# Influenza Surveillance Report

## 2022-2023 Season Summary
## October 2, 2022 – May 20, 2023
## Rhode Island

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# Influenza Surveillance Report: Rhode Island, 2022-2023 Flu Season

- Rhode Island Department of Health maintains a multi-faceted influenza surveillance system containing the following sources of data:
  - Sentinel surveillance (ILINet)
  - State Health Laboratory surveillance
  - Hospital surveillance
  - Respiratory illness outbreaks surveillance in congregate care settings
  - Emergency room syndromic surveillance
  - Influenza-associated death reporting

- Influenza cases are not individually reportable, so the influenza surveillance system components allow the monitoring of viral trends, morbidity, and mortality within Rhode Island

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- This report contains data from all of the above surveillance systems, providing a complete understanding of the 2022-2023 influenza season.

- While surveillance continues year-round, this report covers the active influenza season, which lasts from MMWR Week 40-MMWR Week 20, or October-May.

# 2022-2023 Influenza Season: National Summary

- Nationally, the 2022-2023 season was a long flu season, (20 weeks of influenza-like illness above baseline this season, compared to 21 weeks above baseline during the 2018-2019 season, which was the longest season in 10 years).

- In the United States, there were 176 pediatric deaths nationally during the 2022-2023 season[1].

- Influenza activity increased earlier than usual during the 2022-2023 season, with influenza-like illness peaking in mid-November.

- Influenza A (H3N2) viruses predominated, although Influenza A (H1N1) 2009 viruses circulated throughout the season as well.

- Influenza vaccination was thought to provide substantial protection this season, reducing the risk of having to seek care for influenza A by 54% among adults <65 (interim vaccine effectiveness).[2]

1. https://www.cdc.gov/flu/weekly/index.htm
2. https://www.cdc.gov/mmwr/volumes/72/wr/mm7208a1.htm

# 2022-2023 Influenza Season: Rhode Island Summary

- The 2022-2023 season suggested a return to pre-COVID influenza activity levels, with earlier peaks (December) than in prior seasons.
- The percent of influenza-like illness (%ILI) surpassed the regional baseline during the 2022-2023 season, unlike the 2021-2022 season.
- There were 32 influenza-associated deaths and 101 non-COVID respiratory outbreaks at congregate living facilities.
- The Rhode Island State Health Laboratories (RISHL) tested 13,123 specimens for influenza; 1,586 were positive.
- 5,579 specimens at hospitals tested positive for influenza during the season. Of those who tested positive, 819 individuals were hospitalized.
- The predominant strain of influenza circulating in Rhode Island was influenza A (H3N2), although influenza A (H1N1) 2009 circulated throughout the season. There were lower levels of influenza B than in many seasons.

# U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet)

# ILINet:
# Sentinel Provider Surveillance

- The U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet) is a national surveillance system that provides information on outpatient **influenza-like illness**, independent of laboratory testing.

- **Influenza-like illness** is: a fever **and** a cough **and/or** a sore throat

- **Percent influenza-like illness (% ILI):** the number of patients seen with ILI divided by the total number of patients seen in a given week.

- 31 community-based outpatient practices and emergency departments participated during the 2022-2023 season.
  - Urgent cares, family practitioners, pediatricians, university health services, and CVS MinuteClinics.
  - Emergency rooms from 10 hospitals are also sentinel sites.

- Data are reported weekly to CDC and RIDOH.

# ILINet:
# Data Summary

- **Nationally**, the percentage of outpatient visits related to influenza-like illness (%ILI) peaked in mid-November, with 7.47% percent of all visits related to ILI.

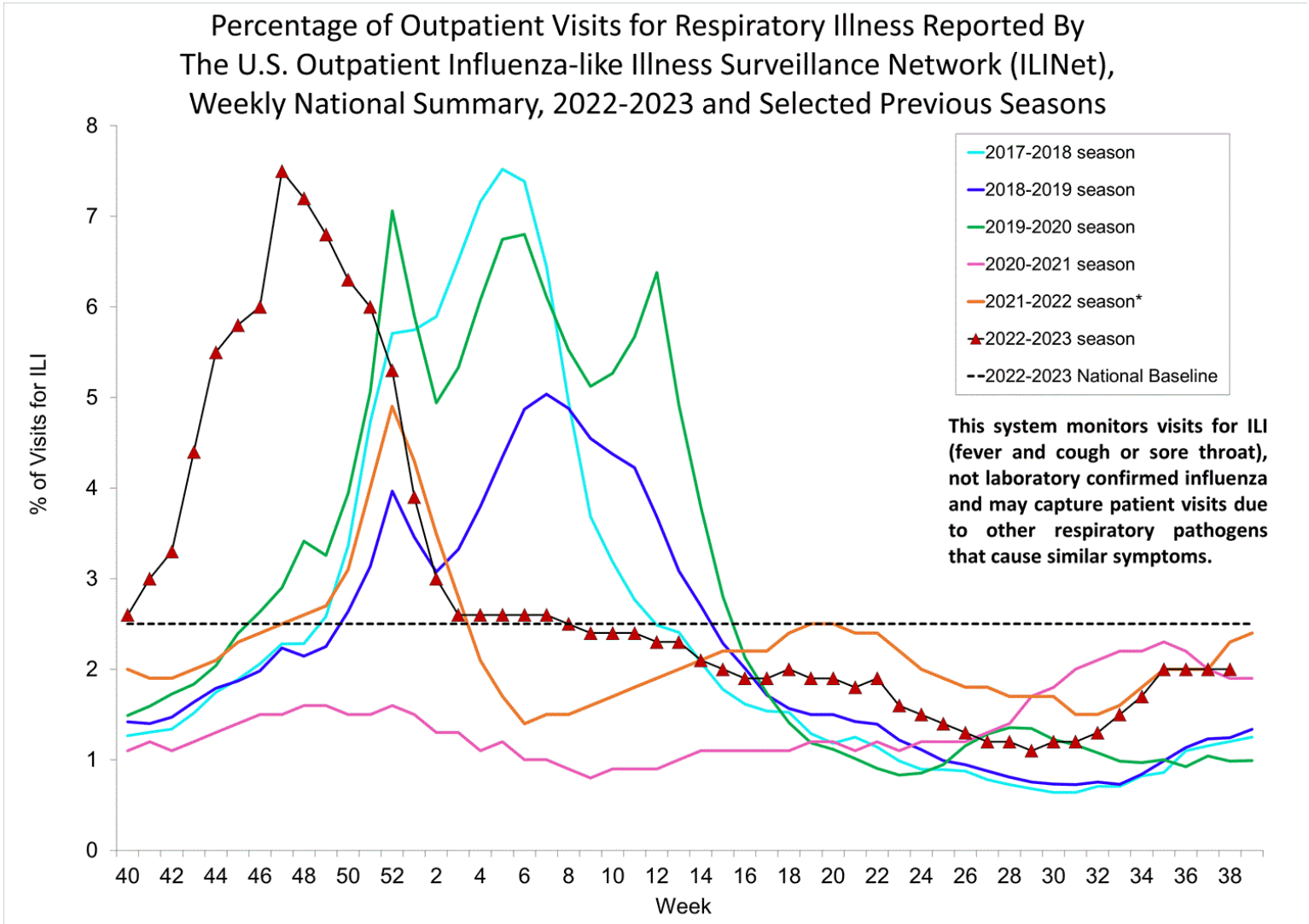
- In **Rhode Island**, the %ILI peaked in late December, with 6.97% percent of all visits related to ILI.

