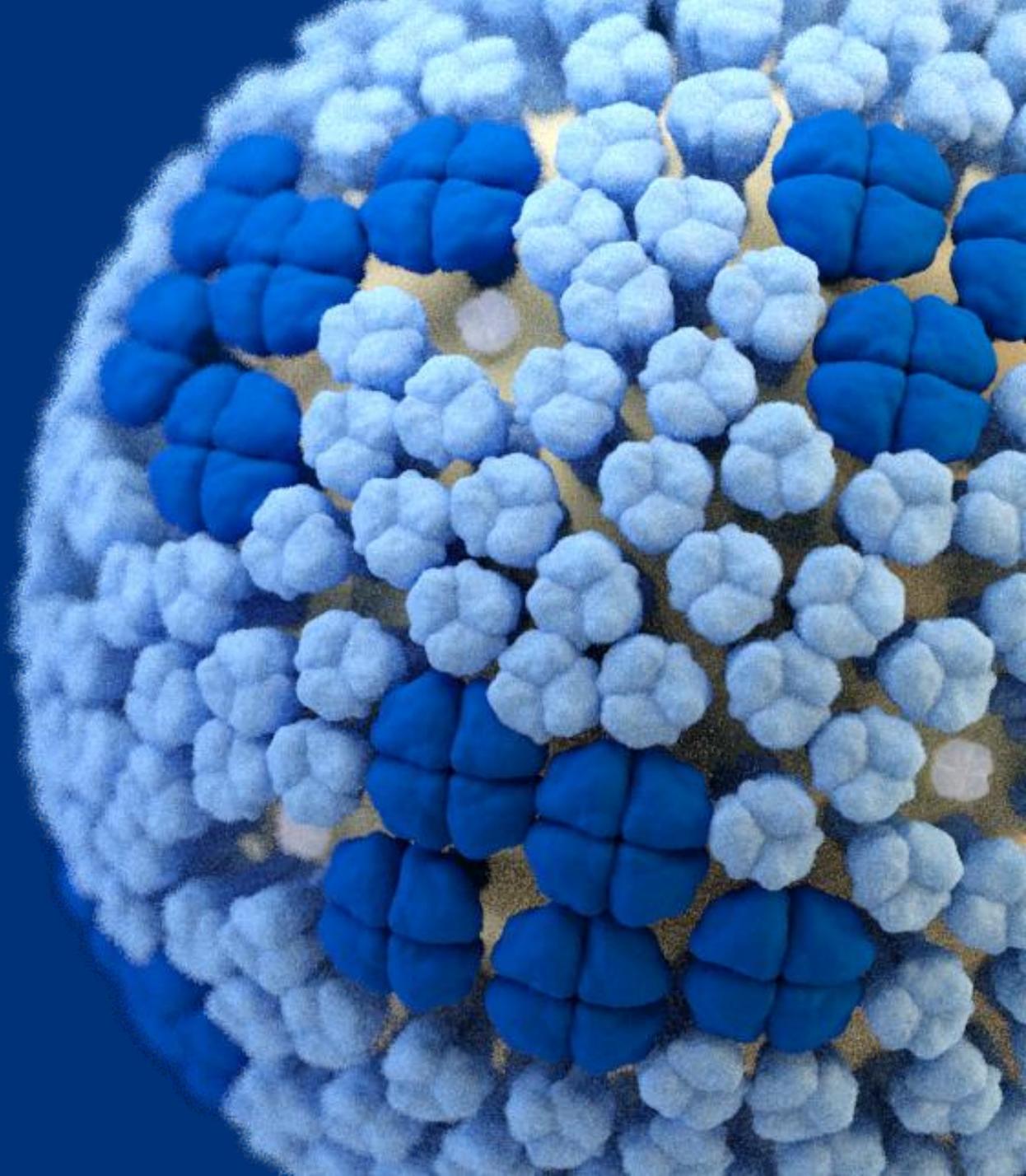
Tim Uyeki, MD, MPH, MPP

Chief Medical Officer, Influenza Division

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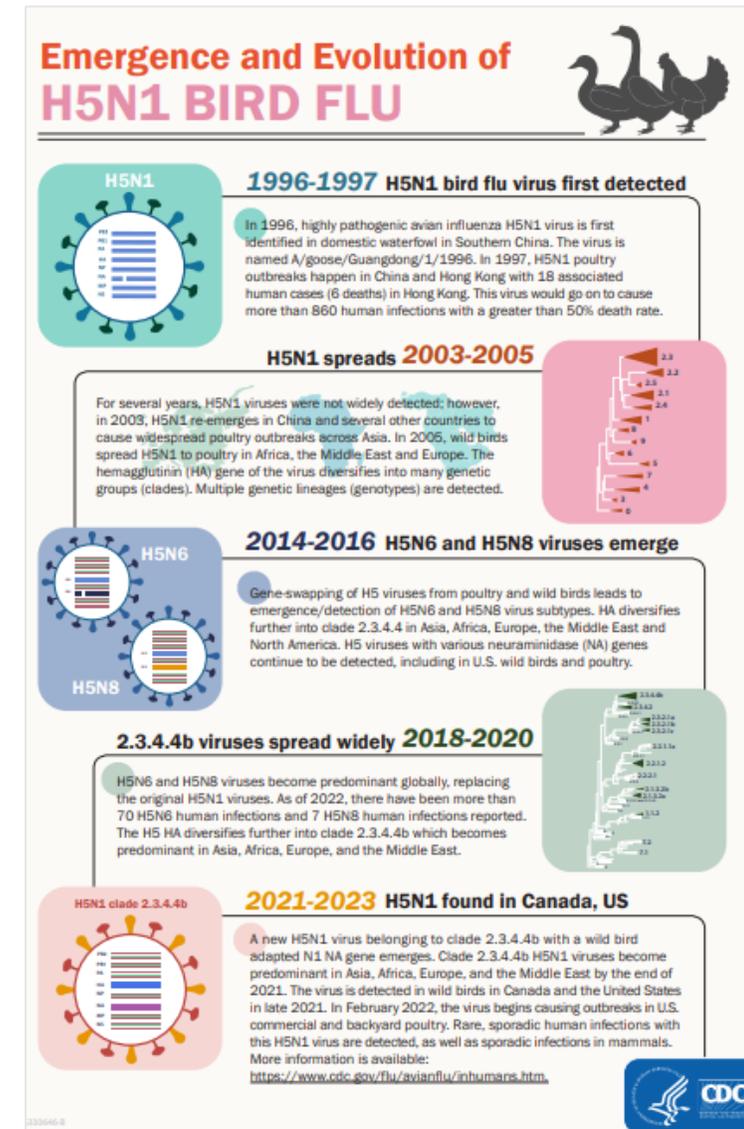
Centers for Disease Control and Prevention

July 16, 2024



# Overview of Highly Pathogenic Avian Influenza (HPAI) A(H5N1) virus

- HPAI A(H5N1) virus first detected in a poultry outbreak in Scotland (1959)
  - Infect respiratory and gastrointestinal tracts of birds
  - High mortality in infected poultry
  - Continue to evolve (classified into virus clades)
- Clade 2.3.4.4b viruses emerged in 2020 in wild birds
  - Unprecedented wide global spread
    - Many bird species infected, poultry outbreaks
    - Many terrestrial and marine mammals infected (often fatal)
  - Detected in wild birds in North America (end of 2021)
  - Poultry outbreaks, wild bird detections since 2022 (ongoing)
    - **>99 million commercial poultry/backyard birds affected (48 states)**
    - >9500 wild birds (50 states or territories)
    - 2024: Livestock (goats, dairy cattle)



