Fast PHACTs:
“One Health: What is it and what does it mean for every clinician?”

Matthew Leslie, DVM, PhD
Will Sander, DVM, MPH, DACVPM
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February 20, 2025

CME Accreditation Statement

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Financial Disclosures

Name and Credentials	Role in Activity	Was there a relevant Financial Disclosure	List of Mitigated Disclosures
Matthew Leslie, DVM, PhD,	Presenter	No	N/A
Will Sander DVM, MPH, DACVPM	Presenter	No	N/A
Hillary Spencer, MD, MPH	Facilitator/Presenter	No	N/A
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David Hale-Arroyo	Staff	No	N/A

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Learning Objectives

Upon completion of the webinar, participants will:

- Increase awareness of the core principles of One Health and discuss the challenges and future perspectives of One Health.
- Enhance knowledge of the current H5N1 avian flu pandemic in the context of public health responses and clinician roles.
- Improve knowledge of clinician roles in diagnosis and treatment of H5N1.

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Facilitated by:

Hillary J.J. Spencer, MD, MPH
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One Health: What is it and what does it mean for every clinician?

Presented by:

Matthew Leslie, DVM, PhD
IDPH Laboratory Data and Zoonotic Disease Epidemiologist

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One Health: What is it and what does it mean for every clinician?

IDPH FAST PHACTS
02/20/25

Matthew Leslie, DVM, PhD
Laboratory Data Epidemiologist
Office of Disease Control
Illinois Department of Public Health

What we will cover today

- **Background on the One Health approach to public health.**
- **Examples of One Health in action in Illinois.**
  - Rabies – potential human exposures.
  - One Health concerns in Illinois companion/production animals.
- **H5N1 Influenza – "The One Health challenge of our time."**
  - Background and timeline of H5N1 from emergence to today.
  - H5N1 transmission and clinical course.
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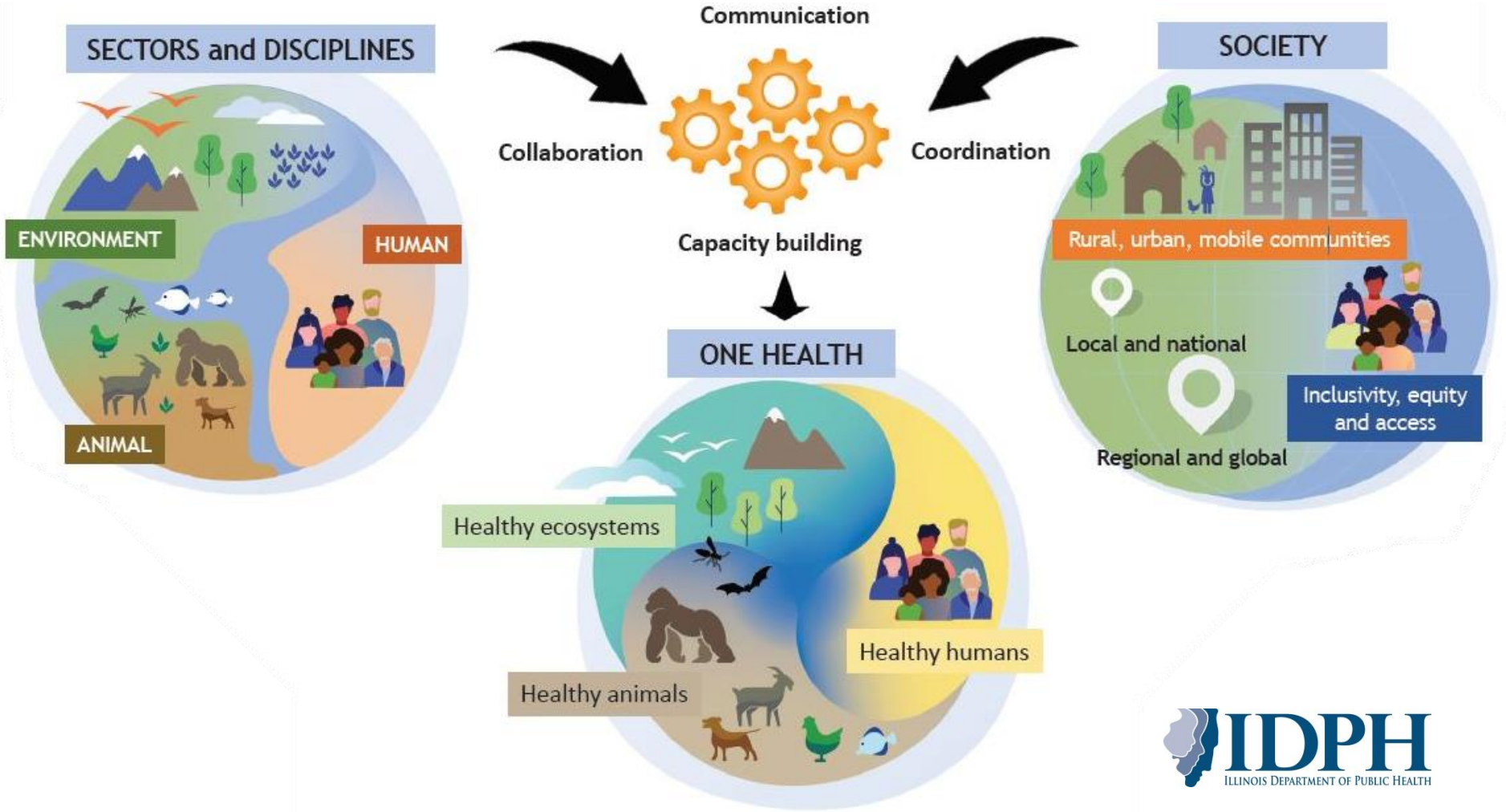
One Health framework

"OneHealth"– we are all interconnected; Our actions and choices impact everyone and everything around us.



