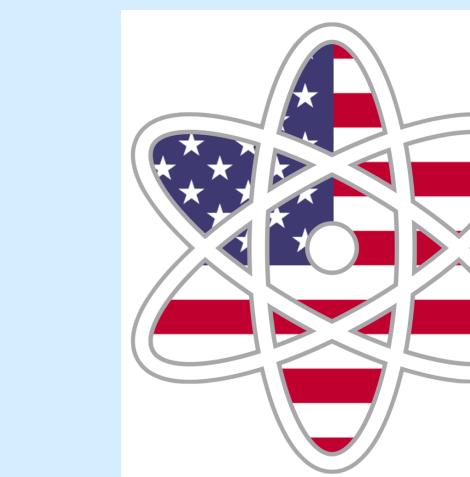


Can Current Testing at YNHH Detect Emerging Avian Influenza Threats Like H5N1?

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virus emergence | transmission | evolution



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Abstract/Main Research Question

This project assesses whether current respiratory virus testing protocols at YNHH are sufficient to **detect a novel H5N1 case**. We map the existing diagnostic framework and identify its limitations in subtyping respiratory viruses.

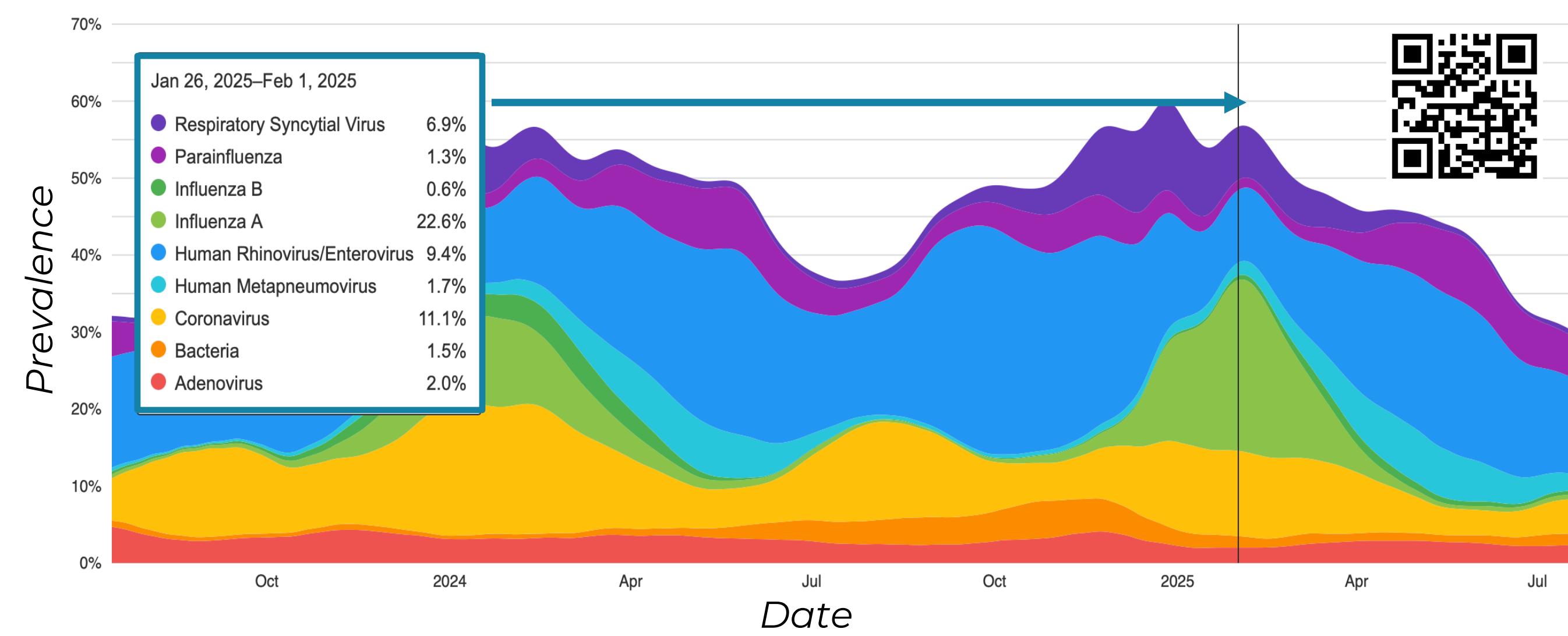
Our findings suggest critical gaps in surveillance, particularly in patients who are not admitted to YNHH.