- ILI remained above the **regional** baseline for 8 weeks, from the third week of November through the first week of January.

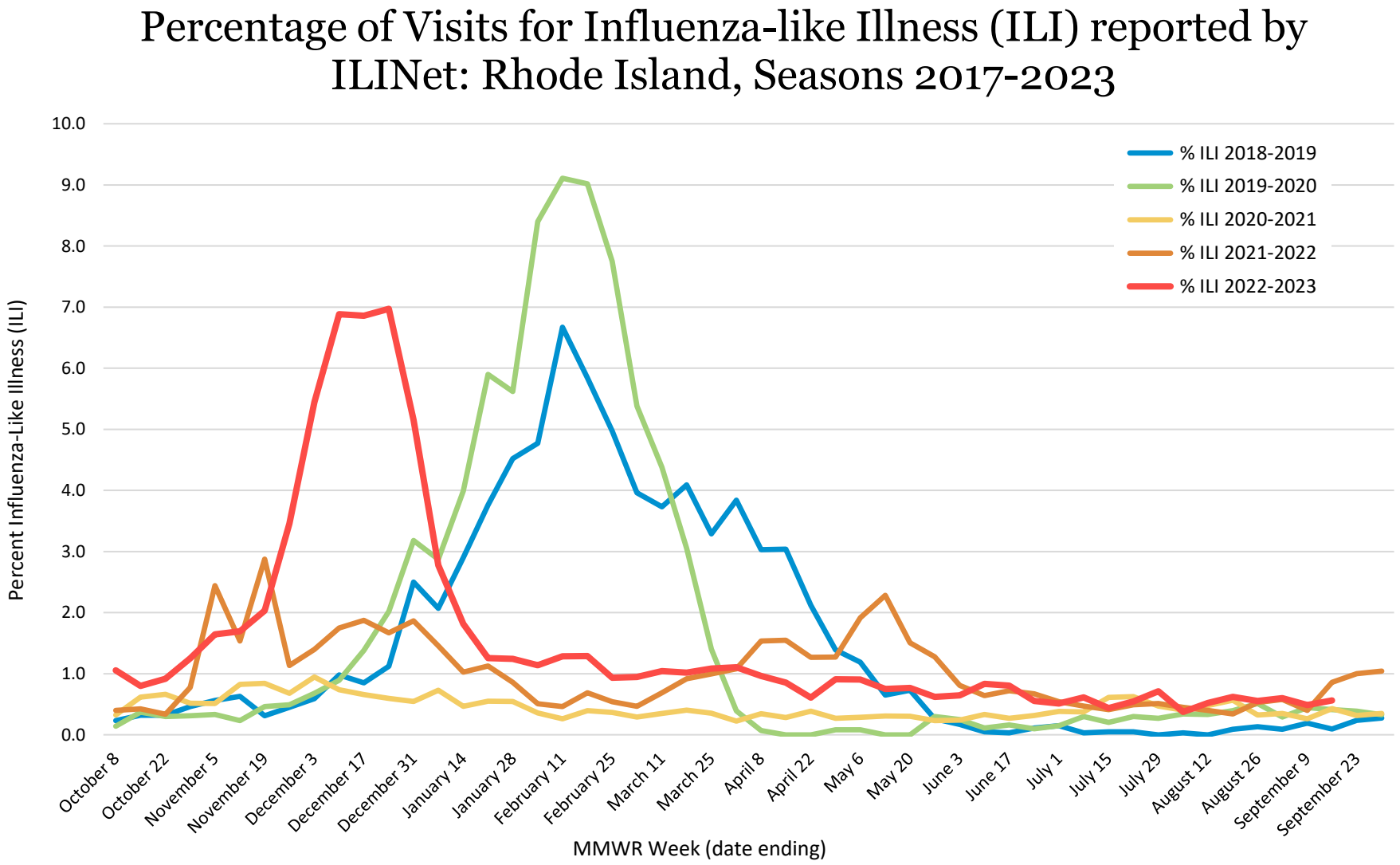
- **Rhode Island's** peak ILI was slightly lower than both the country and region's peak ILI.

- The majority of ILI visits occurred in children and adults between ages 5 and 24. This is a function of ILINet's representation of outpatient visits, rather than a reflection of the burden of influenza. Older adults are hospitalized at much higher rates than children for influenza, represented more fully in later slides.