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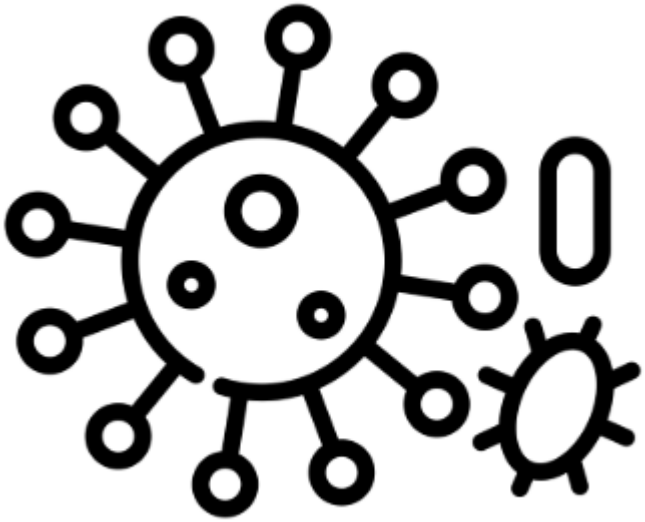
Live poll

_____ of current diseases, and _____ of emerging diseases are transmissible between humans and animals?

A) 35% / 50%
B) 50% / 50%
C) 10% / 30%
D) 60% / 75%



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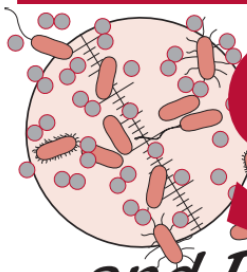

STOP

and Report Infectious Disease

Illinois Reportable Diseases

Anaplasmosis
Anthrax
Arboviruses
Babesiosis
Brucellosis
California Encephalitis virus
Campylobacteriosis
Carbapenem-res. Enterobacteriaceae
Chikungunya virus
Cholera
COVID/SARS-CoV-2
Cryptosporidiosis
Dengue virus
Diphtheria
Eastern Equine Encephalitis virus
Ehrlichiosis
E. Coli (O157:H7 / Shiga Toxin)
Hantavirus
Hepatitis B and E
Histoplasmosis
Influenza A, novel
Jamestown Canyon virus
Keystone virus
La Crosse virus
Leptospirosis
Listeriosis
Lyme disease
Malaria
Plague
Powassan virus
Psittacosis
Q fever (*Coxiella burnetii*)
Rabies
St. Louis Encephalitis virus
Salmonellosis
Severe Acute Respiratory Syndrome
Snowshoe hare virus
Spotted fever rickettsioses
Resistant S. aureus
Invasive S. pneumoniae
Tetanus
Trichinosis
Trivittatus virus
Tuberculosis
Tularemia
Typhus
Vibriosis (non cholera)
West Nile virus
Western Equine Encephalitis virus
Yellow Fever virus
Zika virus

Illinois reportable disease that *may* undergo zoonotic transmission **Bolded** names are 'classic' zoonotic diseases.

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One Health practice

More than acknowledging the interconnectedness of living things.

Are we inquiring enough about human-animal disease interactions in households?

Can pets/owners be proxies of disease status?

One Health communication

The One Health framework for public health calls for cross-professional communication

- Doctors
- Nurses
- Pharmacists
- Veterinarians
- Animal control officers
- Public health practitioners

Do you have any relationships with these health professionals in your region?

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Fishing trip scenario

- Returning home from a weekend trip, putting away the fishing gear in the garage …
- Feels something small brush against their hand in the dark …
- Something flies out of the window …

Live poll

What percent of bats tested in Illinois are positive for rabies?

A) None – there hasn't been a rabies-positive bat in Illinois in a long time.

B) Practically none - every couple years, there might be a single positive bat.

C) 1-2%

D) 3-7%

E) 14-16%

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Post-Exposure Prophylaxis(PEP) recommended following bat exposures unless the bat tests negative.

- Known bite.
-  Wake up to a bat in the room.
- Physical contact with the bat, can't rule out a bite.
- Person alone in the room with a bat are incapable of saying if they were exposed.

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Rabies

- Rabies is an acute, progressive encephalomyelitis.
- Incubation period = prolonged and variable.
- Rabies virus must travel to the brain before it can cause symptoms and before it enters the salivary glands.
- ~4,000 US animal cases each year; >90% in wildlife.
- Transmission almost always occurs via virus-laden saliva entering tissues, usually by the bite of a rabid animal.
  - More theoretical: Saliva from a rabid animal into mucus membranes or breaks in the skin.
  - Rarely: Laboratory exposures.

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Rabies PEP is costly and often over-utilized. Recommend it when needed, but not for every exposure.

Millions of bites, thousands of emergency department visits. What do these patients need?