To address these, we explore a triad of enhanced detection strategies:

1. routine use of airborne respiratory virus samplers in high-risk hospital areas
2. incorporation of wastewater-based H5N1 surveillance
3. pooled RT-PCR testing of residual clinical swabs to enable low-cost batch screening for novel pathogens.

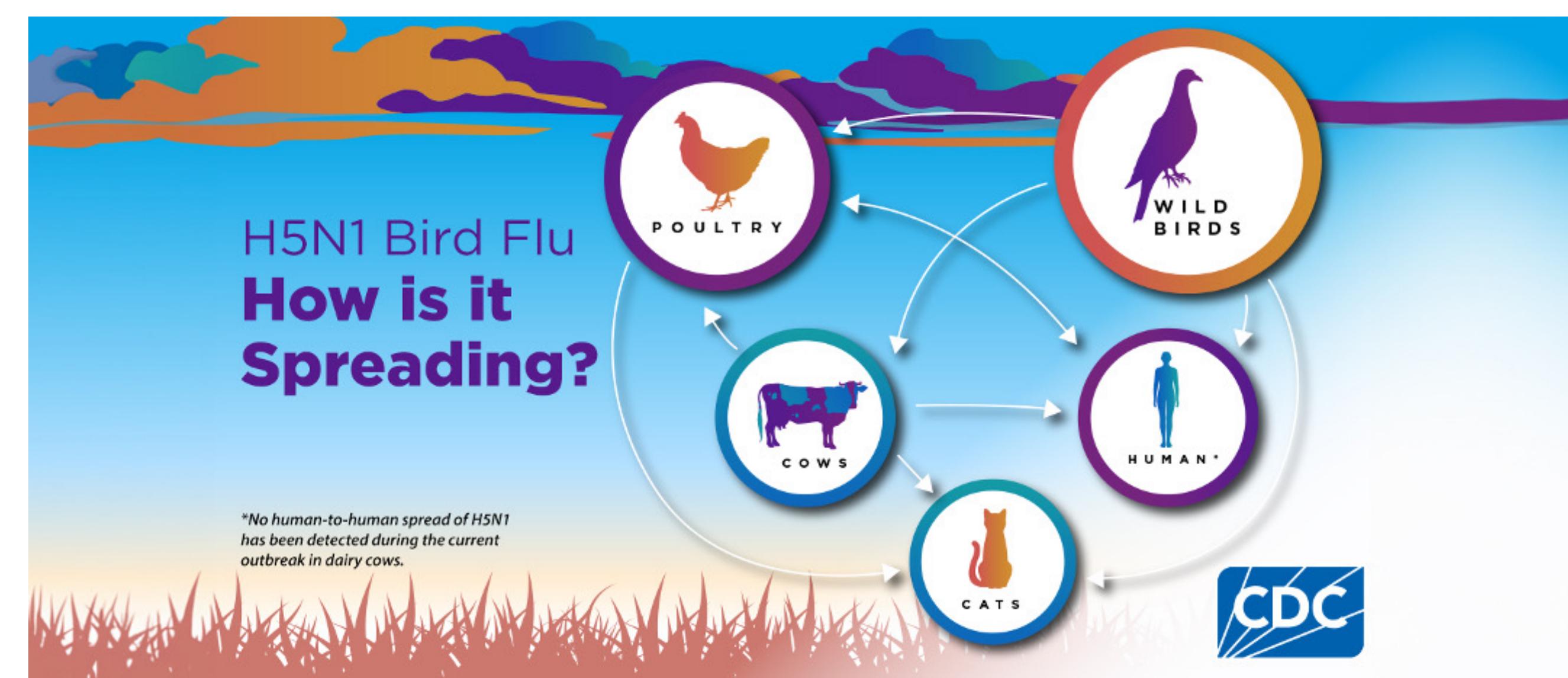
Together, these interventions can improve early detection of avian-origin influenza or other novel strains.