# Human Infections with HPAI A(H5N1) Viruses

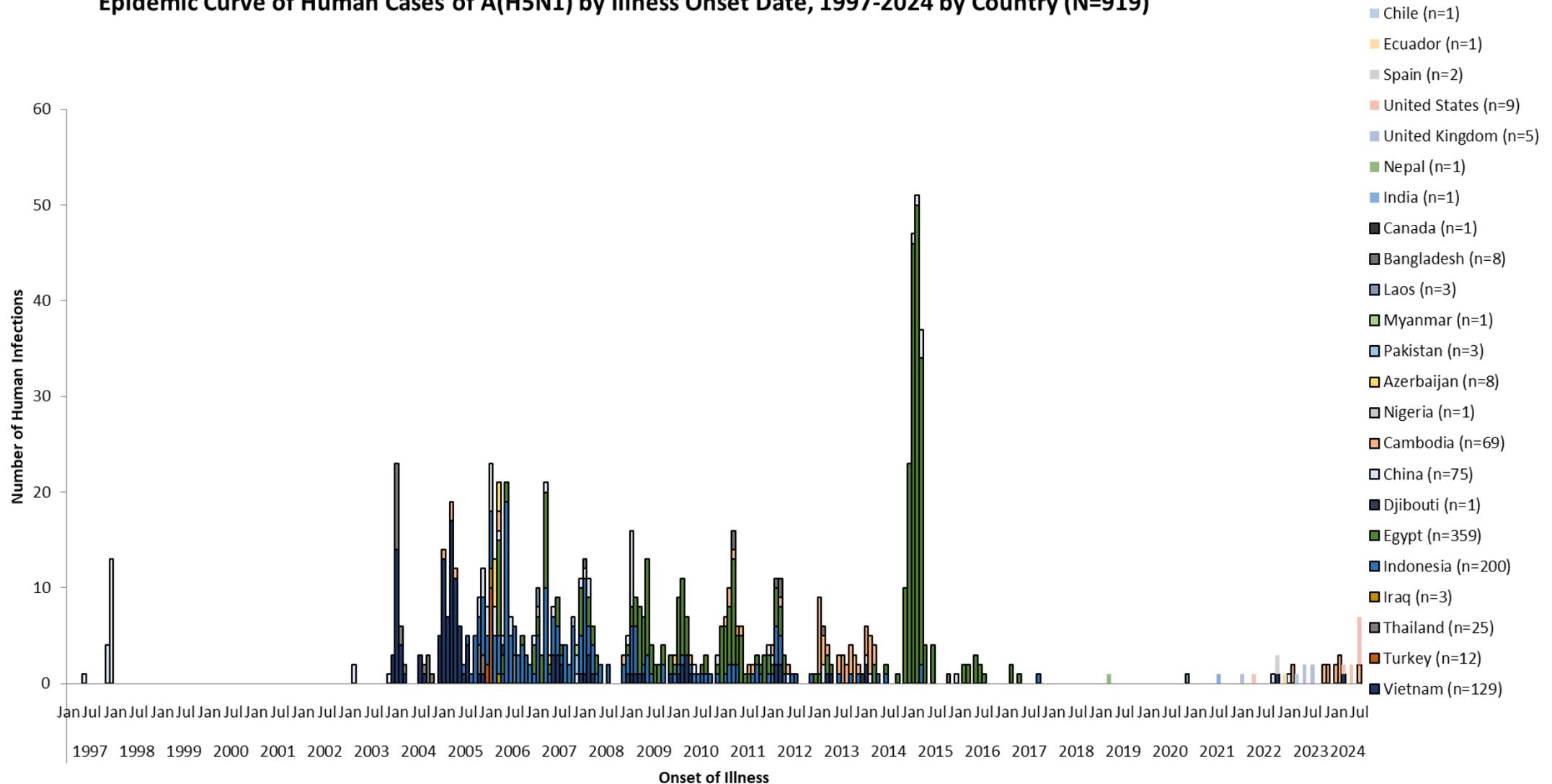
- HPAI A(H5N1) viruses bind preferentially to receptors most prevalent in the human lower respiratory tract
  - Virus receptors are also found on conjunctivae
- First human infections identified in 1997 (Hong Kong)
  - 18 cases, 6 deaths
- 1997 to date: **919 human cases reported (24 countries)\***
  - **51% case fatality proportion**

# HPAI A(H5N1) Cases Since 1997\*

**2022-2024: 36 cases**

(Australia 1, Cambodia 13, Chile 1, China 2, Ecuador 1, Spain 2, UK 5, US 9, Vietnam 2)

**Epidemic Curve of Human Cases of A(H5N1) by Illness Onset Date, 1997-2024 by Country (N=919)**

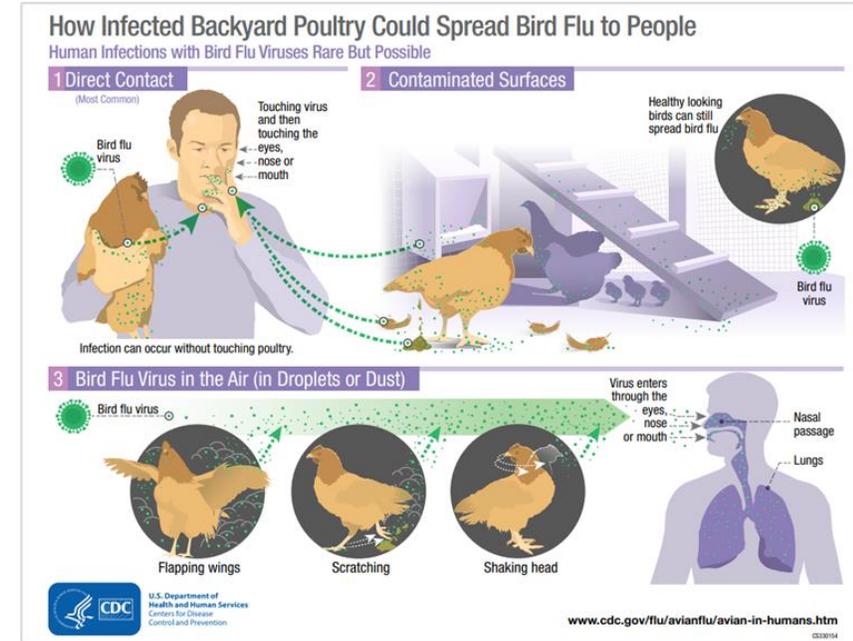


**\*Includes some A(H5)+, presumed H5N1 cases**

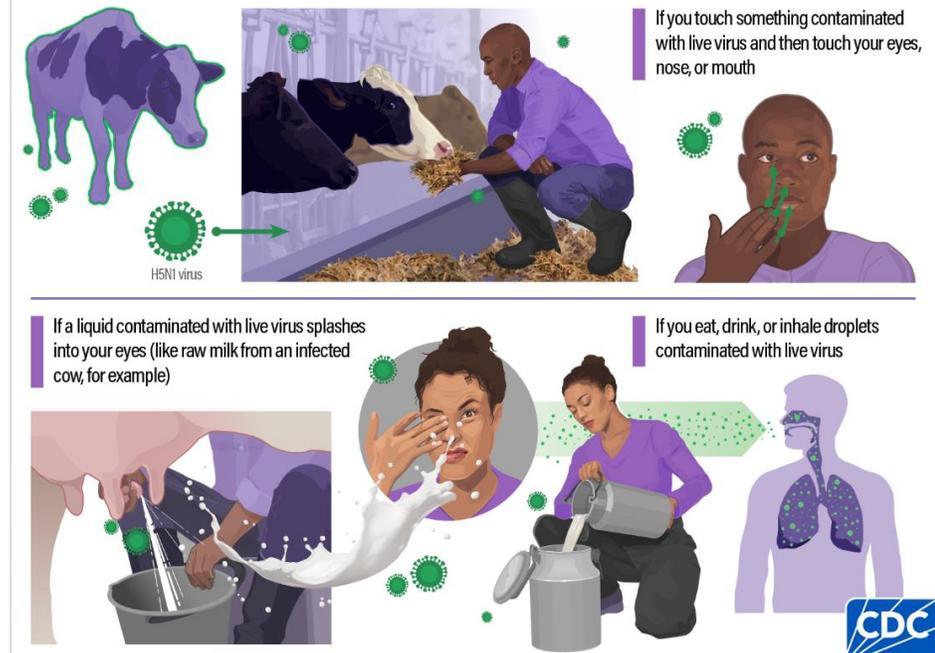
# Human Infections with HPAI A(H5N1) Viruses

➤ **Unprotected exposures** (without respiratory or eye protection)