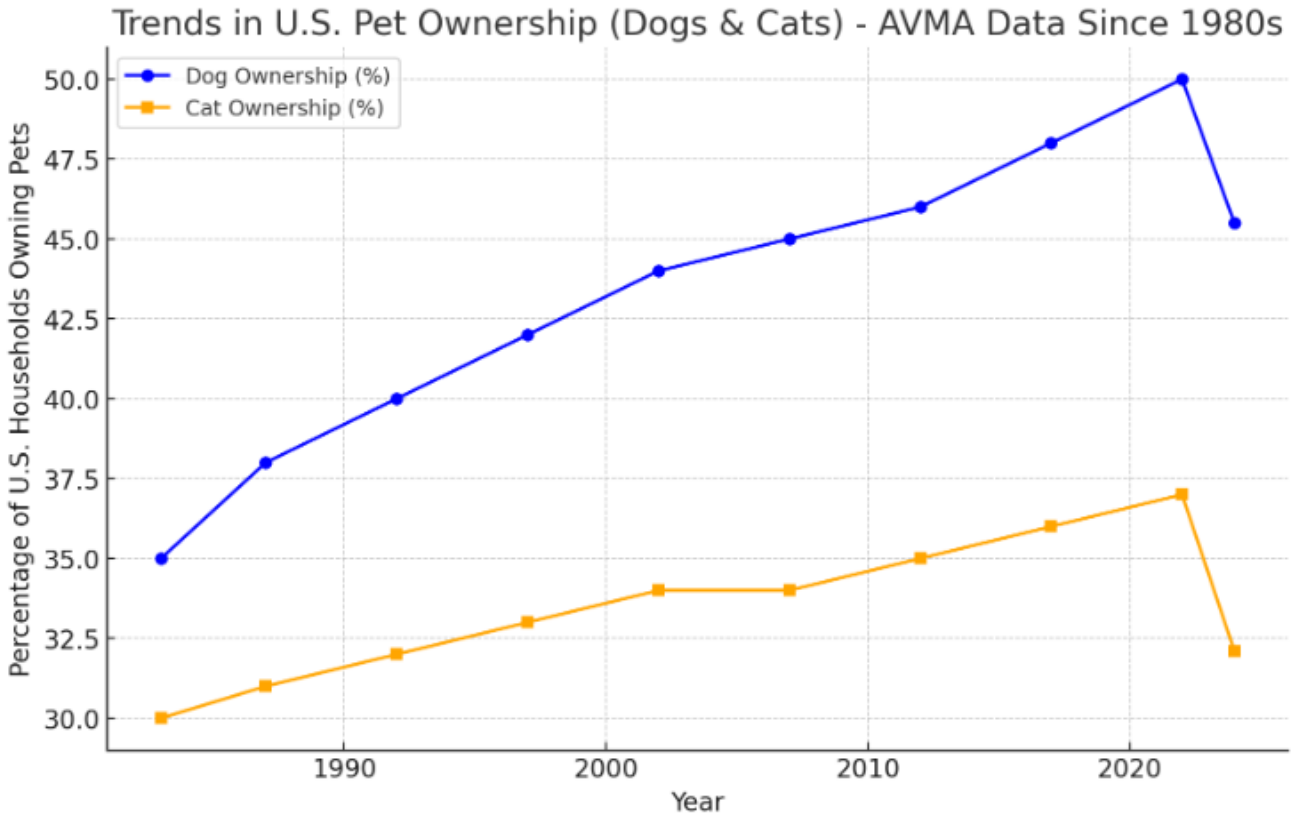
Wound care

Antibiotic therapy

Tetanus booster

Rabies risk assessment

U.S. pet ownership

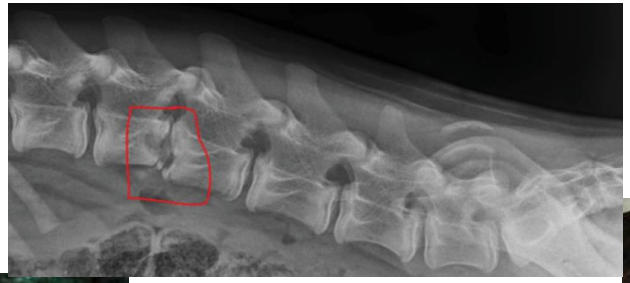


Statistic	Dogs	Cats
Percentage of U.S. households owning	45.5	32.1
Total number of U.S. households owning	59.8M	42.2M
Average number per pet-owning household	1.5	1.8
Total number in the U.S.	89.7M	73.8M

https://www.avma.org/resources-tools/reports-statistics/us-pet-ownership-statistics

Zoonotic disease concern in the small animal veterinary clinic

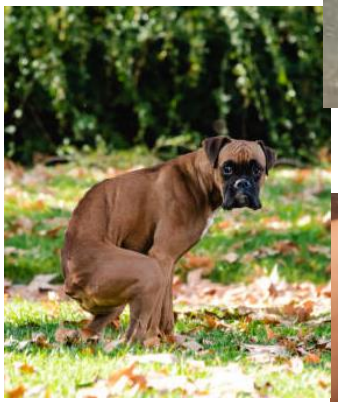
Brucella



Resistant bacterial infections

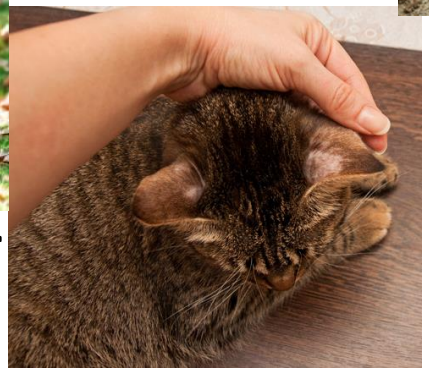
GI parasites

Toxoplasma



Leptospirosis

Campylobacter



Ring worm

Zoonotic disease concern in large animal medicine

Cryptosporidiosis

Anthrax

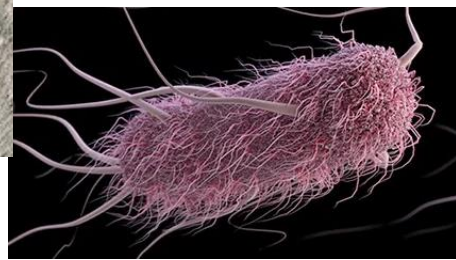
Q fever

Coxiella burnetii

Brucellosis

Tuberculosis

Ring worm



E. coli O157:H7

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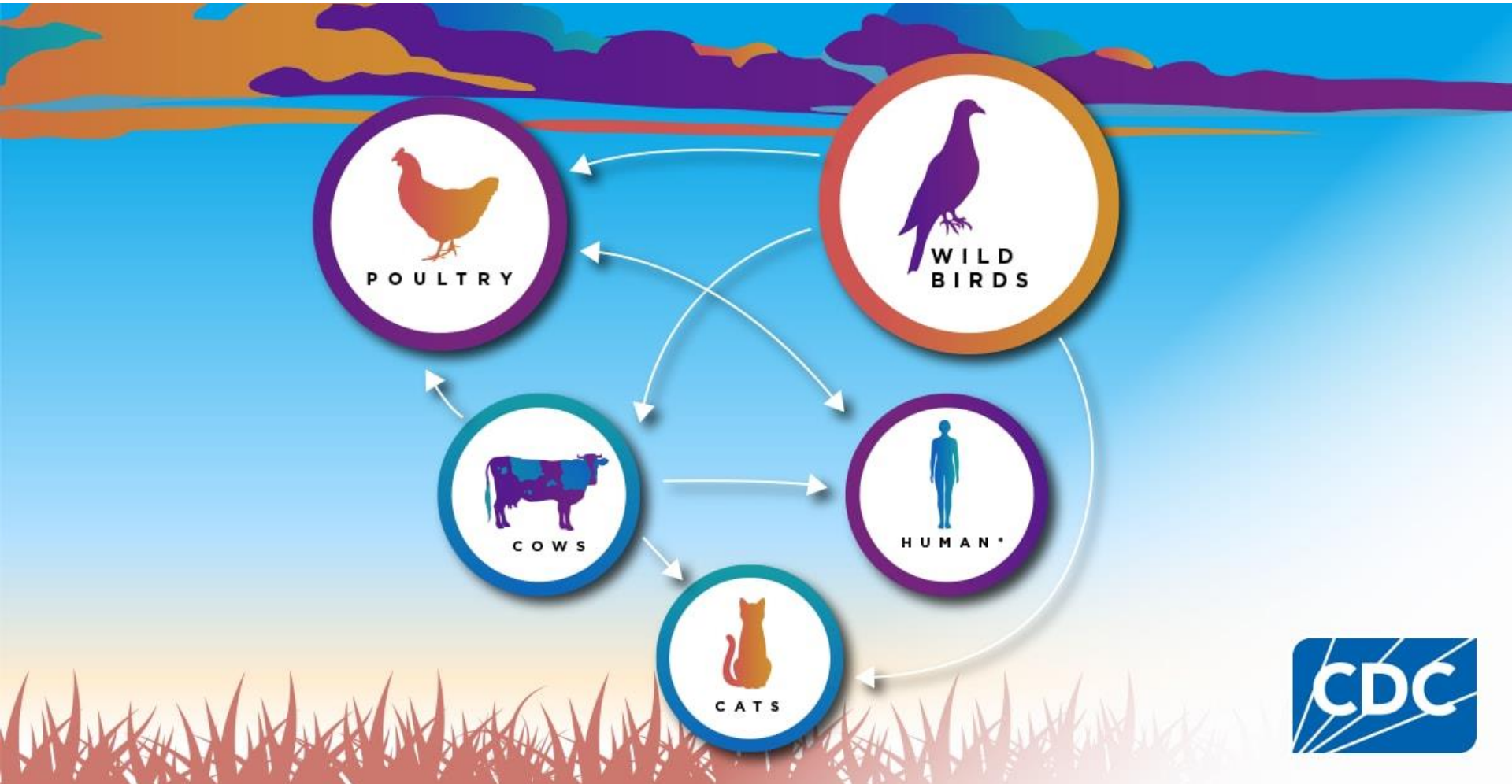
H5N1 Influenza – “The One Health challenge of our time.”