# ILINet: National Data

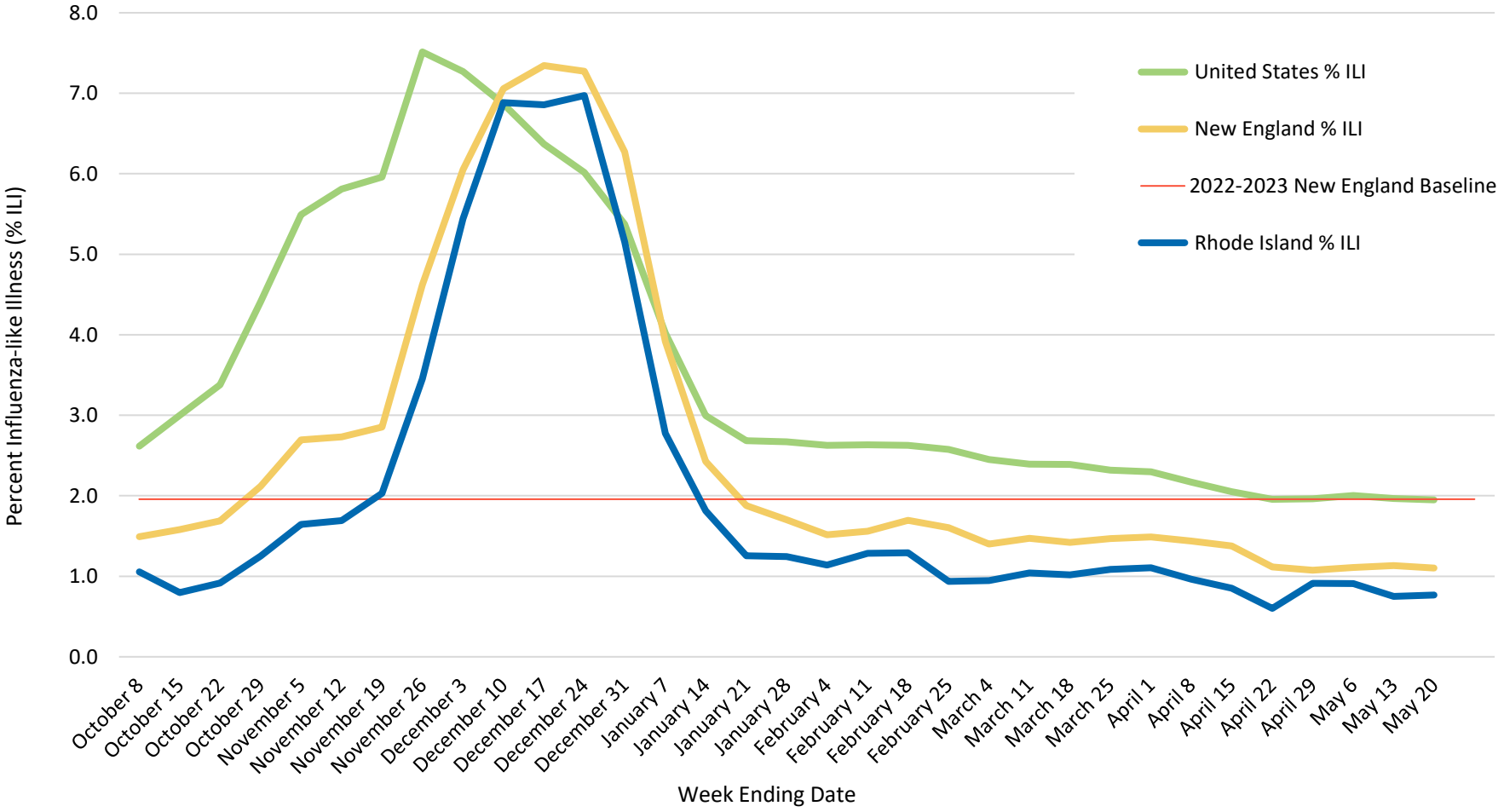


# ILINet:
## % ILI Comparison Among Seasons

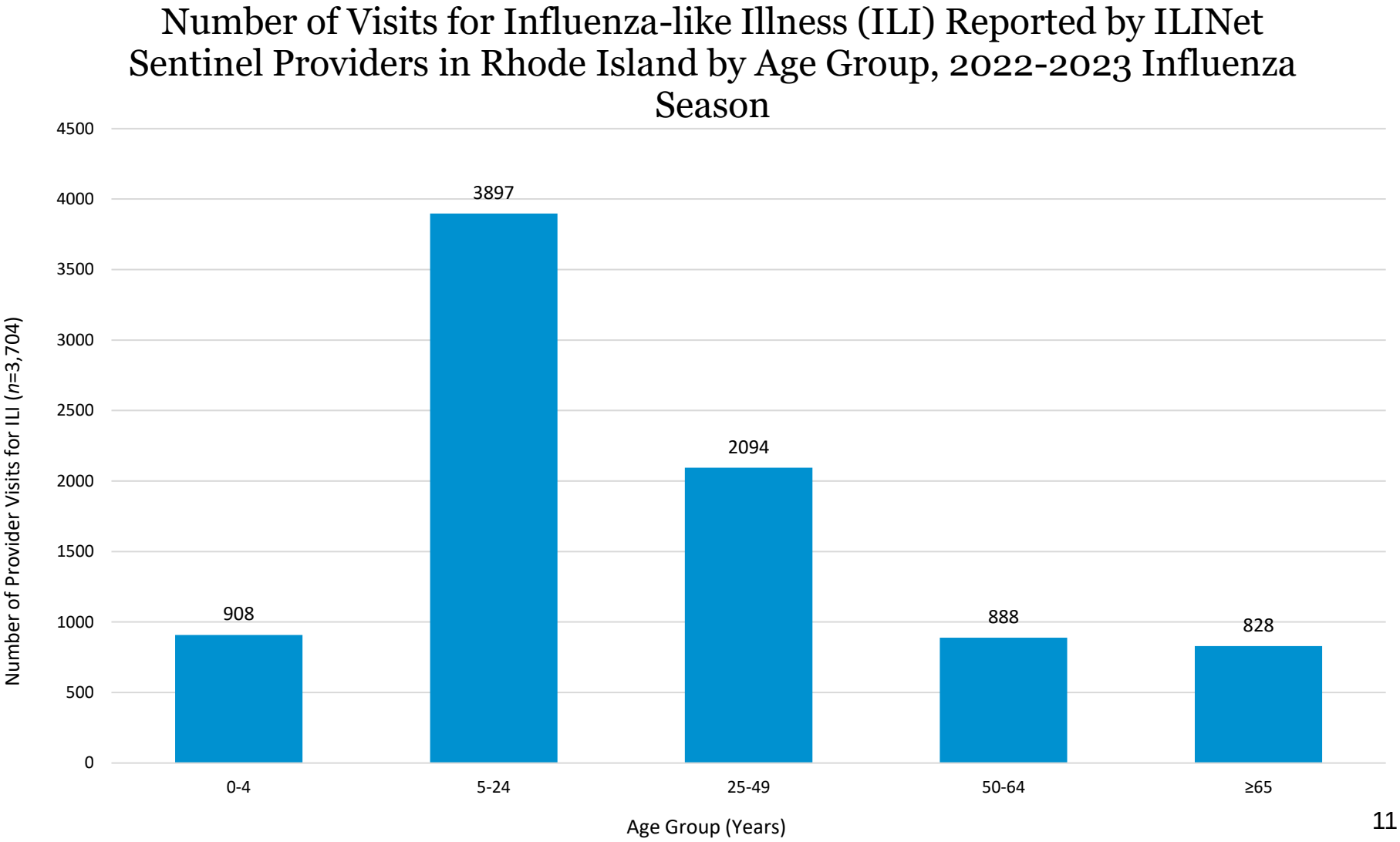


# ILINet:
## % ILI Comparison of Country, Region and State

### Percentage of Visits for Influenza-like Illness (ILI) reported by ILINet: Rhode Island, New England, and the United States, 2022-2023



# ILINet:
## Age Groups



# Rhode Island State Health Laboratories (RISHL)

# Rhode Island State Health Laboratories: Influenza Testing

- RI State Health Laboratories (RISHL) performs molecular testing for influenza.
  - Provides important information on specific influenza strains circulating in Rhode Island.
  - Performs influenza A subtyping and influenza B lineage testing.
  - Helps CDC monitor antiviral susceptibility and identify novel viruses.

- Specimens are submitted to RISHL by congregate living facilities experiencing respiratory outbreaks and ILINet sentinel providers. One ILINet provider is a large health center that submits the majority of specimens.

- Any specimen submitted for influenza testing is tested for both SARS-CoV-2 and influenza.

- 13,123 specimens were tested at RISHL during the 2022-2023 season; 1,586 specimens tested positive for influenza.

- During the peak of the season, Influenza A subtyping was performed on a percentage of specimens that tested positive for Influenza A. Specimens from congregate living outbreaks are always subtyped. During the shoulders of the season, almost all specimens were subtyped.