- **Poultry exposures**
  - **Direct/close contact with sick/dead poultry**
  - Visiting a live poultry market
- **Exposure to other infected animals**
  - **Direct contact or close exposure (swans, dairy cows)**
- Limited, non-sustained human-to-human transmission from prolonged exposure to a symptomatic H5N1 patient (last reported 2007)



## H5N1 Bird Flu Might Spread from Cows to People in Several Ways



# HPAI A(H5) Cases, U.S. 2022-2024

- **Human cases (n=9)**
  - **Associated with poultry exposures: 5** (H5N1: 2; H5: 3)
    - April 2022: 1 case reported fatigue while depopulating poultry (CO)
    - July 2024: 4 cases in poultry workers performing poultry depopulation (CO)
    - All cases were clinically mild, not hospitalized
  - **Associated with dairy cattle exposures: 4** (H5N1: 3; H5: 1)
    - March - July 2024: 4 cases in dairy farm workers (TX, MI, CO)
    - All cases were clinically mild, not hospitalized

# Signs and Symptoms of HPAI A(H5N1) Virus Infection

## Clinical findings in mild illness:

- Fever or feverishness, nonproductive cough, muscle aches, malaise, headache, sore throat, myalgia
  - Abdominal pain; vomiting and diarrhea can occur
  - Eye discomfort/redness/eye discharge (conjunctivitis) alone is uncommon but can occur

## Progression to lower respiratory tract disease (5-7 days after symptom onset): difficulty breathing, shortness of breath, chest pain, tachypnea

- Hospital admission findings:
  - Clinical: hypoxia, signs of pneumonia
  - Laboratory: leukopenia, lymphopenia, mild-to-moderate thrombocytopenia
  - Radiographic findings: patchy, interstitial, lobar, and/or diffuse infiltrates and opacities, consolidation



Uyeki NEJM 2024



37-yo woman, illness day #7  
Admission CXR



Illness day #10; died day #11



21-yo male, illness day #5  
Admission CXR



Illness day #12; survived  
(not ventilated)

T Uyeki, CDC September 2005

# Clinical Complications of HPAI A(H5N1) Virus Infection

- **Pneumonia is the most common complication**
  - Progression to respiratory failure, ARDS
  - Community-acquired bacterial co-infection is rare; ventilator associated pneumonia in intubated patients
- **Other complications**
  - Acute kidney injury
  - Sepsis, shock, DIC, multi-organ failure (respiratory & renal failure)
  - Cardiac failure
  - Atypical complications
    - Encephalitis, meningoencephalitis
    - Reye syndrome with salicylate exposure
    - Spontaneous miscarriage in a pregnant woman

# Potential Exposures to H5N1 Virus

- **People with close, prolonged, or unprotected exposures to infected animals (including livestock), or to environments contaminated by infected animals, are at greater risk of infection**
- **Potential occupationally exposed persons**
  - Dairy farm workers
  - Slaughterhouse workers
  - Milk processing facility employees
  - Poultry workers
  - Veterinarians, veterinary assistants
- **Unprotected exposure to a symptomatic person with H5N1 virus infection**

• Monitor for signs or symptoms of acute respiratory illness and/or conjunctivitis and seek clinical care if signs/symptoms occur (testing, potential antiviral treatment)

# Influenza Testing (Outpatients)

- **If A(H5N1) virus infection is suspected (use recommended PPE\*):**
  - **Patients with acute respiratory symptoms:**
    - › Collect (1) a nasopharyngeal swab, and (2) a combined nasal and throat swab specimen
      - » Place each specimen into separate tubes of viral transport media
  - **Patients with conjunctivitis:**
    - › Collect (1) a conjunctival swab, and (2) a nasopharyngeal swab
      - » Place each specimen into separate tubes of viral transport media
- **Influenza A virus, and A(H5) virus testing must be done at a public health laboratory**

## **Influenza tests available in clinical settings**

- *Cannot specifically identify A(H5N1) virus*
- *Cannot differentiate A(H5N1) virus from seasonal influenza A(H3N2) and A(H1N1)pdm09 viruses*
  - *Need to perform subtyping of influenza A viruses (H1, H3), and A(H5) assays*

\*PPE: NIOSH approved N95 filtering facepiece respirator, eye protection, gown, gloves

# Influenza Testing (Hospitalized Patients)

- **Patients with lower respiratory tract disease (use recommended PPE\*)**
  - Collect **upper respiratory specimens** (NP swab, combined nasal & throat swabs), and **sputum** for influenza A and A(H5) virus testing at public health laboratories
  - Intubated patients: Also collect **endotracheal aspirate specimens (or BAL fluid)**
- ***Collect multiple respiratory specimens from different sites on multiple days for patients with suspected HPAI A(H5N1) virus infection to maximize potential for diagnosis***

\*PPE: NIOSH approved N95 filtering facepiece respirator, eye protection, gown, gloves

# Antiviral Treatment and Prophylaxis

- **If A(H5N1) virus infection is suspected**
  - **Start empiric antiviral treatment with oseltamivir as soon as possible** (while awaiting results)
  - **Recommend home isolation for mild illness, notify local and state public health for testing, monitoring and follow-up as soon as possible**
  - **If A(H5N1) virus infection is confirmed: home isolation**
    - Consider: until clinically improved and repeat respiratory specimens are negative for influenza
- **Post-exposure antiviral prophylaxis**
  - If A(H5N1) virus infection is confirmed, **household and other close contacts are recommended to receive oseltamivir at treatment dosing as soon as possible** (twice daily x 5 days; longer duration for ongoing exposures)
    - » **Monitor for any illness signs/symptoms x 10 days after the last exposure**

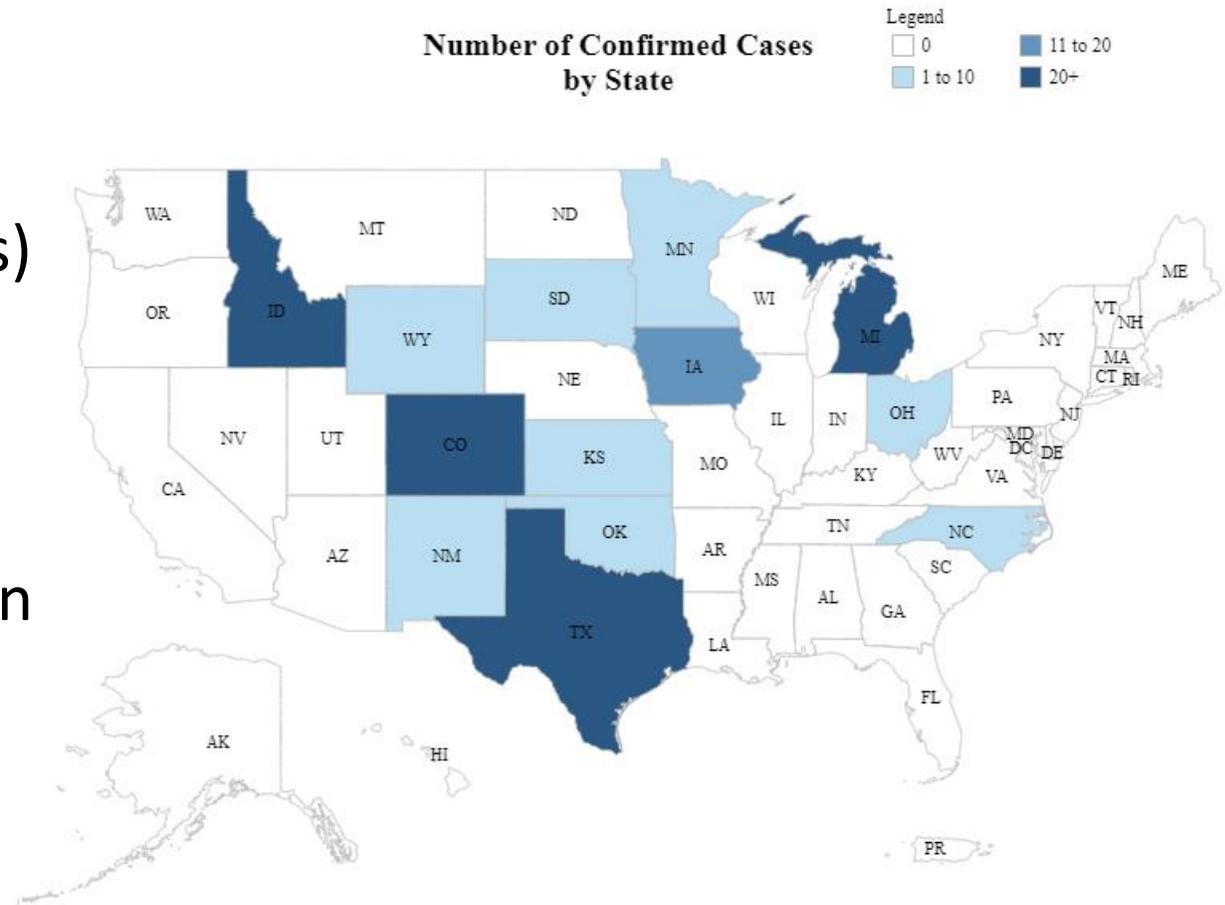
# Clinical Management: Hospitalized Patients