Respiratory Pathogen Trends (RP2.1)



Introduction

- Avian Influenza (H5N1) is a subtype of Influenza A that primarily affects birds and cattle
- **Human infections are rare**, typically occurring in individuals with direct exposure to infected animals
- There is **no confirmed person-to-person transmission of H5N1** to date
- Due to its **potential for mutation** and broader spread, the CDC and state health departments are actively monitoring the situation.
- Surveillance and testing capacity remain limited, and **most hospitals, including YNHH, do not currently perform internal testing for H5N1**



Methodology

We conducted interviews with 8 Emergency Department and Urgent Care Physicians, reviewed clinical workflows, testing algorithms, and historical respiratory testing data at YNHH.

Untyped Flu A positive cases were flagged for potential follow-up. Detection strategies such as wastewater surveillance and airborne biosensors were evaluated for feasibility.

Results

- Most Flu A-positive samples were not subtyped
- No internal H5N1 testing exists; detection depends on clinical suspicion
- Retrospective review showed missed detection opportunities for novel strains
- Outpatients and mild cases are largely excluded from testing

RESPIRATORY VIRUS TESTING PANELS



4-Plex Respiratory Virus Panel

- Flu A
- Flu B
- RSV
- Covid
- Does not subtype
- Results in 1 hour
- \$150-\$200 per test