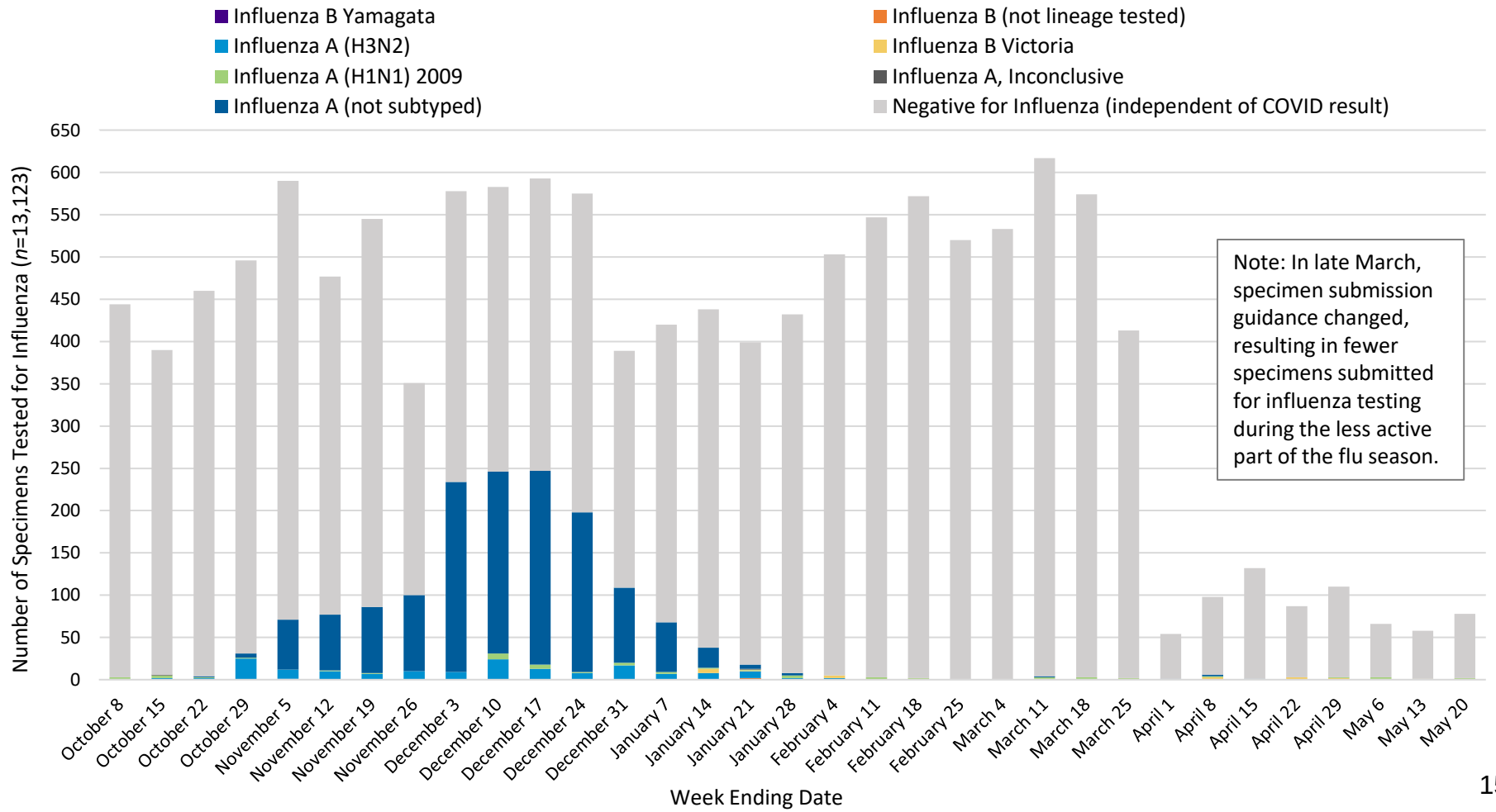
# Rhode Island State Health Laboratories: Influenza Results

| Influenza Test Results, RISHL, 2022-2023 | | |
|---|---|---|
| **Result** | **2022-2023 Season Cumulative (n=13,123; 1,586 positive)** | |
| | N | % |
| **Influenza A (H3N2)** | **168** | 10.6% |
| **Influenza A (H1N1) 2009** | **46** | 2.9% |
| **Influenza A (not subtyped)** | **1,341** | 84.6% |
| **Influenza A, inconclusive** | **4** | 0.3% |
| **Influenza B Victoria** | **23** | 1.5% |
| **Influenza B Yamagata** | **1*** | 0.1% |
| **Influenza B (lineage not performed)** | **3** | 0.2% |
| Negative for influenza | 11,537 | N/A |

*Influenza B Yamagata detection was likely a result of a recent live attenuated influenza vaccine (nasal spray) administration

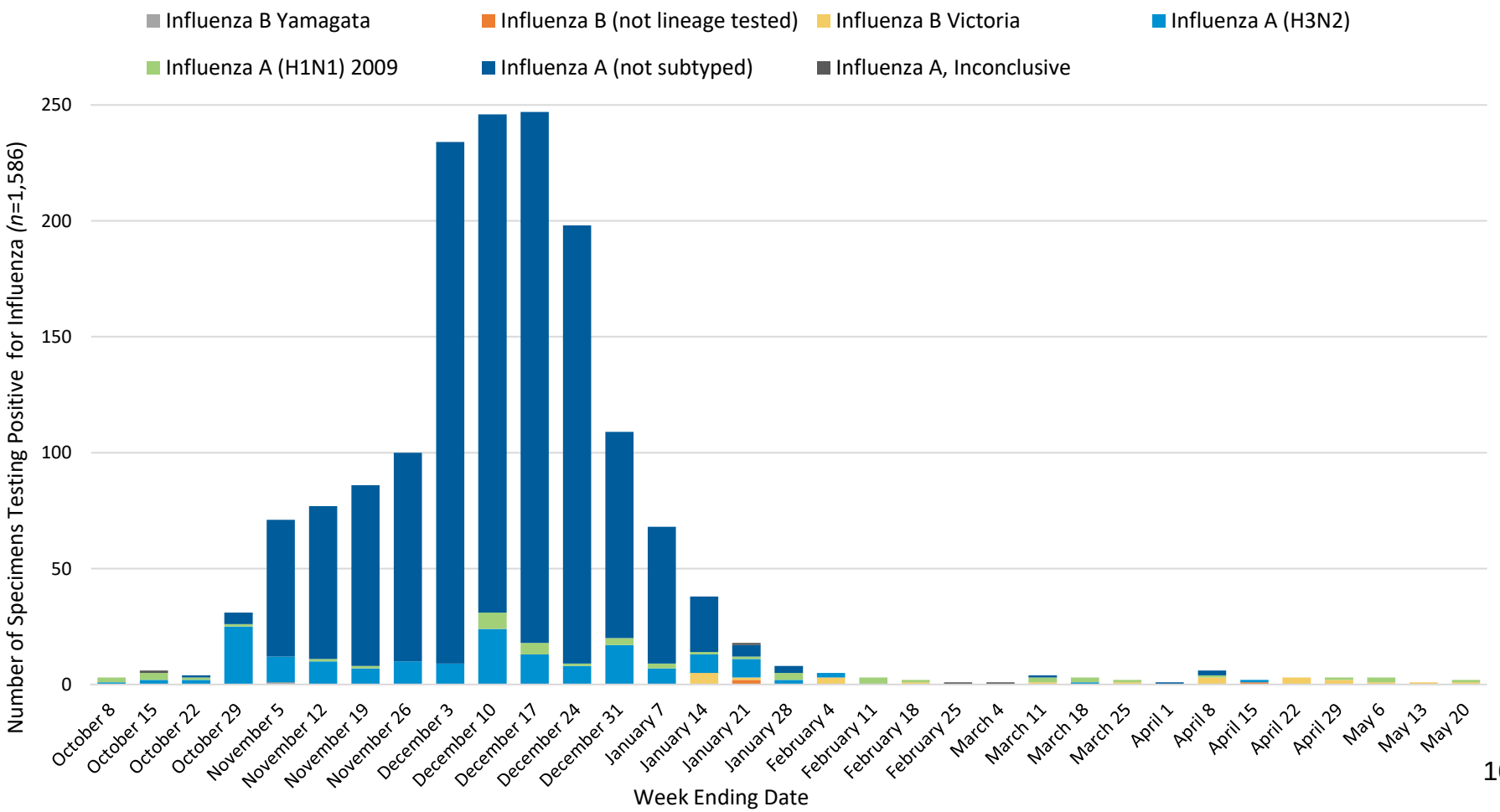
# Rhode Island State Health Laboratories: Influenza Testing (Positives and Negatives)