- **Isolate patients, follow recommended infection prevention and control measures, use recommended PPE**
- **Oseltamivir treatment**
- **Supportive care of complications**
  - Advanced organ support, critical care
- Immunomodulators
  - **Avoid moderate to high-dose corticosteroids**
    - › Associated with prolonged viral shedding
    - › May increase risk for ventilator-associated pneumonia and death
  - No data for other immunomodulators (e.g., IL-6 receptor blockers, JAK inhibitors)

# HPAI A(H5N1) in Dairy Cattle: Current Situation and Response Updates

# HPAI A(H5N1) in U.S Dairy Herds

- Since March 2024: USDA has confirmed A(H5N1) virus infections of dairy herds in >155 farms (13 states)
  - Clade 2.3.4.4b virus
  - High levels of virus in raw milk
- Other animal species reported in association with infected dairy herds in the U.S. include:
  - Wild birds, cats, racoons, opossums



# A(H5) Human Cases related to Dairy Cow Exposure

- 4 human cases identified to date (H5N1: 3)
  - Late March/early April: Texas: 1 case
  - May: Michigan: 2 cases
  - July: Colorado: 1 case
- Adult dairy farm workers in contact with cows, all with clinically mild illness
  - Not wearing recommended PPE (no respiratory or eye protection)
    - 3 cases with conjunctivitis only, 1 case with acute respiratory symptoms
    - All offered oseltamivir, and recovered without hospitalization
    - No human-to-human transmission

\* [Health Alert: First Case of Novel Influenza A \(H5N1\) in Texas, March 2024 | Texas DSHS](#)

† [Influenza A \(H5N1\) \(michigan.gov\)](#)



# CDC Recommendations on Raw Milk

- A(H5N1) virus has been detected in raw cow milk of infected cows.
- Pasteurization kills A(H5N1) viruses and pasteurized milk is safe to drink.
- People should not drink raw milk or consume products made from raw milk.
- CDC recommends against consuming raw milk contaminated with live [A\(H5N1\) virus](#) as a way to develop antibodies against [A\(H5N1\) virus](#) to protect against future disease.



<https://www.cdc.gov/food-safety/foods/raw-milk.html>

# Self-knowledge Check: What are possible signs and symptoms of HPAI A(H5N1) Virus Infection in humans?

- A. Nonproductive cough
- B. Conjunctivitis
- C. Fever
- D. Signs of pneumonia
- E. A and B only
- F. All of the Above

# Self-knowledge Check: What are possible signs and symptoms of an HPAI A(H5N1) Virus Infection in humans?

- A. Nonproductive cough
- B. Conjunctivitis
- C. Fever
- D. Signs of pneumonia
- E. A and B only
- F. All of the Above**

Rationale: Based on past clinical and hospital admission findings, these are all signs and symptoms observed in patients with H5N1 virus infection.



# HPAI A(H5N1) Virus Healthcare Infection Prevention and Control

**Ryan Fagan, MD, MPH&TM**

July 16, 2024

CDC Division of Healthcare Quality Promotion

# Rationale for CDC Interim Healthcare Infection Control Guidance for HPAI A(H5N1)

- Historically high morbidity and mortality associated with H5N1 virus infections
- Extremely low population immunity to H5N1 viruses
- Opportunities for viral mutations and adaptation
- No H5N1 vaccines currently available
- CDC Interim Guidance for Infection Control in Healthcare Settings for Novel Influenza A Viruses Associated with Severe Disease: [https://www.cdc.gov/bird-flu/hcp/novel-flu-infection-control/?CDC\\_AAref\\_Val=https://www.cdc.gov/flu/avianflu/novel-flu-infection-control.htm](https://www.cdc.gov/bird-flu/hcp/novel-flu-infection-control/?CDC_AAref_Val=https://www.cdc.gov/flu/avianflu/novel-flu-infection-control.htm)

# Selected Recommendations from Interim Guidance for Patients with HPAI A(H5N1) Virus Infections

- **Patient placement in airborne infection isolation room**
- **Personal protective equipment for healthcare personnel: gloves, gown, eye protection, and respiratory protection at least as protective as N95 filtering facepiece respirator**
- **Source control**
- **Additional standard precautions**
  - Standard cleaning, disinfection, laundry, and food service procedures
  - Respiratory hygiene and cough etiquette
- **Follow local medical waste regulations**

# Self-knowledge Check: Which of these is recommended for patients with suspected or confirmed HPAI A (H5N1) infection?

- A. Patient placement in AIIR room
- B. Personal protective equipment for healthcare personnel: gloves, gown, eye protection, and respiratory protection at least as protective as N95 filtering facepiece respirator
- C. Source control
- D. Follow local medical waste regulations
- E. All of the above

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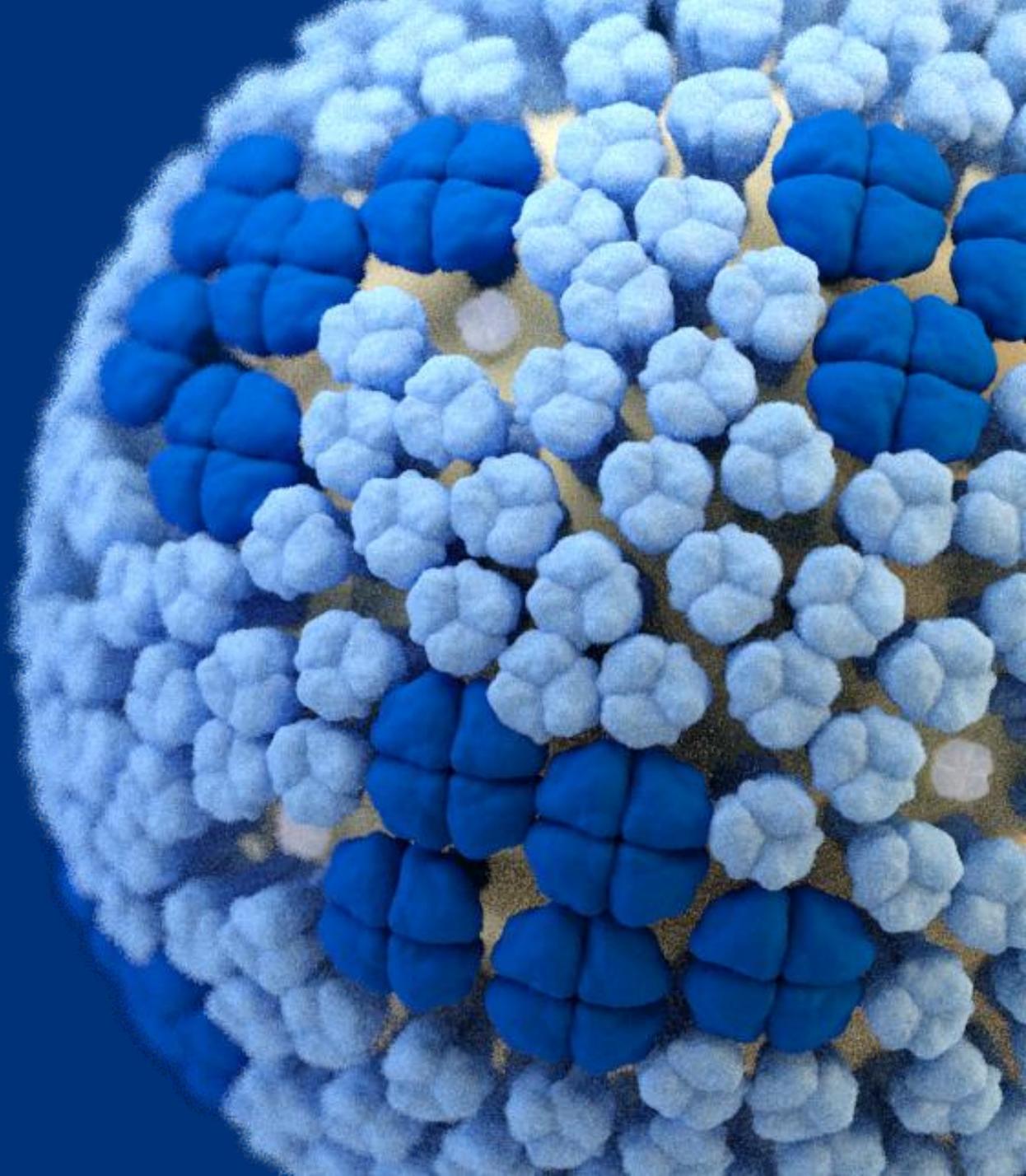
Rationale: All of the options are recommended for patients with suspected or confirmed HPAI A (H5N1) infection.