H5N1 from emergence to today

- 1996: "Highly pathogenic avian influenza" H5N1 first identified in domestic waterfowl in southern China.
  - A/goose/Guangdong/1/1996.
- Late 1990's: Poultry outbreaks in China- 860 infections; >50% mortality.
- 2003: After some quiet years, H5N1 re-emerges to cause widespread poultry outbreaks across Asia.
- 2005: Wild birds spread H5N1 to poultry in Africa, the Middle East, and Europe.
- 2021: A new H5N1 virus belonging to clade 2.3.4.4b with a wild bird-adapted N1 gene emerges and quickly predominates worldwide.
- February 2022: The virus begins causing poultry outbreaks in the U.S. Rare, sporadic human infections with this H5N1 virus are detected.
- Feb 2022-Now: H5N1 is detected widely in U.S. birds and other mammals.

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H5N1 from emergence to today

- March 2024: Texas Department of State Health Services reported the **first detection of H5N1 in dairy cattle.**
  - Clade 2.3.4.4b, Genotype B3.13
- As of February 19, 2025:
  - H5N1 detected in 1,582 flocks in all 50 states.
    - >162,000,00 agricultural poultry birds lost.
  - H5N1 detected in 972 dairy herds in 17 states.
  - The Center for Disease Control and Prevention (CDC) has **confirmed 69 human H5N1 infections** in the U.S. since 2022.
    - 23 cases associated with infected poultry.
    - 41 cases associated with infected dairy cattle.
    - 2 cases "other".
    - 3 cases with unknown exposure sources.
    - 1 case fatality.
    -

No dairy cattle or human patients have ever tested positive for H5N1 in Illinois.

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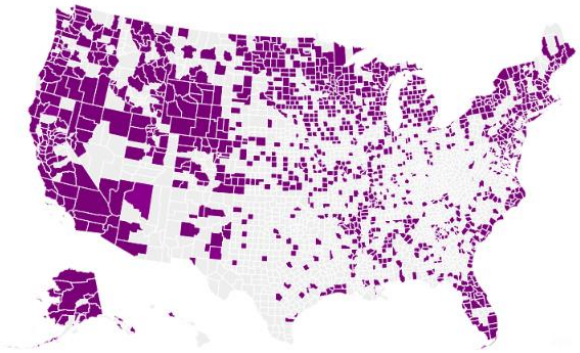
Influenza nomenclature

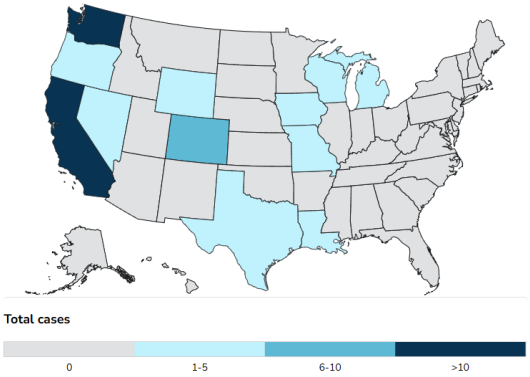
- Avian influenza viruses are classified as “low pathogenic” or “highly pathogenic” based on the severity of the disease they cause in poultry.
- **Subtype** is categorized on **Hemagglutinin** and **Neuraminidase** genes.
  - A(H5N1) -> influenza A containing Hemagglutinin 5 and Neuraminidase 1.
- Influenza A is further classified into **genetic clades** based on (H) genes. There can be **multiple genotypes within individual clades.**
    - D1.1 vs. B3.13
- Formal naming convention
  Virus type/host origin/geographic origin/strain number/year of isolation