## Specimens Tested for Influenza at the Rhode Island State Laboratories, 2022-2023 Influenza Season



# Rhode Island State Health Laboratories: Influenza Testing (Positives Only)

## Influenza-Positive Specimens, Rhode Island State Health Laboratories, 2022-2023 Influenza Season



# Hospital Influenza Tests and Hospitalizations

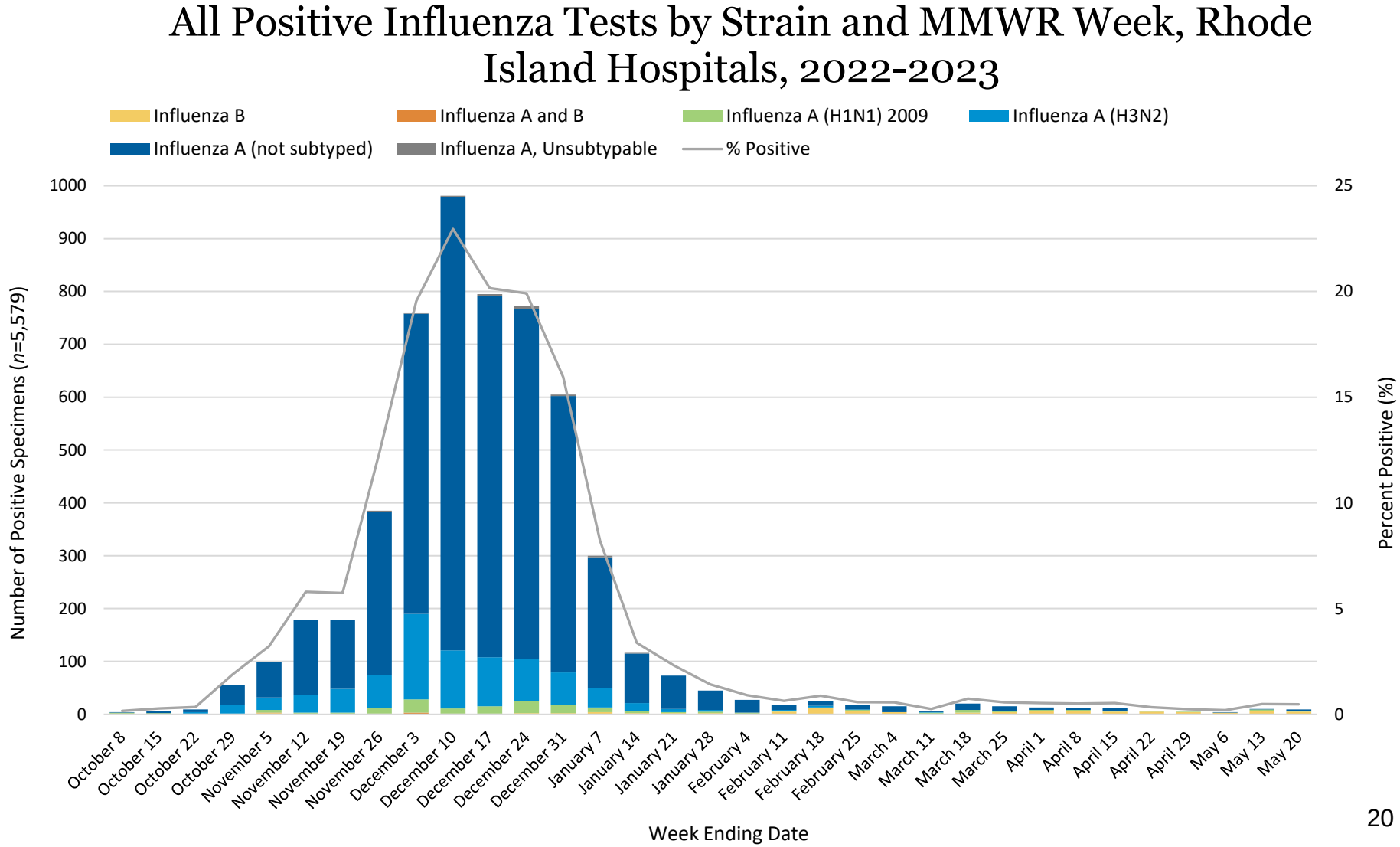
# Hospital Influenza Tests:
## Hospital Laboratory Surveillance

- All positive influenza tests at Rhode Island's 10 acute care hospitals are reported to RIDOH weekly.
- The data reported to RIDOH includes inpatient hospitalizations and emergency department visits.
- Influenza-positive hospitalizations are presented as a subset of all hospital data.
- Data include both molecular and rapid antigen testing methods.
- Not all assays subtype influenza A, which leads to a large number of unsubtyped influenza A results, represented as "Influenza A (not subtyped)"

# Hospital Influenza Tests:
## Data Summary

- During the 2022-2023 season, 5,579 specimens tested positive for influenza at hospital laboratories.
- Notably, there were significantly more positive influenza tests in the 2022-2023 season (n=5,579) than in the 2021-2022 season (n=2,339). There were more positive results than in the last pre-pandemic season, 2018-2019 (n=4,853), suggesting a return to pre-COVID levels of influenza. Some of this increase in positive tests may be attributable to increased testing due to COVID test practices.
- During the 2022-2023 season, 819 individuals were hospitalized for influenza.
- Positive tests at hospitals peaked in mid-December, earlier than in previous seasons. This peak was driven by influenza A viruses.
- The most common virus type was influenza A (not subtyped); the most common subtyped virus was influenza A (H3N2).