# Highly Pathogenic Avian Influenza A(H5N1) Virus: Surveillance and Monitoring

Alicia Budd, MPH

Centers for Disease Control and  
Prevention

July 16, 2024



# CDC's Priorities

- Supporting and engaging public health and agricultural partners
- Protecting human health and safety
- Understanding risk to people from HPAI A(H5N1) viruses
- Assessing HPAI A(H5N1) viruses for genetic changes



# Monitoring of Exposed Persons

- **Since February 2022**
  - Active monitoring of people exposed to infected birds, poultry or other animals for 10 days after exposure
    - >9,500 people
    - About **350 people tested** for influenza A
- **Current cattle outbreak (2024)**
  - >1,390 people monitored
  - States and CDC tested **>60 persons**

**CDC** Avian Influenza (Bird Flu)

EXPLORE TOPICS

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JULY 12, 2024 [ESP/AVI](#)

## How CDC is monitoring influenza data among people to better understand the current avian influenza A (H5N1) situation

Weekly Snapshot for Week Ending July 6, 2024

**AT A GLANCE**

CDC influenza (flu) surveillance systems show no indicators of unusual influenza activity in people, including avian influenza A(H5N1).

### Overview

This page provides information on how CDC systems that monitor national, state, and local level influenza data are being used during the [current avian influenza A\(H5N1\) situation](#).

- Influenza virus and illness activity are monitored year-round through a collaborative effort between CDC and many partners, including state, local, and territorial health departments; public health and clinical laboratories; clinics; and emergency departments.
- Human cases of [novel](#) influenza, which are human infections with non-human influenza A viruses that are different from currently spreading seasonal human influenza viruses, are nationally notifiable. Every identified case is investigated and reported to CDC.
- CDC is actively looking at multiple flu indicators during the current situation to monitor for influenza A(H5N1) viruses, including looking for spread of the virus to, or among people, in jurisdictions where the virus has been identified in people or animals.

### Monitoring of Persons Exposed to Infected Animals\*

**February 2022 – Present**

CDC and state and local health departments monitor people exposed to infected birds, poultry or other animals for 10 days after exposure. Between February 2022 and now, there have been

**ON THIS PAGE**

**Overview**

- Monitoring of Persons Exposed to Infe...
- Main Findings from Surveillance Syste...
- Monitoring for Novel Influenza A virus...
- Public health laboratory reporting
- Systems used to monitor influenza act...
- Monitoring for changes in tests positiv...
- Monitoring for changes in emergency ...
- Show More

<https://www.cdc.gov/flu/avianflu/h5-monitoring.html>

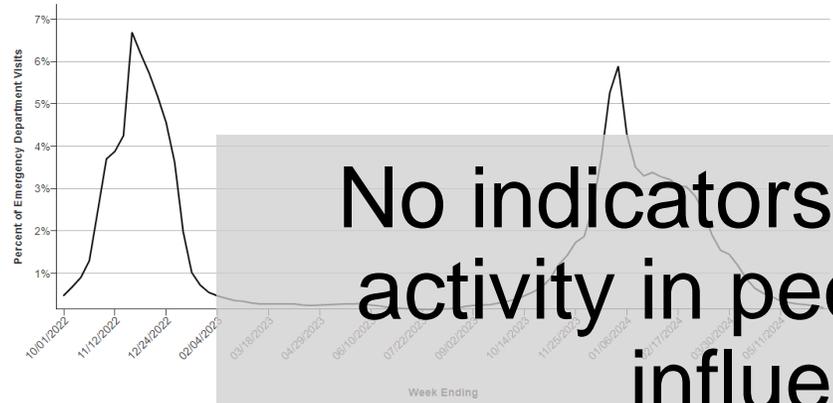
# Summer Influenza Surveillance Priorities

- **Provider outreach to continue influenza testing through summer, particularly for patients with recent history of relevant exposures**
- Continued monitoring of people with recent exposure to HPAI A(H5N1) on confirmed farms
- Facilitate detection of HPAI A(H5N1) human cases in the community through enhanced, national surveillance at seasonal influenza levels
  - Subtyping of influenza A positive specimens, expanded specimen sources
  - Continued surveillance of lab-confirmed influenza associated hospitalizations through FluSurv-NET
- Continued follow-up for areas that flag in syndromic and wastewater data

# Surveillance, Human Monitoring, and Testing

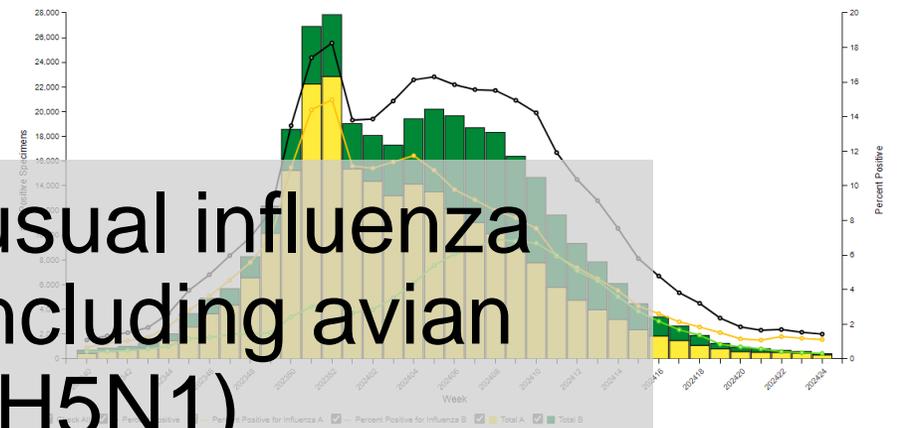
- Since February 2024, public health laboratory monitoring includes testing of **34,091 specimens** using a protocol that would have detected HPAI A(H5N1)

Weekly percent of total emergency department visits associated with influenza

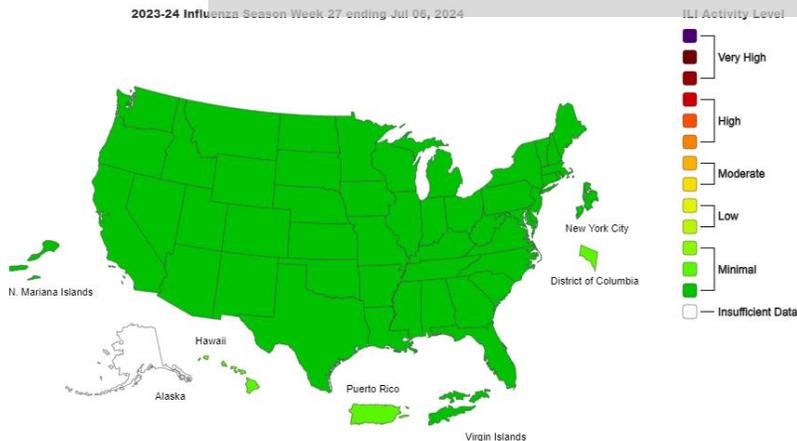


No indicators of unusual influenza activity in people, including avian influenza A(H5N1)

