

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

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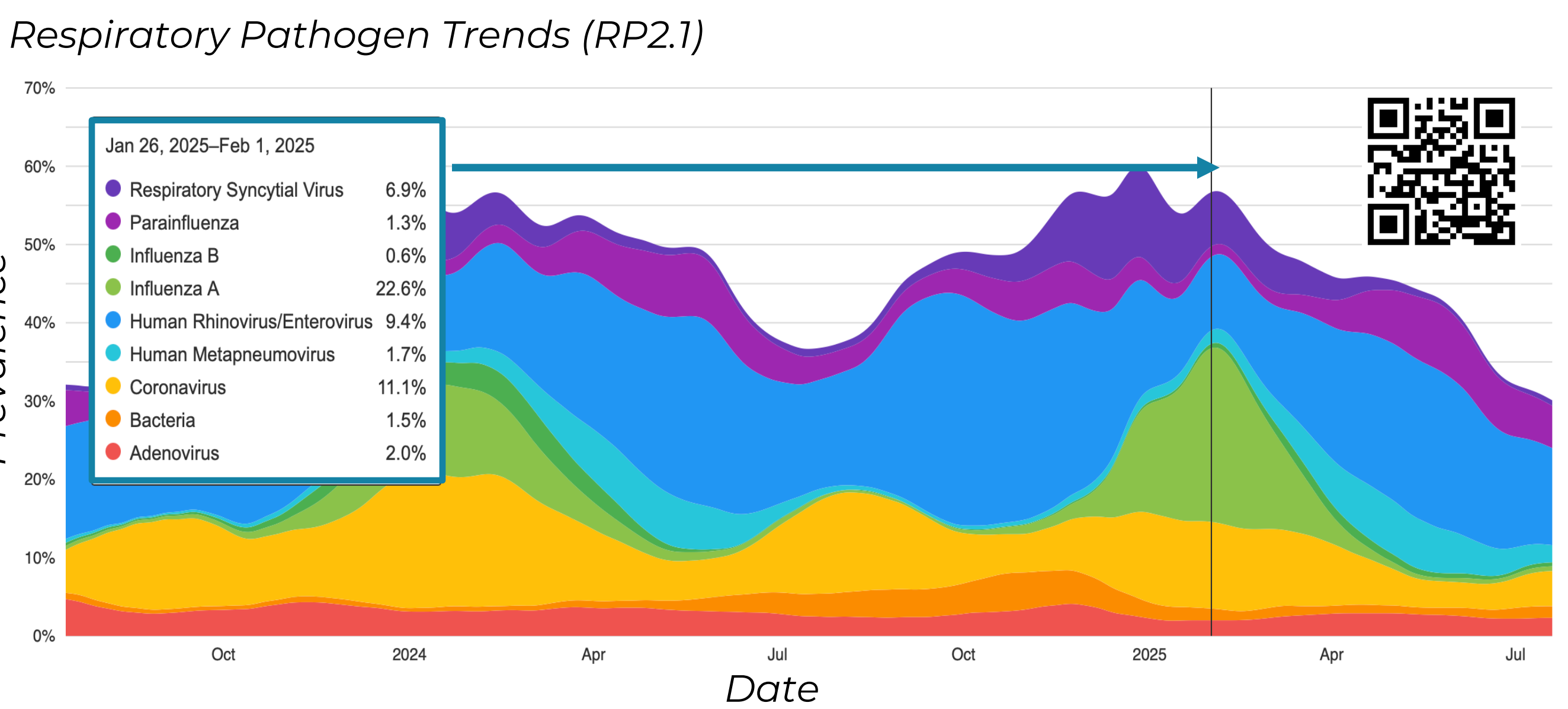
Abstract/Main Research Question

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.