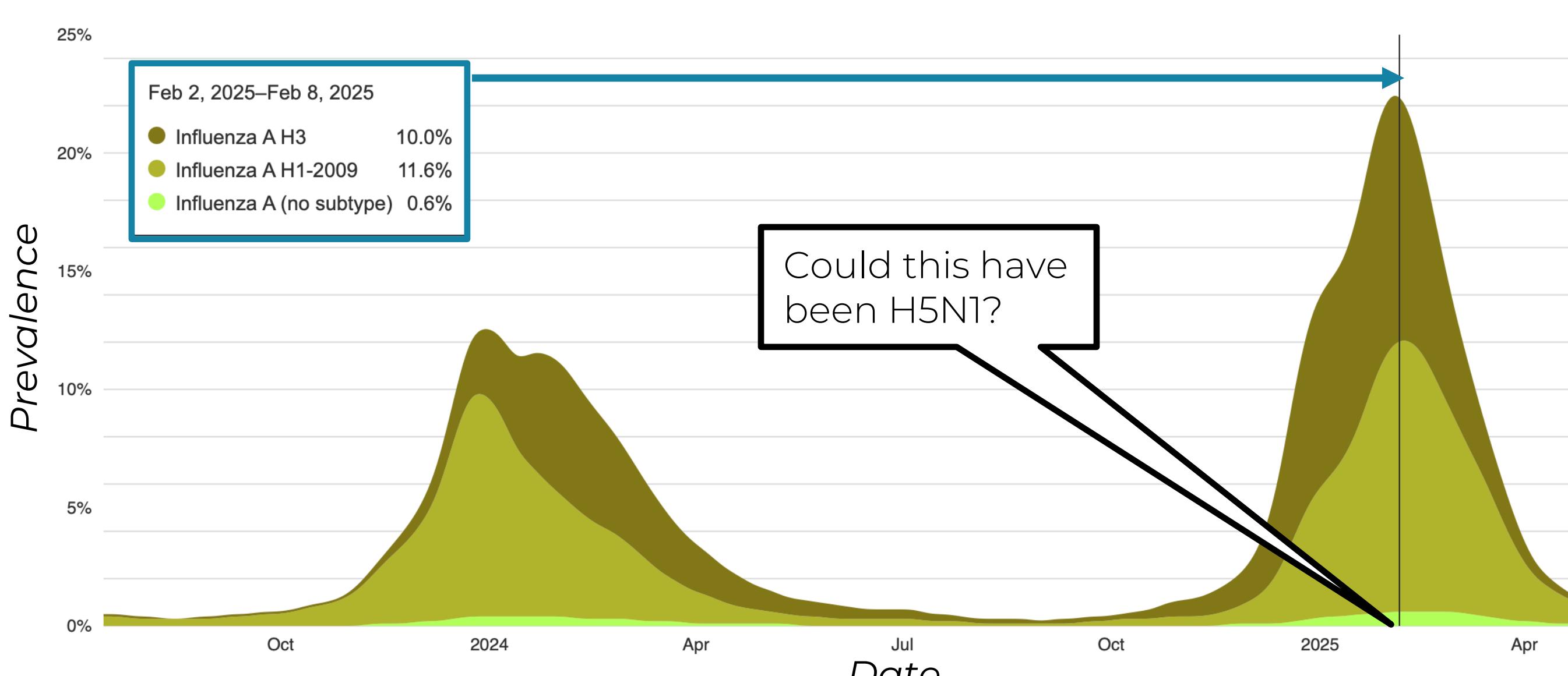
BioFire Respiratory Virus Panel

- 21 pathogens (Viruses and Bacteria)
- Does not subtype for H5N1
- Results in 1-hour
- \$450-\$600 per test

Conclusion

- **Current clinical workflows prioritize patient treatment over public surveillance.**
- Without routine subtyping or broader testing, novel influenza strains like H5N1 could be missed.
- A modest **shift in testing policy and increased passive surveillance could improve early detection** and public health response.

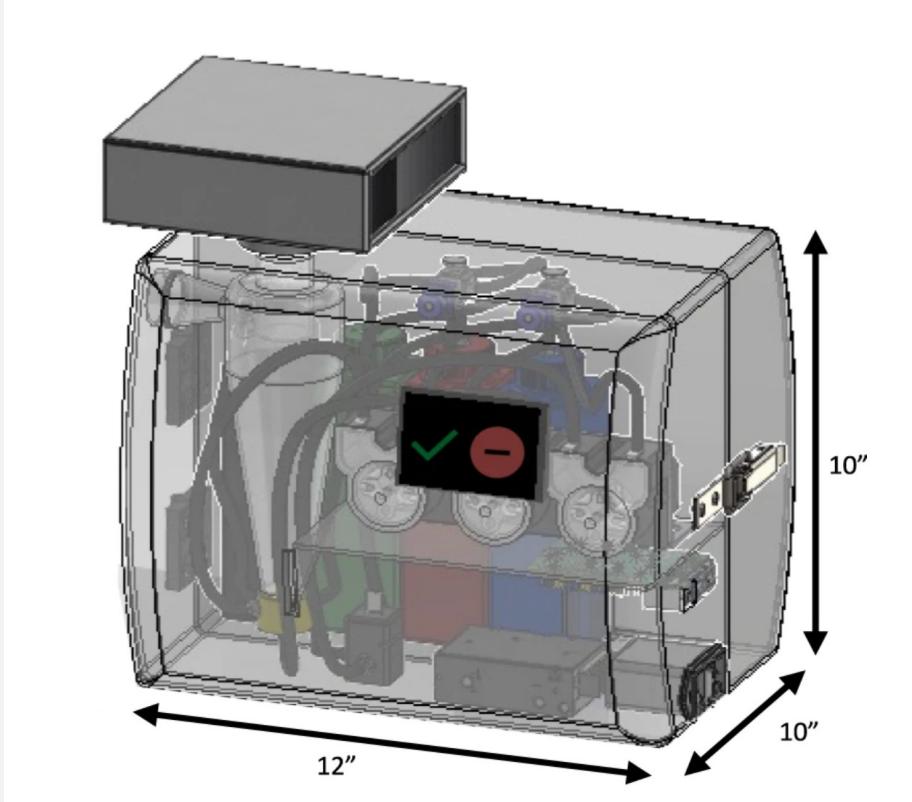
Respiratory Pathogen Trends (RP2.1)