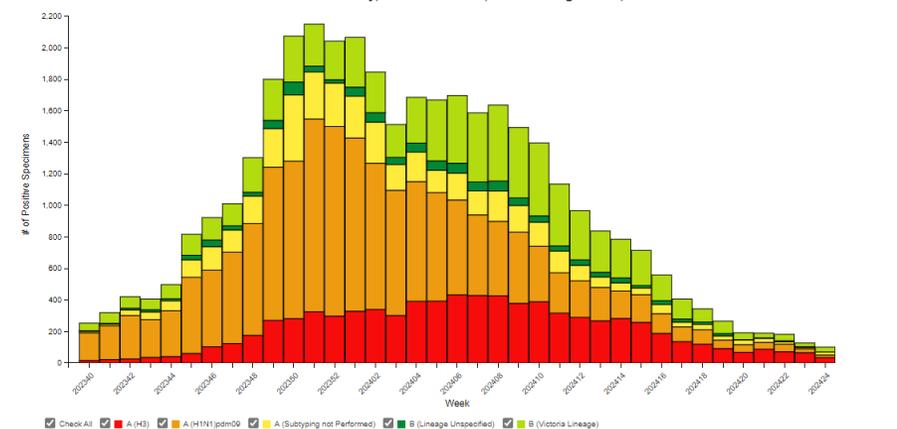
Influenza Positive Tests Reported to CDC by Clinical Laboratories, National Summary, 2023-24 Season, week ending Jun 15, 2024



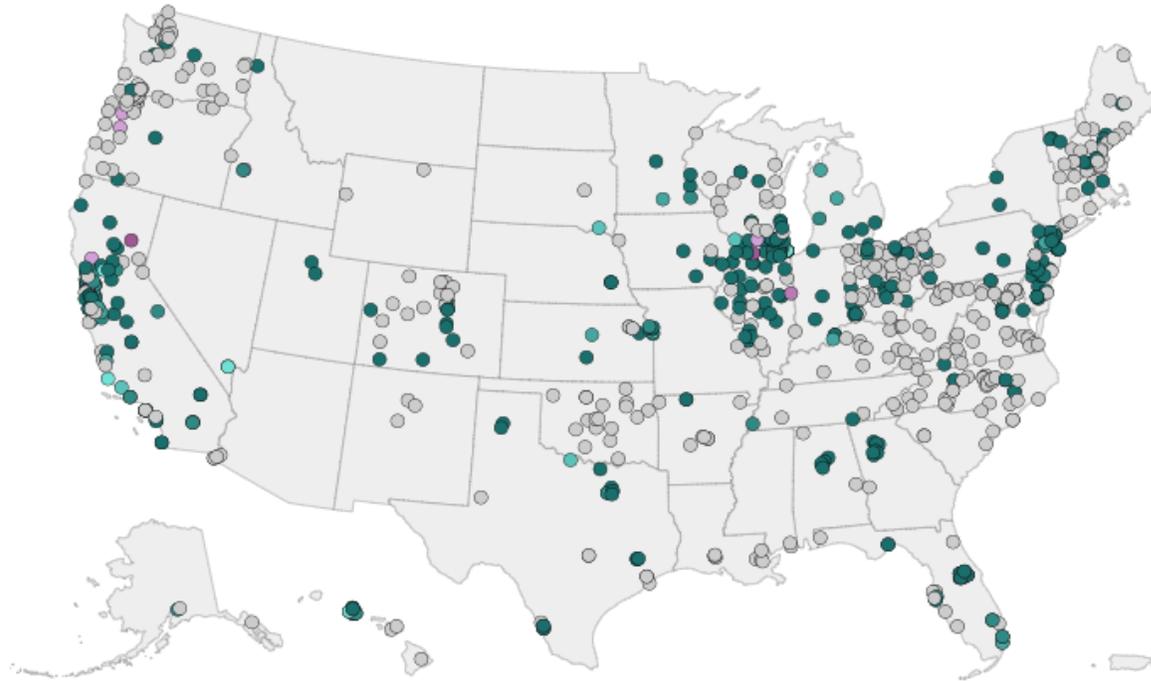
2023-24 Influenza Season Week 27 ending Jul 06, 2024



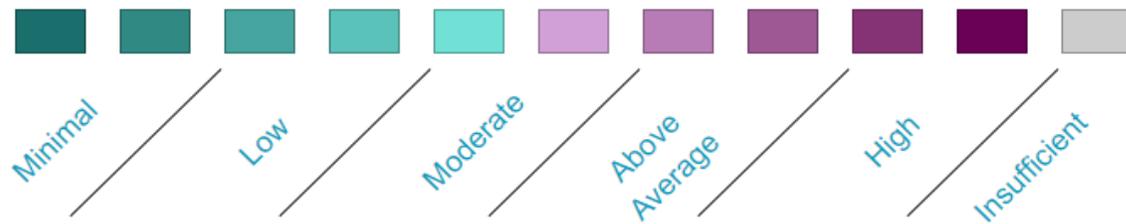
Influenza Positive Tests Reported to CDC by Public Health Laboratories, National Summary, 2023-24 Season, week ending Jun 15, 2024



# 'High' Wastewater Sites and Potential HPAI A(H5N1) Detections



Select a color from the legend to add or remove it from the map.