# All Hospital Influenza Positives: Strain and MMWR Week

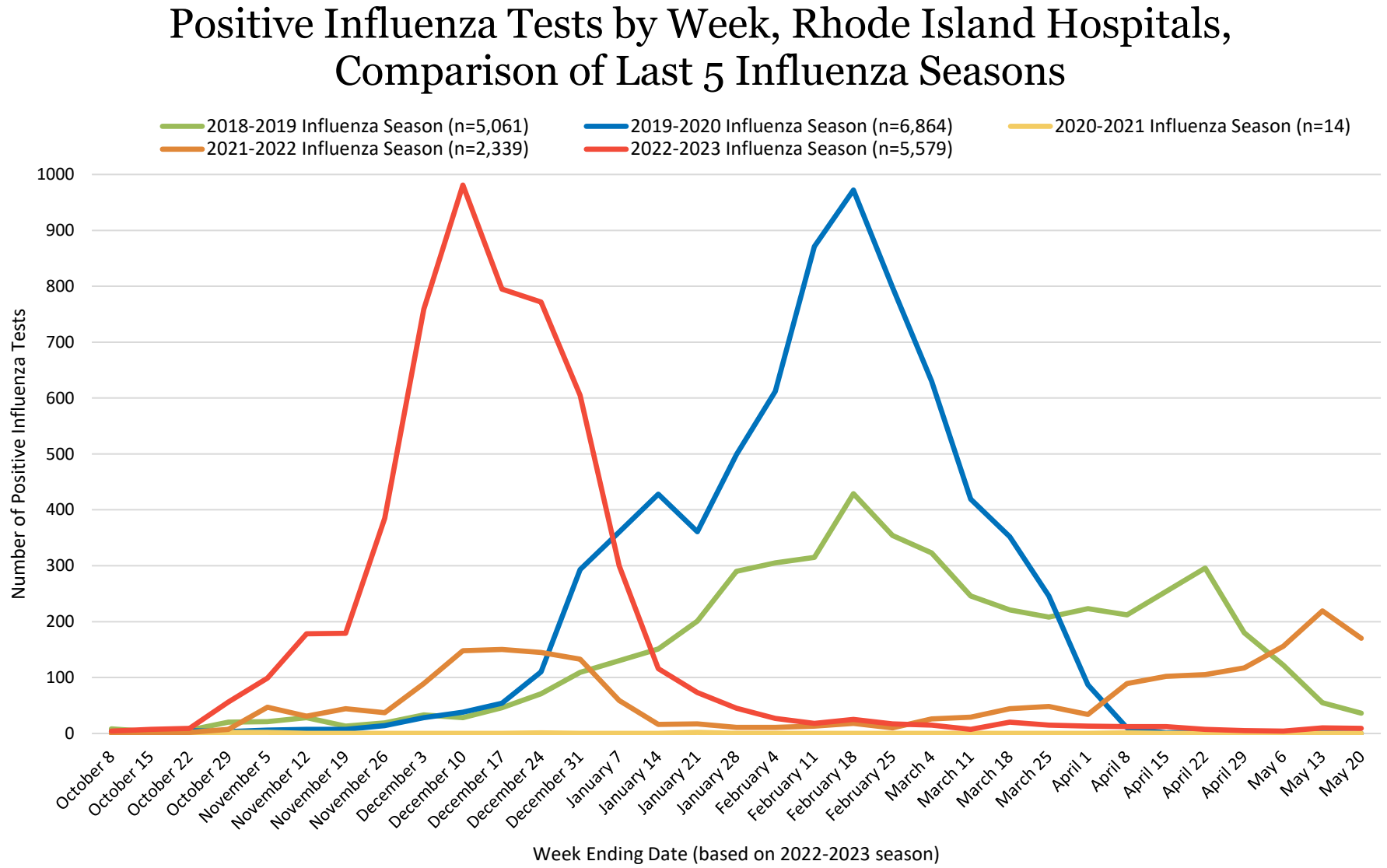


# All Hospital Influenza Positives: Strain Counts and Percentages

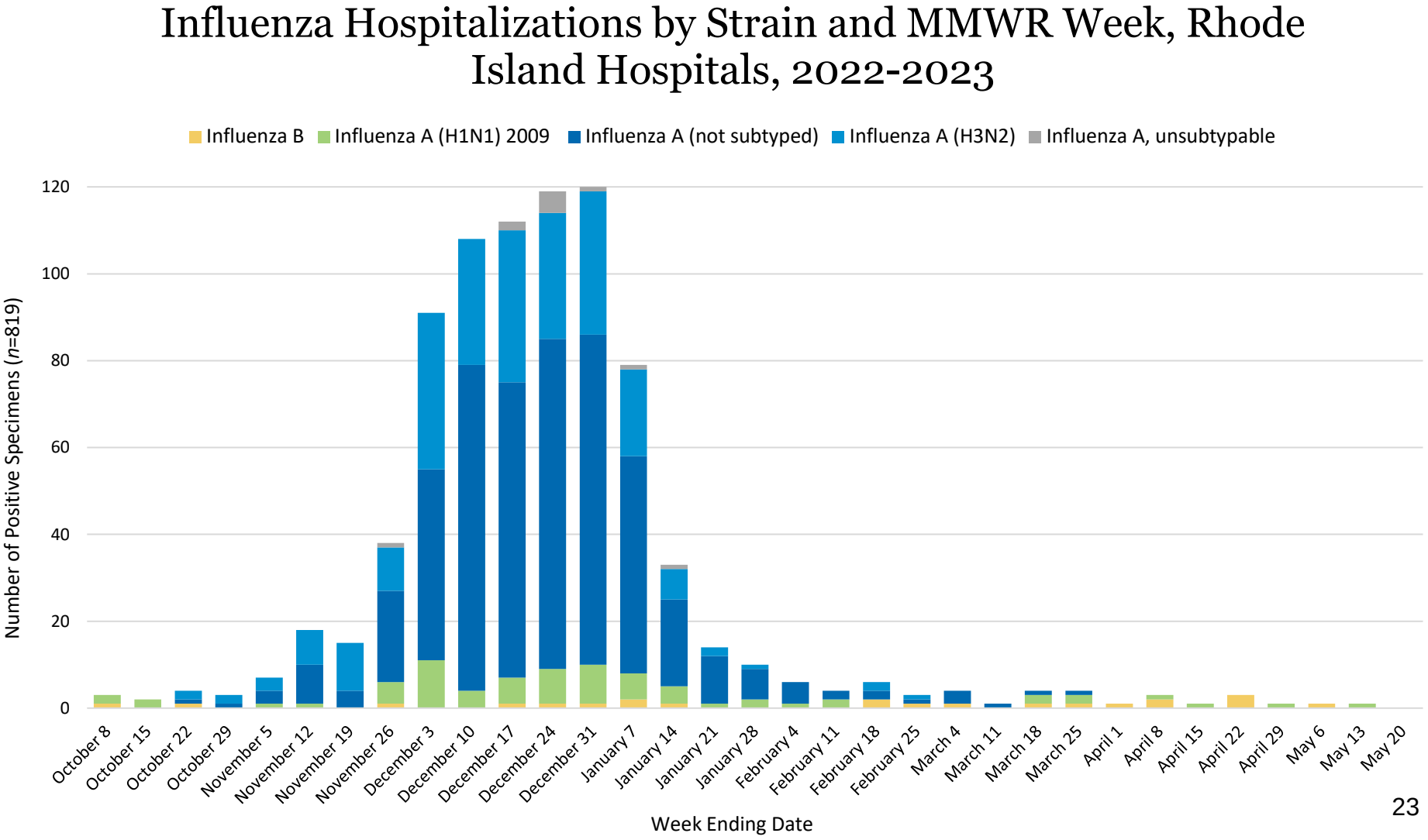
| Positive Influenza tests by strain, Rhode Island Hospitals, cumulative season | | |
|---|---|---|
| **Strain** | **2022-23 Season Cumulative (n=5,579)*** | |
| | N | % |
| Influenza A (Not subtyped) | 4,538 | 81.3% |
| Influenza A (H3N2) | 755 | 13.5% |
| Influenza A (H1N1) 2009 | 160 | 2.9% |
| Influenza A (Unsubtypable) | 21 | 0.4% |
| Influenza B | 101 | 1.8% |
| Influenza A and B | 4 | 0.1% |

*Some counts may differ from earlier estimates due to post-season data cleaning.