E.g., A/dairy_cow/USA/036000-003/2024

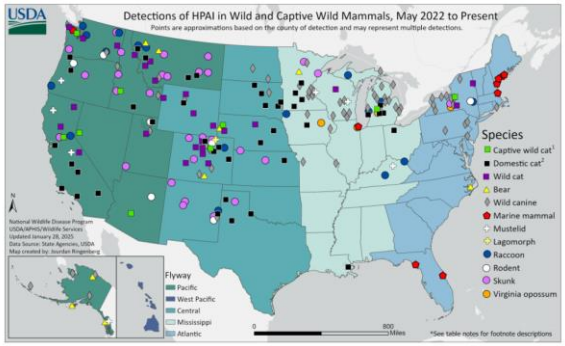
U.S. H5N1 detections



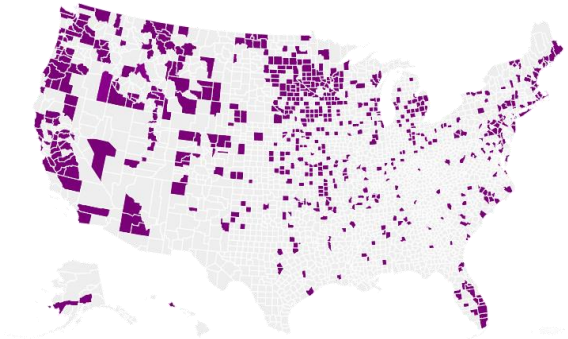
Wild birds



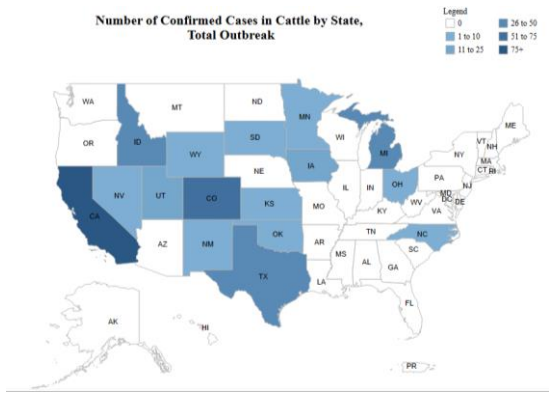
Human cases



Wild mammals



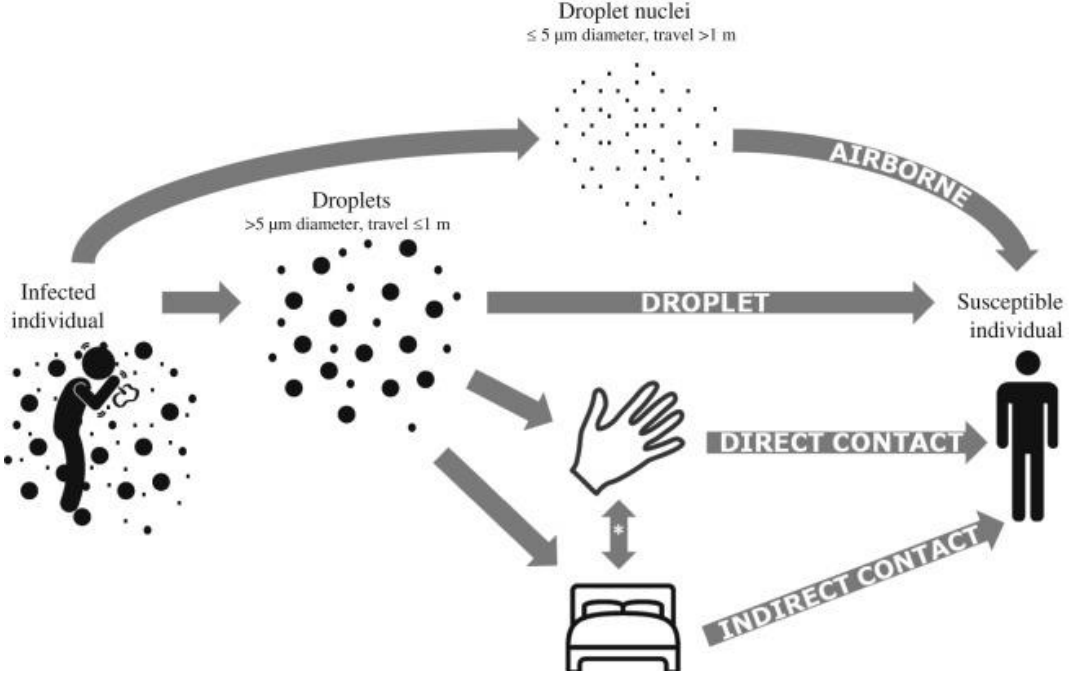
Farmed poultry

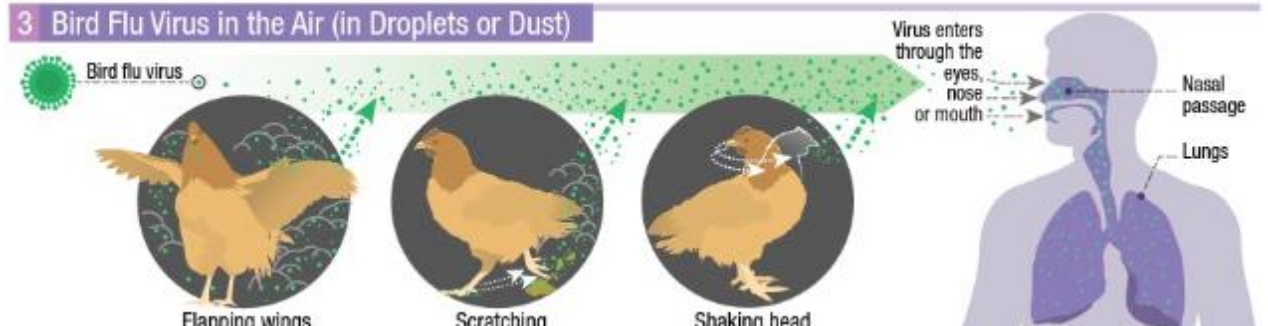


Farmed dairy

Transmission

- Transmission of H5N1 is understood to be like seasonal influenza, which primarily occurs through breathing in air with infected virus in it.
- Transmission may also occur by direct or indirect contact with milk, oral secretions, blood, organs, or fecal material from infected animals.
  - Very high titers of H5N1 found in milk due to unique tissue tropism.





H5N1 pathogenicity across species

- H5N1 infections in the U.S. have varied between species:
  - Highly pathogenic in farmed poultry
  - Mixed pathogenicity in wild birds
  - Highly pathogenic in dairy farm cats. High milk titer exposures?
  - Mild to moderately pathogenic in dairy cows.
    - Most affected animals reportedly recover with supportive treatment, and the mortality/culling rate has been at 2% or less.
    - Signs of illness have been reported in less than 10% of cows within a herd.

- Mildly pathogenic in U.S. human patients – Mild respiratory symptoms and conjunctivitis.
  - Resource-poor vs. research-rich agricultural workers hypothesis?

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H5N1 clinical course

- Clinical findings in mild illness:
  - Fever or feverishness, 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.

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H5N1 pandemic potential

RESEARCH ARTICLE | INFLUENZA

A single mutation in bovine influenza H5N1 hemagglutinin switches specificity to human receptors

TING-HUI LIN, XUEYONG ZHU, SHENGYANG WANG, DING ZHANG, RYAN MCBRIDE, WENLI YU, SIMEON BABARINDE, JAMES C. PAULSON, AND IAN A. WILSON Authors Info & Affiliations

SCIENCE · 5 Dec 2024 · Vol 386, Issue 6726 · pp. 1128-1134 · DOI: 10.1126/science.adt0180

- Person-to-person spread of bird flu viruses has so far been rare and limited, but the risk of a mutation changing this is omnipresent.

H5N1 risk

CDC's assessment indicates that the overall public health risk is currently **low**

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IDPH H5N1 preparedness and planning

- Generating and releasing educational materials for agricultural workers on the H5N1 disease process, workplace hazards, and using personal protective equipment (PPE) correctly.
- Participating in national awareness and planning calls.
- Maintaining close communication with IDPH dairy program and Illinois Department of Agriculture; conducting multi-agency (IDPH, IDoA, IDNR, H5N1) preparedness tabletop exercise.
- Monitoring for potential cases via numerous surveillance platforms – provider reporting (INEDSS), sentinel surveillance sites, syndromic surveillance (ESSENCE), ILInet, wastewater surveillance.
- Assisting with Illinois poultry outbreaks. Monitoring of individuals who had contact with positive or presumed H5N1-positive animals for 10 days after exposure.
- Coordinating PPE release/pre-positioning with the Illinois Farm Bureau.
- Assisting with requests for increased influenza subtyping. Illinois aims to subtype all intensive care unit (ICU) patients.
- Preparing to institute the national milk silo testing plan this February and advancing to more specific state-wide testing later this spring.