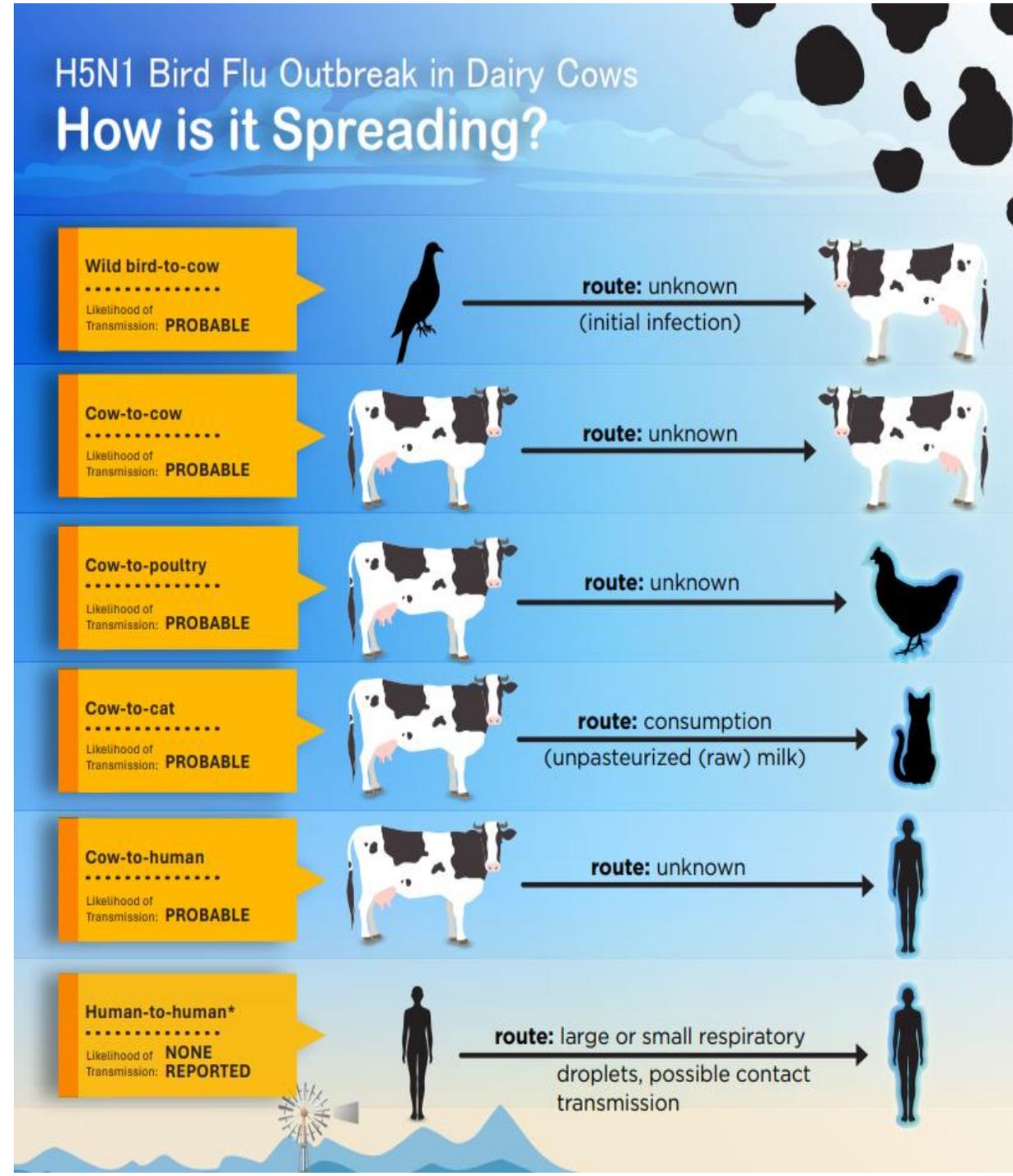


## Developed Levels for Influenza A Virus in Wastewater

- Influenza A Virus Level metric
- Compare current level to levels at the same site during the 2023-2024 influenza season
- Flag  $\geq 80$ th percentile as "High"
- Outreach to state/local partners in "high" areas, as well as notifying USDA and FDA through the UCG Epi WG

# Epidemiologic Investigations

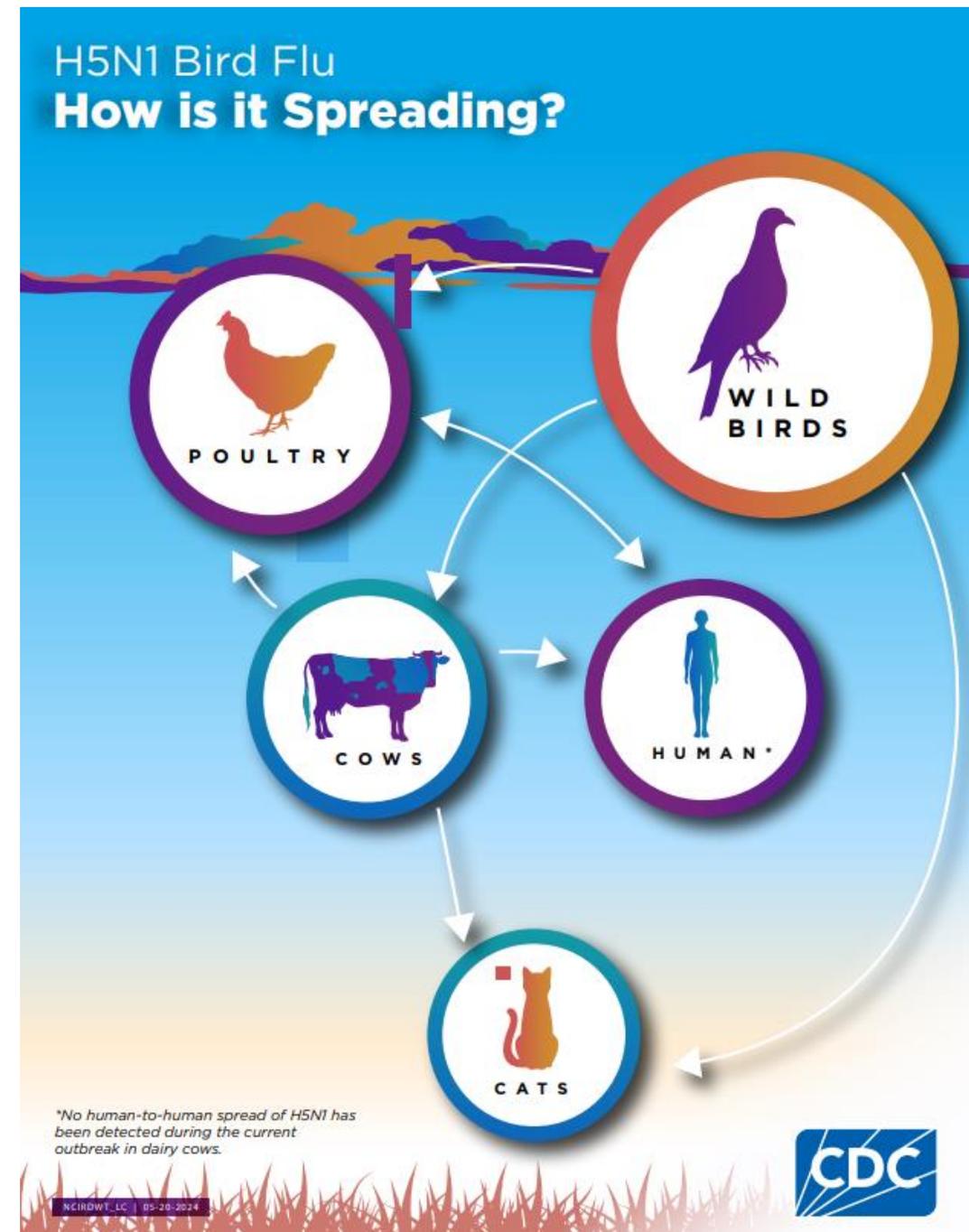
- Health and agricultural partners at local, state and federal level, and affected farms
- Important public health questions
  - Evidence of infection in exposed populations?
  - Spectrum of illness and rate of asymptomatic infections?
  - Types of exposure on farms/dairies?
  - Behaviors associated with human infections or protection from infection?
- Assess risk for symptomatic and asymptomatic infection and a survey to assess exposures



# Public Health Risk

- Overall, current avian influenza A(H5N1) human health risk assessment for the U.S. general public remains low
- Increased risk with exposure to infected animals or environment – occupational, recreational
- Exposed individuals should monitor for symptoms after first exposure and for 10 days after last exposure
- Continued monitoring for influenza throughout summer months

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



# Resources from CDC

## —Situation Updates:

—[CDC A\(H5N1\) Bird Flu Response Update | Avian Influenza \(Flu\)](#)

## —Surveillance Updates

—[How CDC is monitoring influenza data among people to better understand the current avian influenza A \(H5N1\) situation | Avian Influenza \(Flu\)](#)

## —Technical Report

—[Technical Report: Highly Pathogenic Avian Influenza A\(H5N1\) Viruses | Avian Influenza \(Flu\) \(cdc.gov\)](#)

## —Updated Recommendations

—[Highly Pathogenic Avian Influenza A\(H5N1\) Virus in Animals: Interim Recommendations for Prevention, Monitoring, and Public Health Investigations](#)

—[Recommendations for Worker Protection and Use of Personal Protective Equipment \(PPE\) to Reduce Exposure to Novel Influenza A Viruses Associated with Severe Disease in Humans](#)

## CDC A(H5N1) Bird Flu Response Update, July 12, 2024

### AT A GLANCE

CDC provides an update on its response activities related to the multistate outbreak of avian influenza A(H5N1) virus, or "H5N1 bird flu," in dairy cows and other animals in the United States.

### CDC Update

**July 12, 2024** – CDC continues to respond to the public health challenge posed by a multistate outbreak of avian influenza A(H5N1) virus, or "H5N1 bird flu," [in dairy cows and other animals in the United States](#). CDC is working in collaboration with the U.S. Department of Agriculture (USDA), the Food and Drug Administration (FDA), state public health and animal health officials, and other partners using a [One Health approach](#). Four human cases of A(H5) infection associated with this outbreak in U.S. dairy cows have been reported. [\[A\]](#) Based on the information available at this time, CDC's current H5N1 bird flu human health risk assessment for the U.S. general public remains low. On the animal health side, [USDA is reporting](#) that 151 dairy cow herds in 12 U.S. states have confirmed cases of avian influenza A(H5N1) virus infections in dairy cows as the number of infected herds continues to grow.