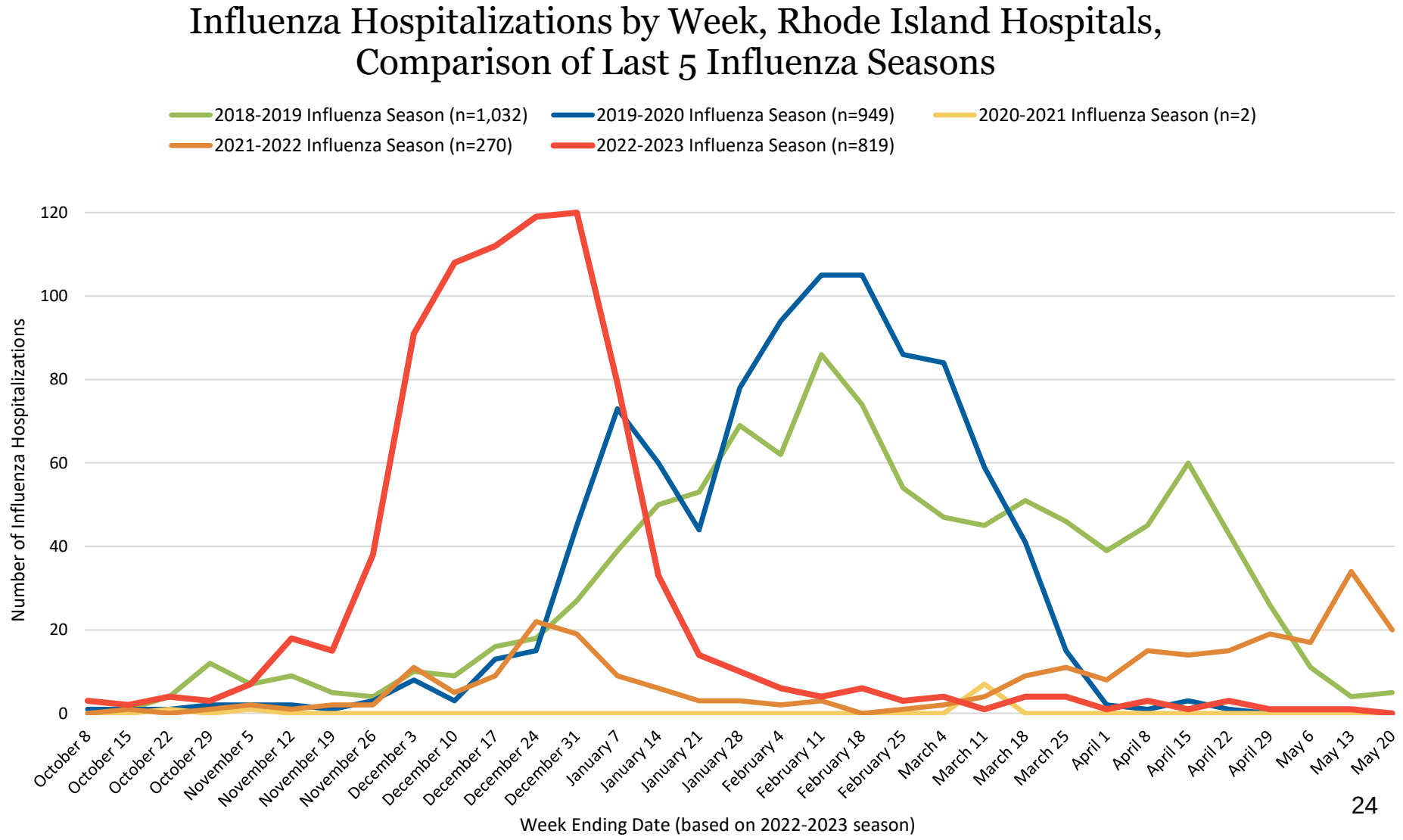
# All Hospital Influenza Positives:
## Season Comparison



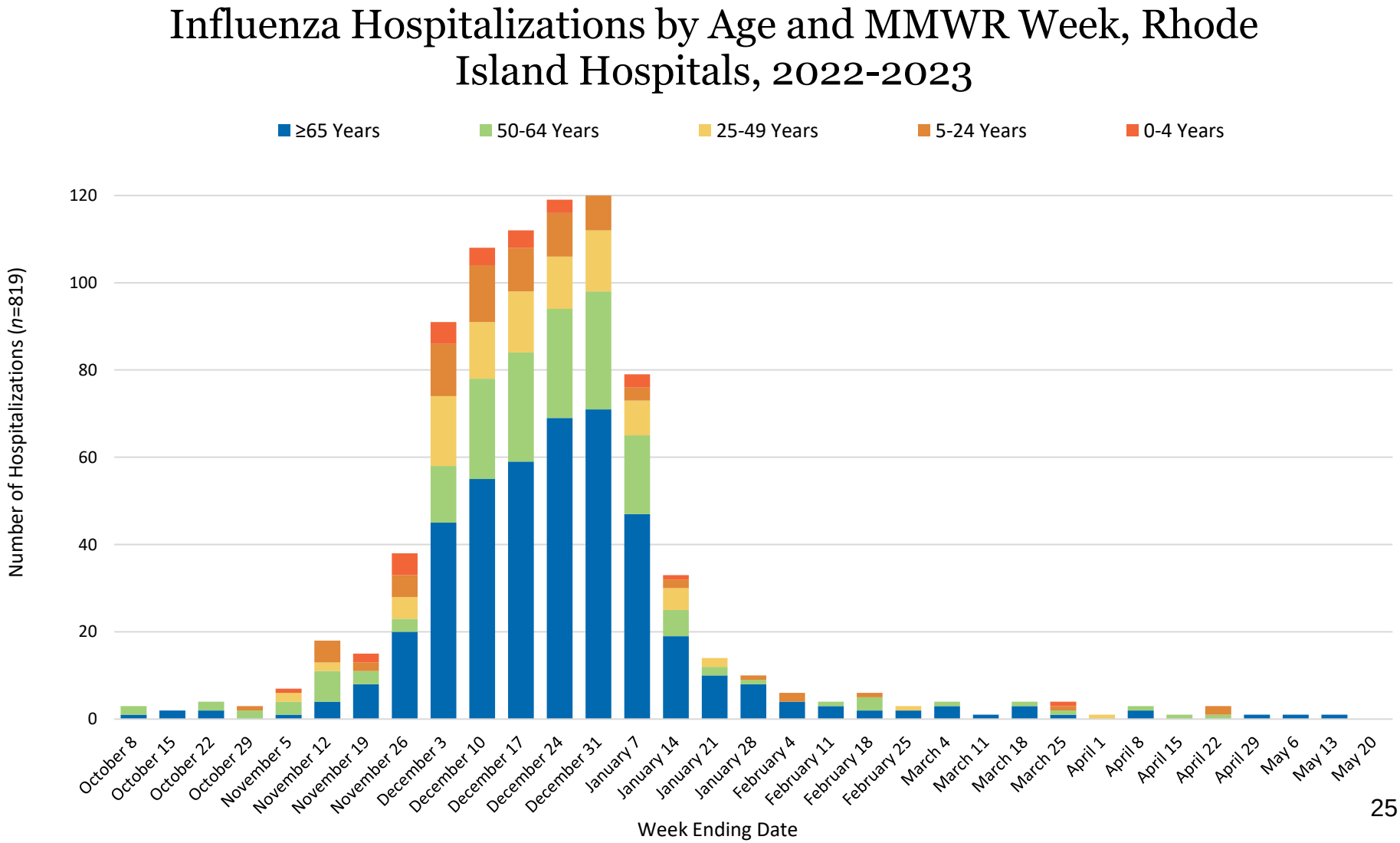
# Influenza Hospitalizations:
## Strain and MMWR Week