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H5N1 suspicion – what's next?

- Majority of the public has little risk of H5N1 – Consider unique exposures.
- **If H5N1 virus infection is suspected:**
  - Notify local and state public health for testing, monitoring, and follow-up ASAP.
  - Isolate patients, follow recommended infection prevention and control measures, use recommended PPE.
  - Start empiric antiviral treatment with oseltamivir ASAP (while awaiting results).
  - Home isolation with symptomatic supportive care for mild illness.
  - Coordination with local and state public health authorities if a case requires hospitalization.
- **If H5N1 virus infection is confirmed:**
  - Home isolation for clinically stable patients until they are clinically improved and at least seven days have passed from the onset of symptoms.
  - Post-exposure antiviral prophylaxis for household and other close contacts.
    - Oseltamivir treatment 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.

It is Important to contact the local health department (LHD) with any clinical concern for H5N1. LHDs can help arrange H5N1-specific testing, contact monitoring, and anti-viral prophylaxis.

H5N1 testing

- Rapid Influenza tests available in many clinical settings cannot specifically identify A(H5N1) virus from other 'seasonal' influenza A viruses H3N2 and H1N1.
  - Need to perform subtyping of influenza A viruses (H1, H3, H5).

- If H5N1 virus infection is suspected (use recommended PPE*):

  - Patients with acute respiratory symptoms:
    - Collect (i) a nasopharyngeal swab, and (ii) a nasal swab combined with an oropharyngeal swab (e.g., two swabs collected separately and combined into one viral transport media vial).
    - The nasopharyngeal swab and the combined nasal-throat swabs should be in separate tubes of viral transport media and will be shipped and tested separately.
  - Patients with conjunctivitis:
    - Collect (i) a conjunctival swab, and (ii) a nasopharyngeal swab.
    - Place each specimen into separate tubes of viral transport media.
  - Patients with lower respiratory tract disease:
    - Collect upper (i) respiratory specimens (NP swab, combined nasal & throat swabs) and (ii) a sputum sample for testing.
    - Intubated patients – collect an endotracheal aspirate or bronchoalveolar lavage specimen.
- Collect multiple respiratory specimens from different sites on multiple days for patients with suspected HPAI A(H5N1) virus infection to maximize the potential for diagnosis.

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

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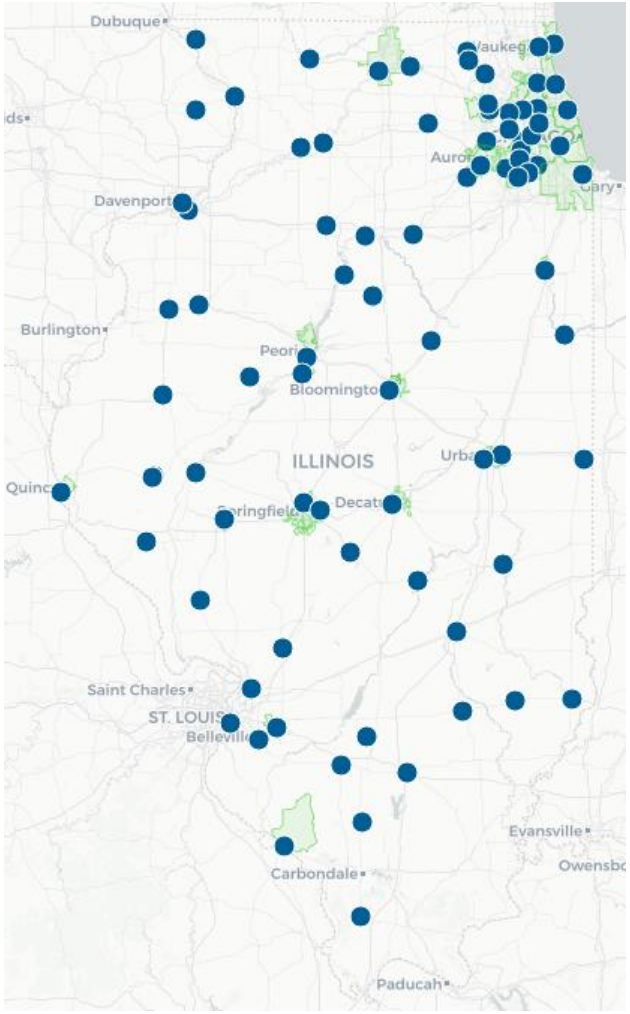
Illinois wastewater surveillance system



IDPH and the CDC monitors influenza trends by detecting influenza A in wastewater.

CDC flagging locations with Flu-A levels in the 80th percentile or higher compared to last flu season.

Limitations: Detects influenza A, but not the subtype, and cannot distinguish potential human vs. animal sources.

Met with local health departments to determine possible influenza inputs.

"Flagged" plants have never demonstrated sustained high signals.

Had a lot of good outreach and education discussions and, was able to ensure no sign of human transmission, but never identified a sure-fire cause of the signals.

Zoonotic disease future

Zoonotic diseases are likely to expand beyond their historic ranges due to climate change, urbanization, globalization, and the widespread migration of humans and animals ….

How will Illinois meet this challenge?