Among other activities previously reported in past [spotlights](#) and still ongoing, recent highlights of CDC's response to this include:

- Reporting that despite extensive efforts, CDC has been unable to sequence or isolate virus from the recent human case in Colorado. Attempts to [sequence](#) viral RNA from the Colorado case were unsuccessful most likely due to insufficient virus in the clinical sample. As a result, CDC has not been able to conclusively determine the [neuraminidase \(NA\)](#) subtype of the virus. Given that cows on the farm where the patient worked were confirmed positive for A(H5N1) virus infection, it is likely this was an N1 also, but that cannot be conclusively demonstrated. Virus isolation attempts in eggs and cells were similarly unsuccessful.
- Continuing to meet with commercial laboratories to discuss H5 assay licensing agreements and interest in development of commercial H5 tests. CDC's Technology Transfer Office and the Influenza Division are actively pursuing establishing licensing agreements with multiple companies, and several have been completed. Eight of those licenses are currently in place, and several more are in progress.

### RELATED PAGES

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[CDC A\(H5N1\) Bird Flu Response Update, July 5, 2024](#)

[CDC A\(H5N1\) Bird Flu Response Update June 28, 2024](#)

[CDC A\(H5N1\) Bird Flu Response Update June 21, 2024](#)

[CDC A\(H5N1\) Bird Flu Response Update June 14, 2024](#)

[Story: Study Shows Ferrets Became Sick with A\(H5N1\) Virus After Eye...](#)

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# Self-knowledge Check: True or False: All of these are important public health questions to consider during epidemiological investigation

- A. Is there evidence of infection with HPAI A(H5N1) virus in exposed populations?
- B. If human infections with HPAI A(H5N1) virus are identified, what is the spectrum of illness?
- C. What are possible exposures to HPAI A(H5N1) virus in workers at farms/dairies?
- D. What are potential behaviors associated with human infections with HPAI A(H5N1) virus or protection from infection?

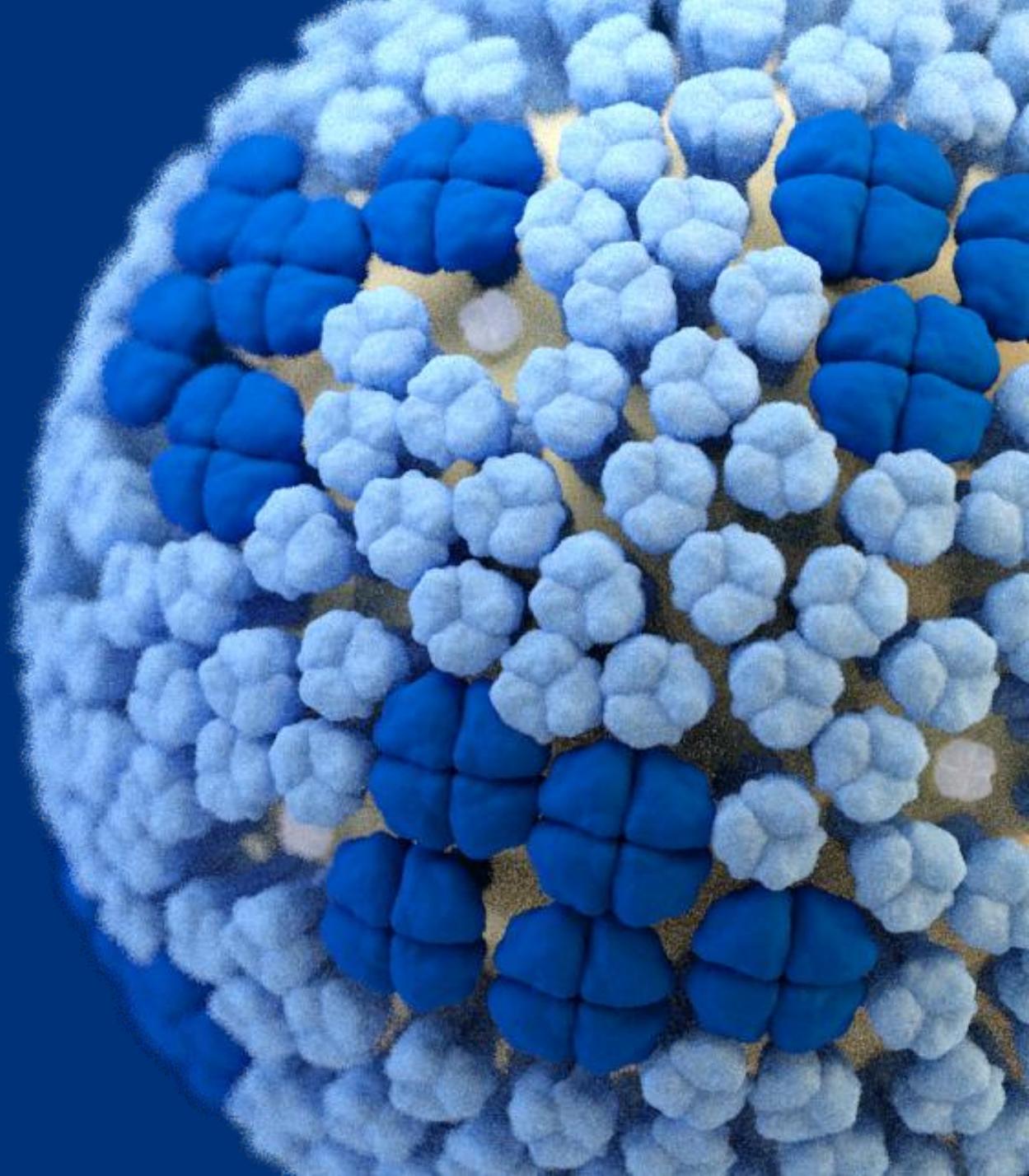
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- D. What are potential behaviors associated with human infections with HPAI A(H5N1) virus or protection from infection?

Answer: **True**

Rationale: All of these questions are important to gain understanding of the full scope of infection and to protect public health.

Thank you



# To Ask a Question

- Using the Zoom Webinar System
  - Click on the “Q&A” button
  - Type your question in the “Q&A” box
  - Submit your question
- If you are a patient, please refer your question to your healthcare provider.
- If you are a member of the media, please direct your questions to CDC Media Relations at 404-639-3286 or email [media@cdc.gov](mailto:media@cdc.gov).

# TRAIN

- **January 1, 2024:** Move from Training and Continuing Education Online (TCEO) to CDC TRAIN (<https://www.train.org/cdctrain>).
- **Existing Activities:** Continue to use TCEO for existing activities that have CE set to expire in 2024, since these courses will not move to CDC TRAIN. You may also use TCEO for existing activities with CE set to expire in 2025, before the courses transition to CDC TRAIN sometime next year. If you begin one of these courses in TCEO, we will let you know when the course will move to CDC TRAIN.
- **Transcripts & Certificates:** You can access and download CE transcripts and certificates in TCEO through the end of 2025.
- Instructions will be available on both platforms and a learner support team will be available to answer questions.

# Continuing Education

- All continuing education for COCA Calls is issued online through CDC TRAIN at CDC TRAIN (<https://www.train.org/cdctrain>).
- Those who participate in today's COCA Call and wish to receive continuing education please complete the online evaluation by **August 19, 2024**, with the **course code WC4520R-071624**. The **registration code** is **COCA071624**.
- Those who will participate in the on-demand activity and wish to receive continuing education should complete the online evaluation between **August 20, 2024**, and **August 20, 2026**, and use **course code WD4520-071624**.

# Today's COCA Call will be Available to View On-Demand

- **When:** A few hours after the live call ends\*
- **What:** Video recording
- **Where:** On the COCA Call webpage
  - [https://emergency.cdc.gov/coca/calls/2024/callinfo\\_071624.asp](https://emergency.cdc.gov/coca/calls/2024/callinfo_071624.asp)

*\*A transcript and closed-captioned video will be available about one week after the live session*

# Upcoming COCA Calls & Additional Resources

- Continue to visit <https://emergency.cdc.gov/coca/> to get details about upcoming COCA Calls.
- Subscribe to receive notifications about upcoming COCA calls and other COCA products and services at [emergency.cdc.gov/coca/subscribe.asp](https://emergency.cdc.gov/coca/subscribe.asp).

# Thank you for joining us today!



<https://emergency.cdc.gov/coca>

For more information, contact CDC  
1-800-CDC-INFO (232-4636)  
TTY: 1-888-232-6348 [www.cdc.gov](http://www.cdc.gov)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

