# Clinical utility of multiplex point-of-care PCR compared to antigen testing for influenza-like illness in the hospital emergency department

Authors: Ruth Pulikottil Jacob, PhD[1] Jordan Chase, BA[2], Emily Webber, MS [3], Annika Faucon[3], Sarah Blach, MS [3]
[1]Cepheid, High Wycombe, UK [2]Cepheid, Sunnyvale, CA, USA [3]Truveta, Bellevue, WA USA

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## Introduction

Various guidelines prefer molecular methods for diagnosis of influenza, SARS-CoV-2, and RSV due to limitations of antigen testing in sensitivity (1,2). Despite this, real-world data from 2021-2022 show that nearly half of symptomatic outpatients were tested using antigen (3).

## Objective

We aimed to assess the clinical utility of rapid NAAT testing for influenza-like illness in non-hospital outpatient compared to antigen.

## Methods

This analysis leveraged real-world data from Truveta EHR database which has approximately 120 million patient records. We assessed patients tested for **COVID-19, influenza A/B, or RSV** between **January 1, 2023, and April 1, 2025**. Eligible patients had:

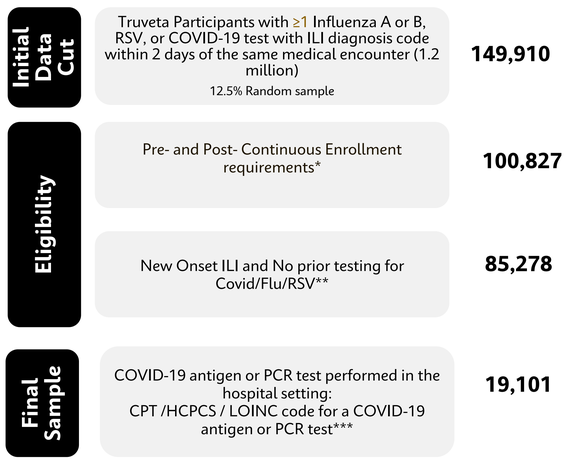
- A **NAAT or antigen test** (Xpert Xpress, ID NOW, or antigen)
- An **influenza-like illness (ILI) diagnosis** within ±2 days of the test
- From this group, we randomly selected **12.5%** for analysis.

To ensure data completeness:

- Patients needed **continuous health record activity** for at least **90 days before** and **30 days after** the test
- We excluded those with **recent prior respiratory tests or ILI diagnoses**
- Only patients with **complete demographic data** (age, sex) were included
- All index had to be performed in **hospital settings** (e.g., emergency department, inpatient)

We then compared **positivity rates, volumes, and length of stay** between patients tested with **NAAT vs antigen.**

Figure 1. Attrition




***Continuous Enrollment**
- 1 encounter >=90 days , >=180 days prior to Index date
- 1 encounter >=2 days and 30 days after Index

**No diagnosis code for ILI in the 90 days prior to the index date and No CPT or HCPCS code for a COVID-19, influenza, or RSV antigen or PCR tests in the 90 days prior to the index date

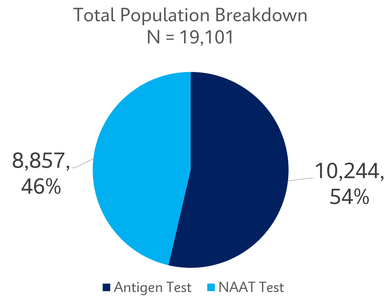
****Hospital Visit**
≥1 encounter identified as an emergency or inpatient visit or an "other non-hospital visit" (includes laboratory with a CPT or HCPCS or LOINC code for a COVID-19 antigen or PCR test (during the identification period (01/01/2023 to 04/01/2025)

## Results

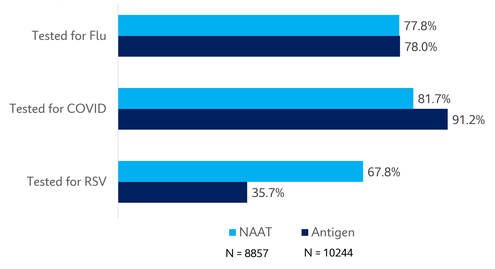
Although patients who were tested with antigen were older on average compared to those who received NAAT testing, NAAT was used more frequently in the oldest and youngest age groups