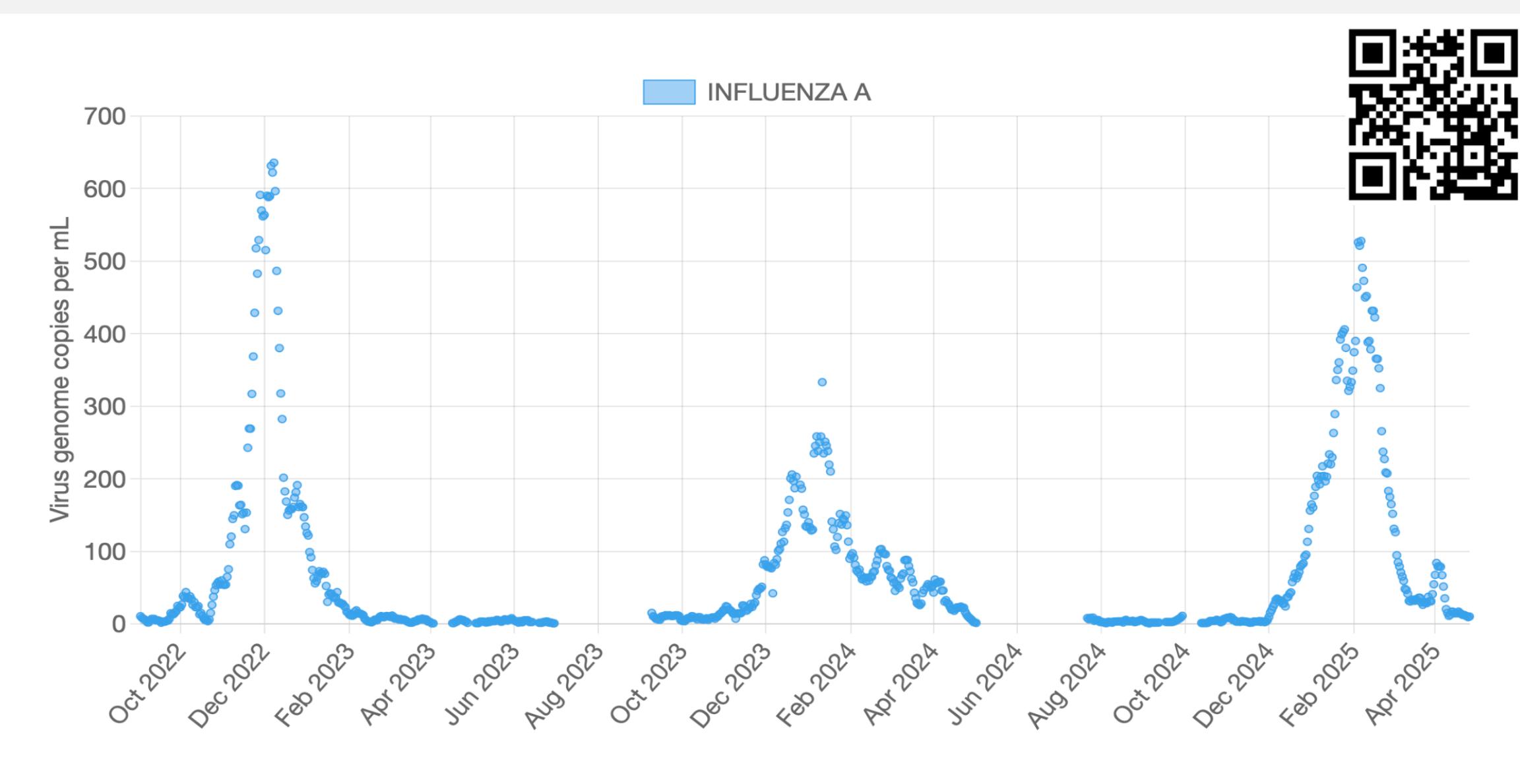
Recommendations

pAQ Monitor - Real-time biosensor

- Rapidly detects airborne respiratory viruses
- Samples up to 1,000 liters of air per minute
- Can be adapted to detect multiple pathogens, including SARS-CoV-2, H5N1, influenza, and RSV
- Ideal for use in hospitals, schools, and other high-risk environments



Peccia lab at Yale University – New Haven Wastewater data



Suggested decision workflow for identifying un-subtyped Flu A cases eligible for RT-PCR-based surveillance at YNHH.