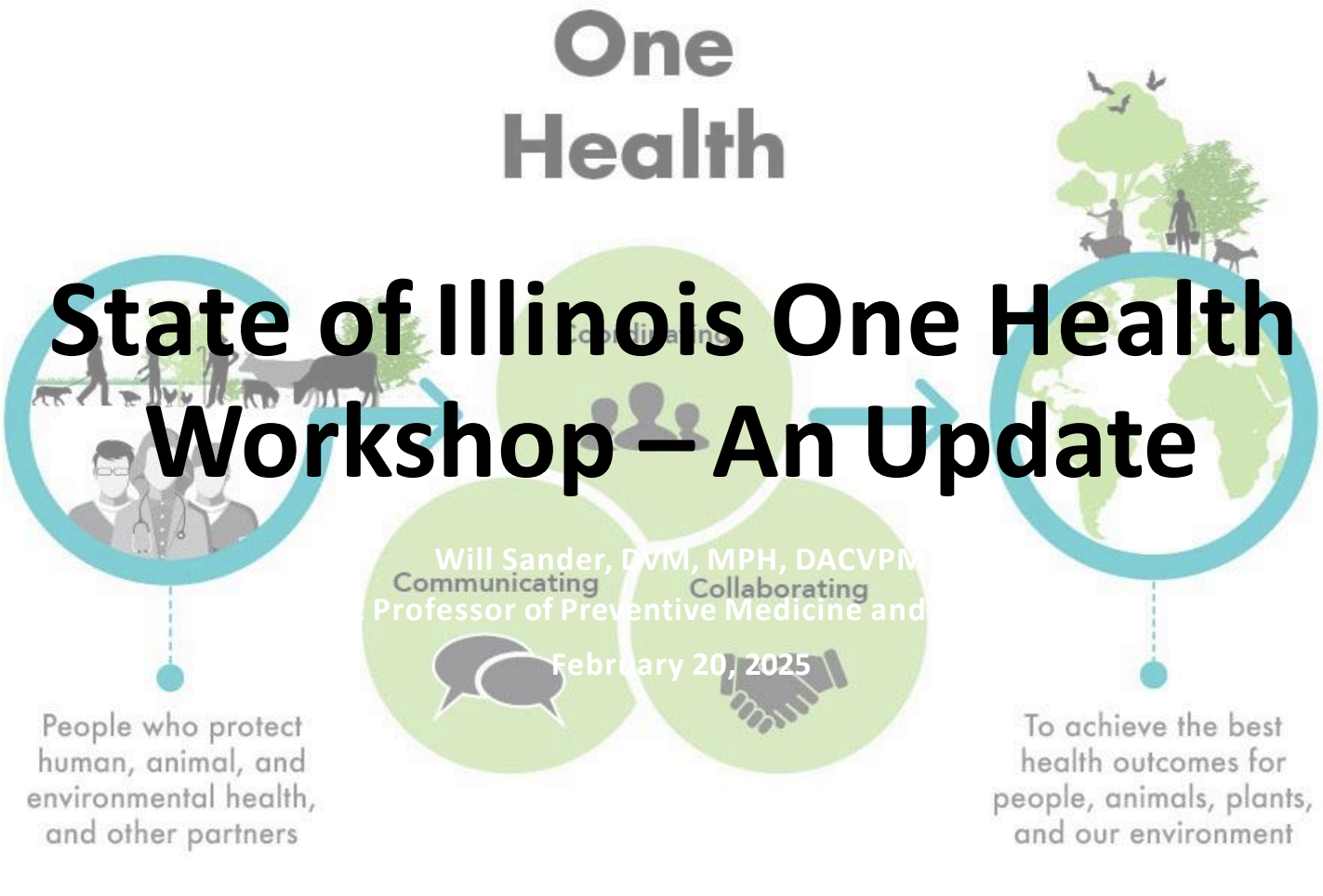
State of Illinois One Health Workshop – An Update

Presented by:

William Sander, DVM, MPH, DACVPM (he/his)

Assistant Professor of Preventive Medicine and Public Health, University of Illinois-College of Veterinary Medicine

UIC UNIVERSITY OF ILLINOIS CHICAGO



State of Illinois One Health Workshop – An Update

Will Sander, DVM, MPH, DACVPM
Professor of Preventive Medicine and

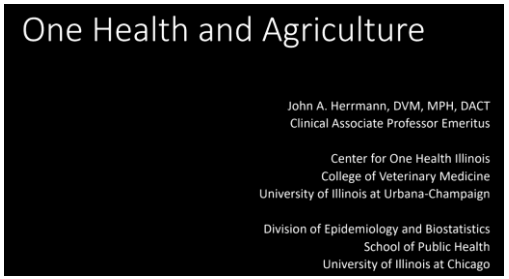
February 20, 2025

State of Illinois One Health Workshop

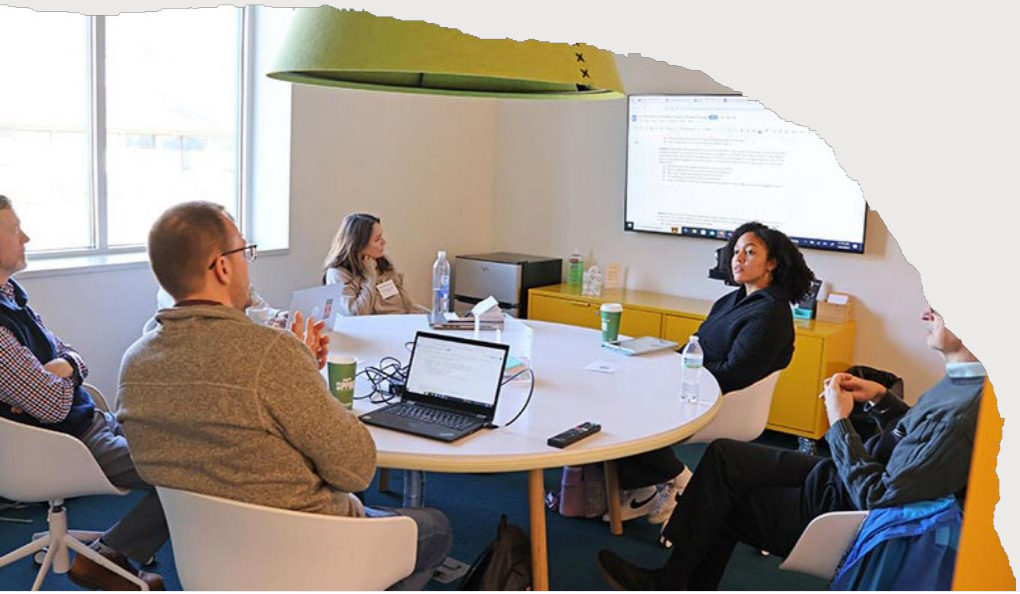
- December 4 and 5, 2024
- Champaign, Illinois
- 60 attendees spanning human, animal, and environmental health.
- Key Goals:
  - Foster new collaborations and partnerships.
  - Understand areas that benefit from One Health collaboration and facilitate One Health conversations.
  - Prioritize the One Health goals agreed on by multisectoral, One Health partners.
  - Develop a report of the assessment to guide funding, program activities, and policy decisions.