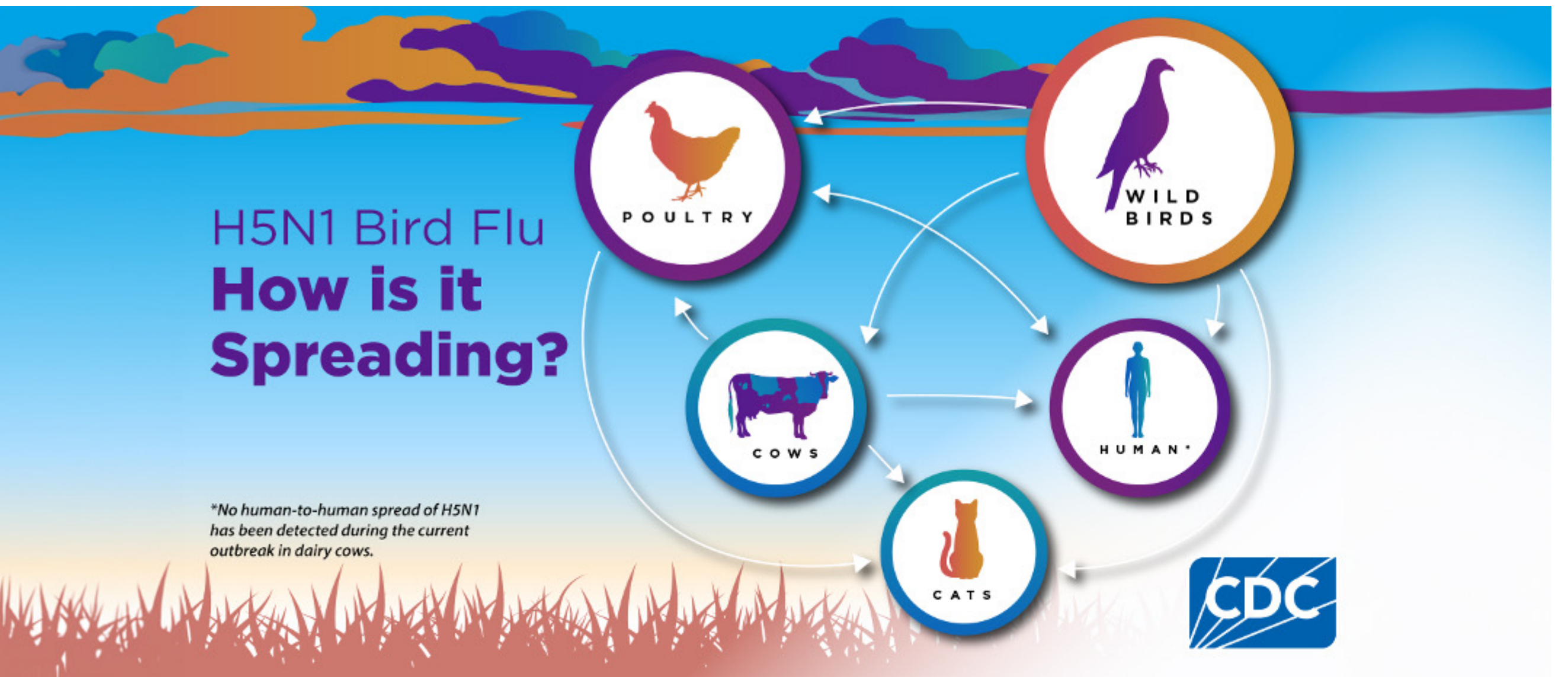
- To address these, we explore a triad of enhanced detection strategies:
1. routine use of airborne respiratory virus samplers in high-risk hospital areas
 2. incorporation of wastewater-based H5N1 surveillance
 3. pooled RT-PCR testing of residual clinical swabs to enable low-cost batch screening for novel pathogens.