| | Overall | Antigen | NAAT Only |
|---|---|---|---|
| | *(N=19,101)* | *(N=10,244)* | *(N=8,857)* |
| **Age at Index (years)** | | | |
| Mean (SD) | 31.5 (25.1) | 33.0 (24.0) | 29.9 (26.2) |
| Median [Min, Max] | 28.3 [0.0600, 98.0] | 30.8 [0.490, 98.0] | 24.9 [0.0600, 97.9] |
| **Age Group** | | | |
| [0-5) | 3938 (20.6%) | 1665 (16.3%) | 2273 (25.7%) |
| [5-11) | 1037 (5.4%) | 587 (5.7%) | 450 (5.1%) |
| [12-18) | 6367 (33.3%) | 3820 (37.3%) | 2547 (28.8%) |
| [18-45) | 3111 (16.3%) | 1865 (18.2%) | 1246 (14.1%) |
| [45-65) | 2085 (10.9%) | 1025 (10.0%) | 1060 (12.0%) |
| >=65 | 2563 (13.4%) | 1282 (12.5%) | 1281 (14.5%) |
| **Sex** | | | |
| Female | 11477 (60.1%) | 6262 (61.1%) | 5215 (58.9%) |
| Male | 7624 (39.9%) | 3982 (38.9%) | 3642 (41.1%) |
| **Ethnicity** | | | |
| Hispanic or Latino | 3453 (18.1%) | 1606 (15.7%) | 1847 (20.9%) |
| Not Hispanic or Latino | 14992 (78.5%) | 8295 (81.0%) | 6697 (75.6%) |
| Unknown | 656 (3.4%) | 343 (3.3%) | 313 (3.5%) |
| **Race** | | | |
| American Indian or Alaska Native | 126 (0.7%) | 75 (0.7%) | 51 (0.6%) |
| Asian | 491 (2.6%) | 347 (3.4%) | 144 (1.6%) |
| Black or African American | 4937 (25.8%) | 3137 (30.6%) | 1800 (20.3%) |
| Native Hawaiian or Other Pacific Islander | 109 (0.6%) | 55 (0.5%) | 54 (0.6%) |
| Other Race | 1243 (6.5%) | 596 (5.8%) | 647 (7.3%) |
| Unknown | 2164 (11.3%) | 761 (7.4%) | 1403 (15.8%) |
| White | 10031 (52.5%) | 5273 (51.5%) | 4758 (53.7%) |

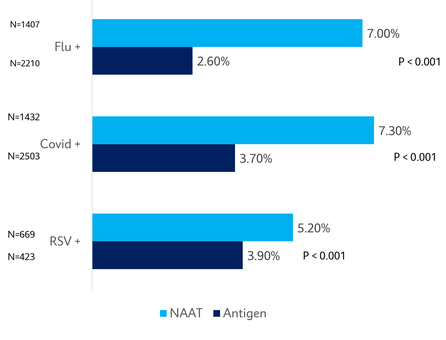
### NAAT was used 46% of the time



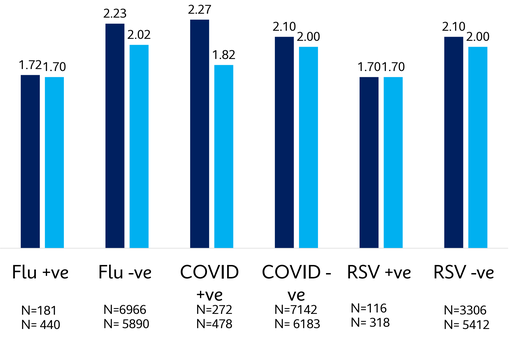

### Among all patients included in the cohort, testing for COVID was most common; patients tested by NAAT generally were tested for all viruses




### NAAT had double the positivity rates of antigen testing




### Among patients with LOS data available, median LOS was slightly shorter in patients tested by NAAT




## Discussion

**Antigen testing is less likely to result in a positive pathogen identification compared to rapid NAAT, and may be associated with longer LOS**

This retrospective analysis examined patterns of respiratory pathogen testing in the hospital setting, focusing on the testing modality, pathogens evaluated, and median length of stay.

This real-world analysis highlights important differences in the use and outcomes of NAAT versus antigen testing for influenza-like illness (ILI) in outpatient settings. NAAT was used in nearly half of hospital-based encounters and demonstrated double the positivity rate compared to antigen testing, suggesting higher diagnostic sensitivity. Despite this, antigen testing was used commonly. Demographic differences in testing frequency suggest that NAAT may be favored for the youngest and oldest patients age groups.

Patients in the cohort were most frequently tested for COVID-19, and NAAT was generally employed for broader viral panels rather than single-virus detection. Among patients with available length-of-stay (LOS) data, those tested by NAAT had slightly shorter median LOS compared to antigen, which may reflect faster and more accurate diagnosis facilitating timely management. This may also reflect the need to reflex a negative antigen test to a more sensitive PCR-based method, which may delay discharge.

These findings underscore the clinical value of NAAT in improving diagnostic yield and potentially influencing care efficiency. However, the frequency of antigen testing suggests that barriers to NAAT adoption may still exist, such as cost, turnaround time, or workflow integration. Future research should explore the impact of NAAT adoption on patient outcomes, resource utilization, and cost-effectiveness in both hospital and outpatient care. This should include evaluation of the impact on additional testing, antibiotic treatments, antiviral treatments, influenza-like illness-related healthcare encounters, as well as comparison of the existing cohort with propensity score matching or multivariate models to address the potential for confounders and biases.

## Conclusion

Enhancing access to rapid, high-sensitivity testing may support greater efficiency in the hospital by enabling faster care and management decisions.

References
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