Key Focus Areas

- Zoonotic Disease
- Agriculture
- Environment
- Climate Change
- Access to Health Care
- Antimicrobial Resistance
- Data Interoperability



Overall Structure



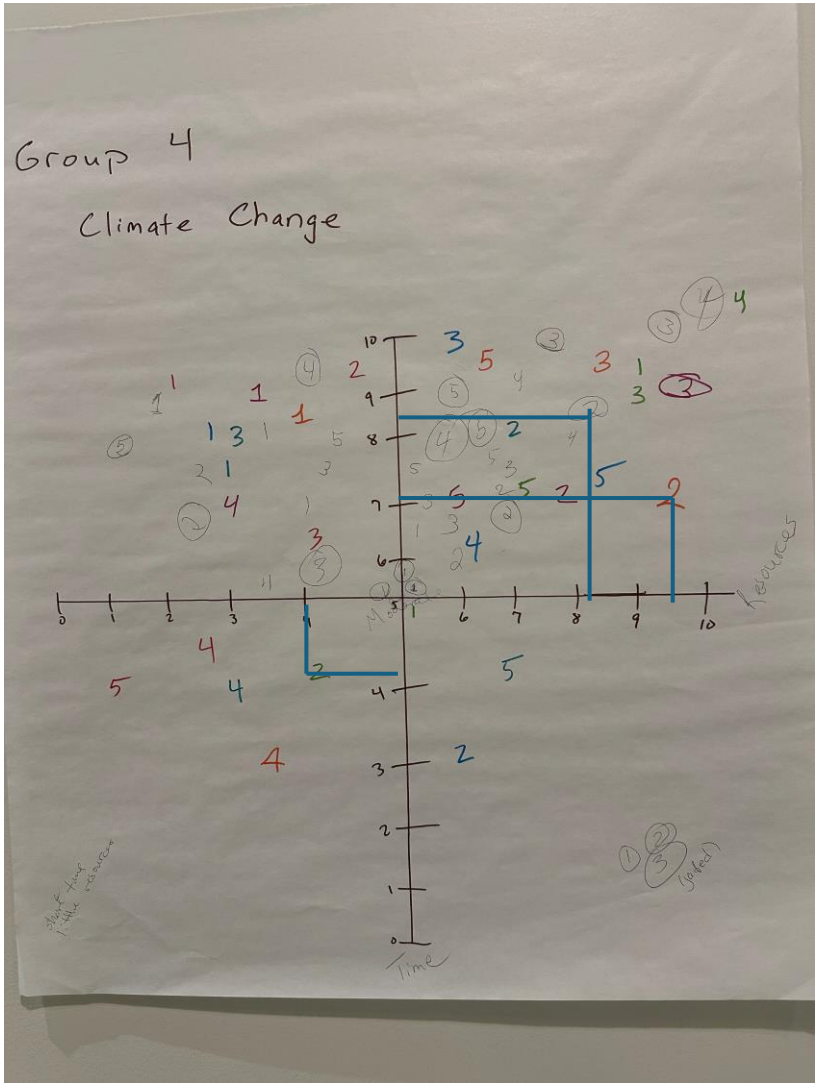
- Opening Comments from Dr. Sameer Vohra, IDPH director.
- Lightning Talks on each of the seven topics – intersection with One Health.
- Takeaways from One Health Needs Assessment – state of Washington.
- Workshop Sessions – small groups:
  - Assess barriers and gaps.
  - Assess strengths and best practices.
  - Identify potential solutions/approaches.
  - Select consensus solutions.
- Prioritizing One Health Actions – time and resources.

Participants

Illinois Department
of Transportation

FEMA

Prioritization Process



Solution	Resources	Time
2	9.5	7.1
2	4.2	4.2
2	8.2	8.5

Top 5 One Health Action Items – requires **most** time/resources

- Build in Surge Capacity: Funding, communication, equipment, trained workers, and funding networks.
- Advancements in monitoring and sensor technologies to evaluate environmental precursors.
- Invest in more public health workers to address 1) timely access to needed care; 2) inclusive, accessible, safe, and comfortable care; and 3) usual source of care (patient/provide relationship) (examples: nurse midwives and doula, community health workers, and health navigators).
- Legislative action to establish a cabinet-level, multi-agency workgroup to develop a One Health framework similar to HR 2061/S681 passed at the federal level.
- More effectively transitioning research into practice via education, communication, advocacy, knowledge.

Top 5 One Health Actions – requires **least** time/resources

- Speaker bank on One Health for producers, community partners, etc. in Illinois.
- Build and maintain institutional trust through regular ongoing One Health meetings.
- Define priority problems.
- Set-up a registry of data owners that includes what kind of data they have in Illinois.
- Executive Order to mandate that One Health principles be considered in all administrative rulemaking.

Stay Tuned

- Next Steps
  - White paper with action items in the next three months.
  - Continued effort on formalized state-level One Health framework.
  - Continue to work on partnerships at the local level.

- Questions?
  - wsander@illinois.edu

Next to come in the FAST PHACTs series

- March 20, 2025: "Wisdom in life, wisdom in health: clinicians guide to elder care resources and end of life considerations."
- April 17, 2025: "Prenatal Care and Reproductive Health Primer for PCPs."

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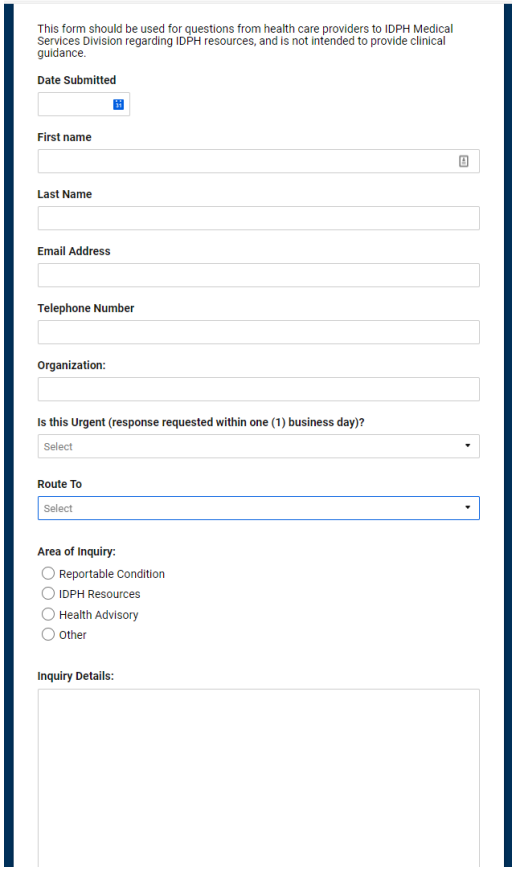
Reach out to us!



This form should be used for questions from health care providers to IDPH Medical Services Division regarding IDPH resources, and is not intended to provide clinical guidance.

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First name

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[Contact IDPH Medical Services Division]

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For questions, contact David Hale-Arroyo at David.hale-arroyo@illinois.gov