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



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

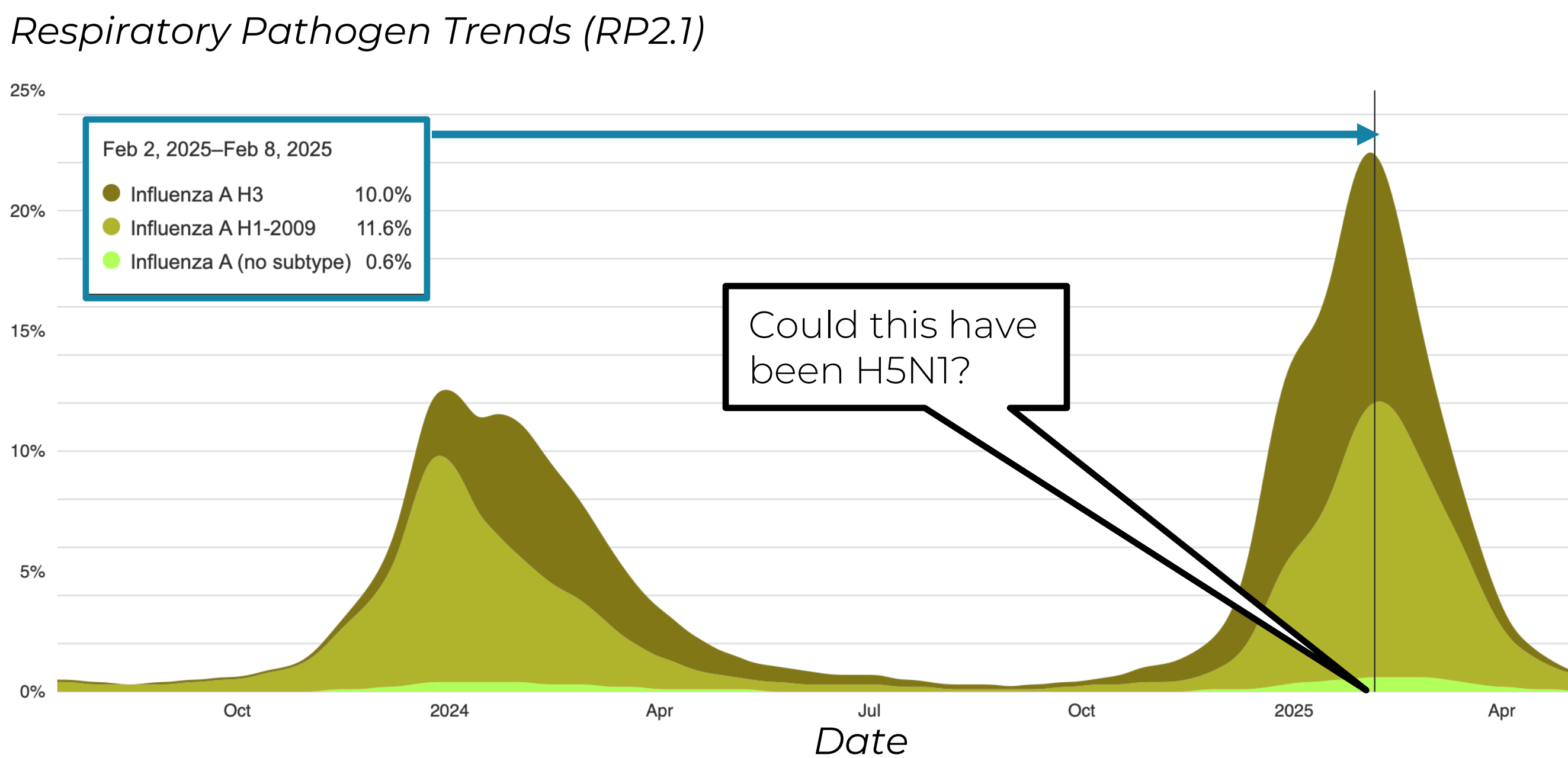


BioFire Respiratory Virus Panel

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

Conclusion

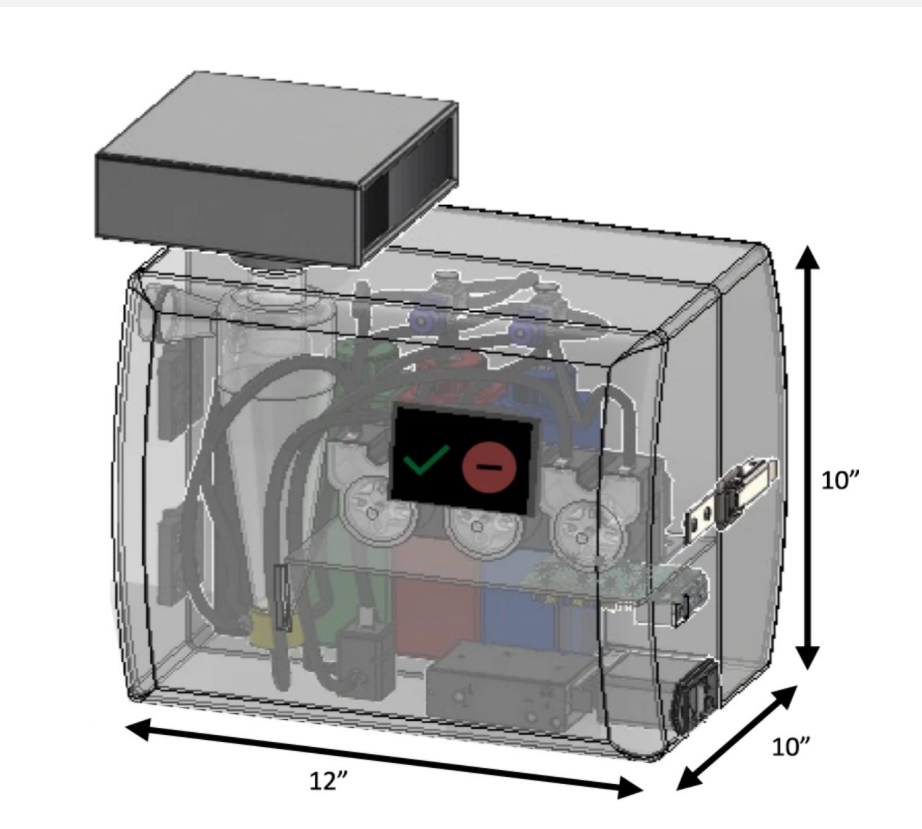
- **Current clinical workflows prioritize patient treatment over public surveillance.**
- Without routine subtyping or broader testing, novel influenza strains like H5N1 could be missed.
- A modest **shift in testing policy and increased passive surveillance could improve early detection** and public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



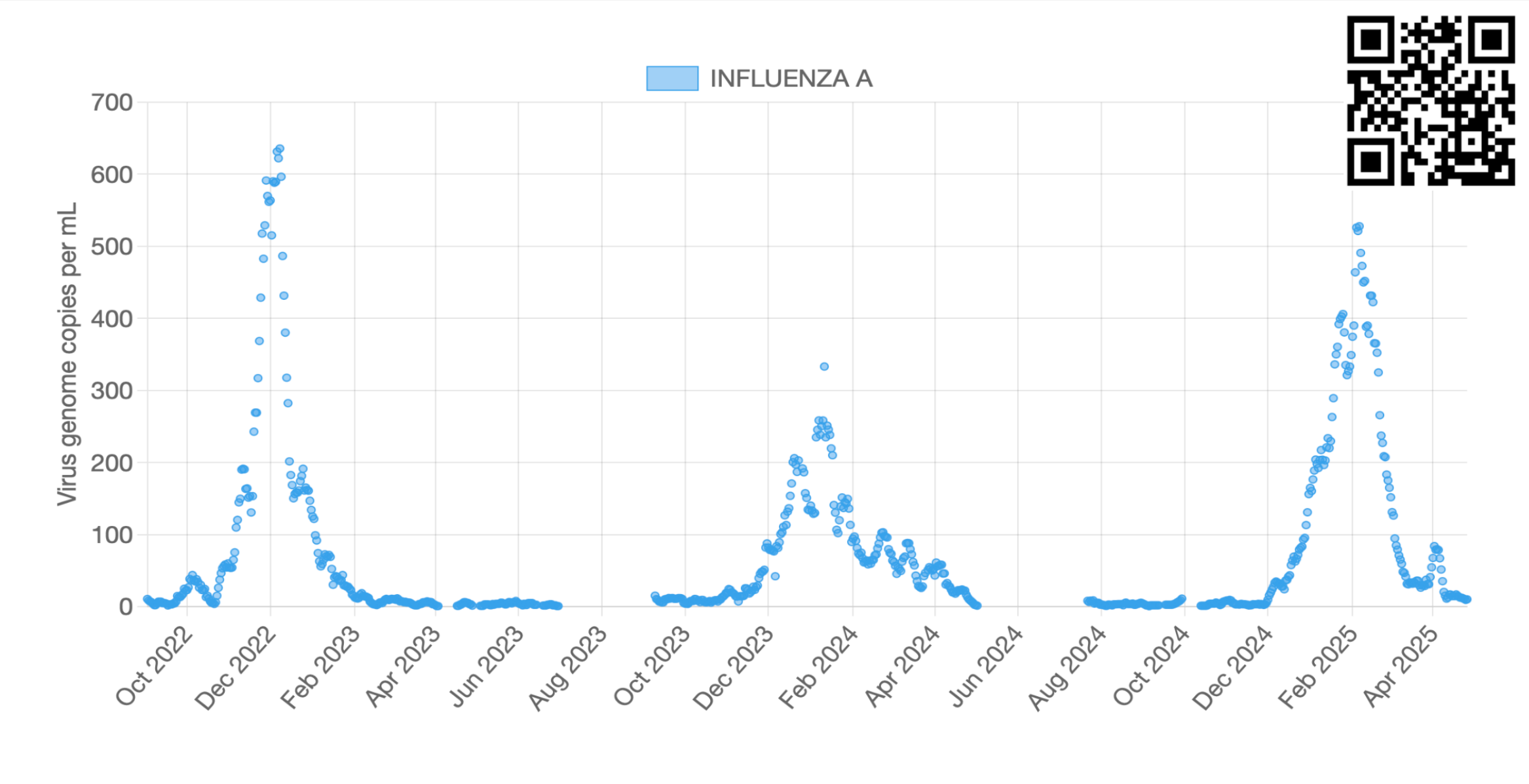
Recommendations

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.