# Influenza Hospitalizations:
## Season Comparison

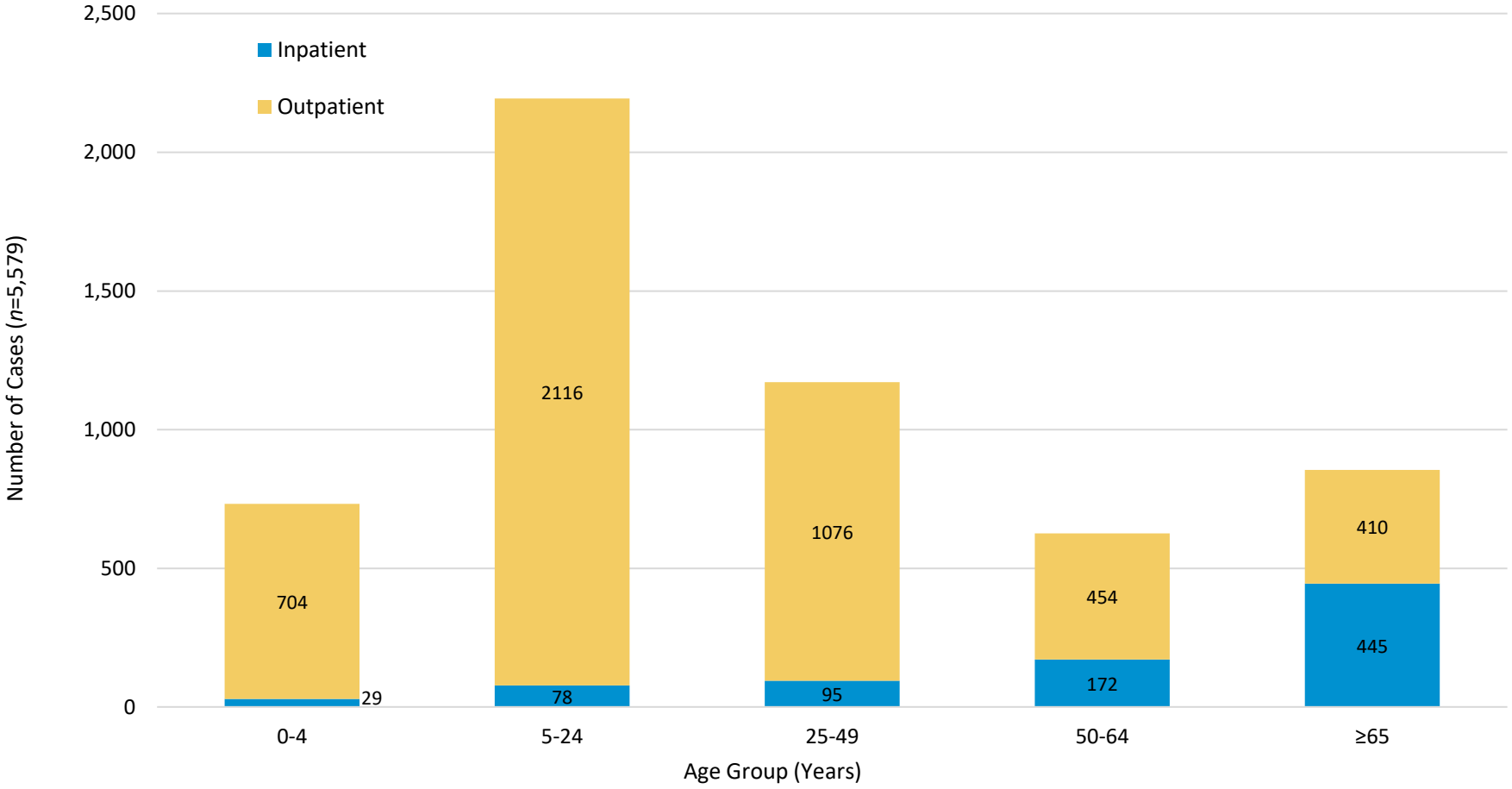


# Influenza Hospitalizations:
## Age Group and MMWR Week



# All Hospital Influenza Tests:
## Age Group and Hospitalization Status

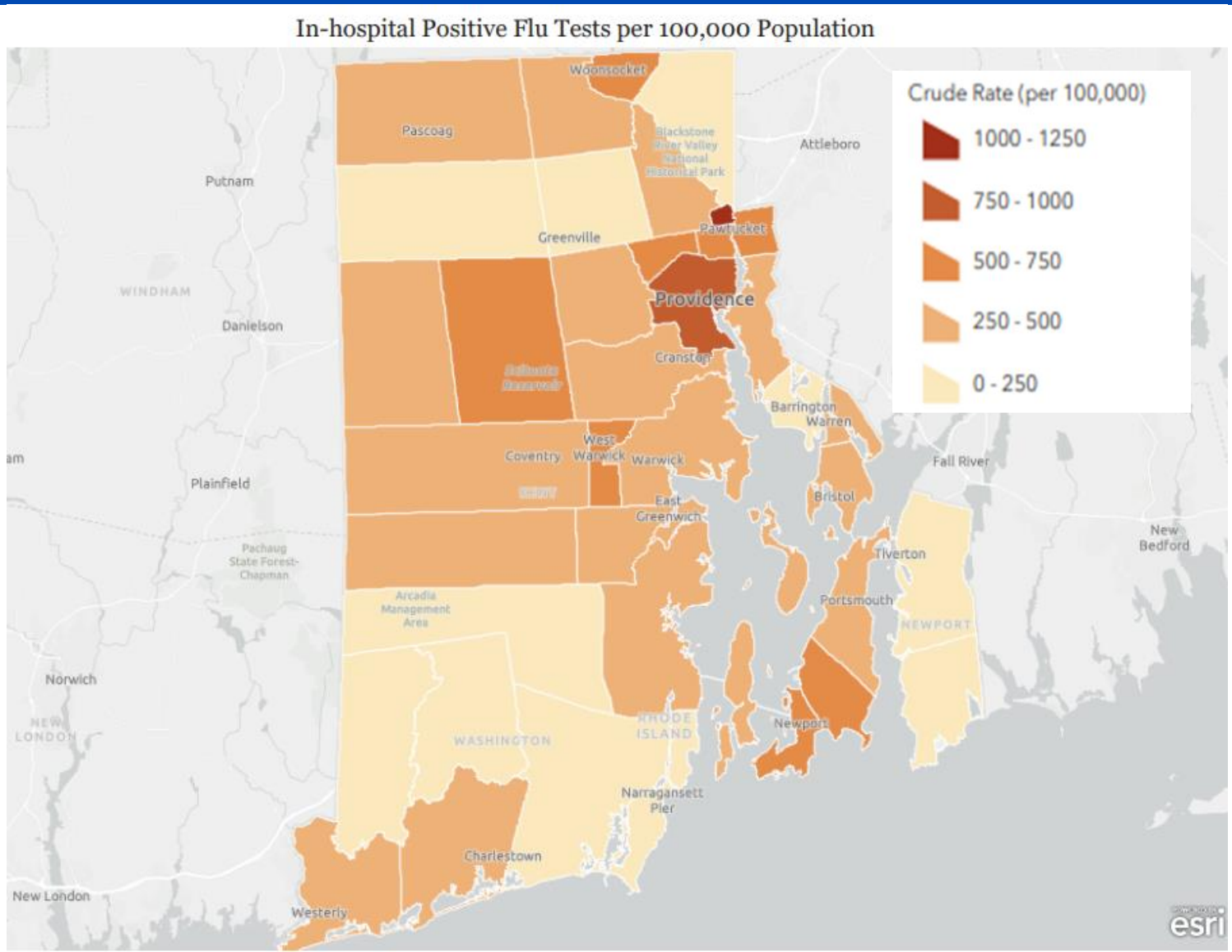
### Positive Influenza Tests by Hospitalization Status and Age, Rhode Island Hospitals, 2022-2023



# Hospital Data:
## Geospatial Analysis

- In-hospital positive influenza tests and influenza-associated hospital admissions are reported by Rhode Island's 10 acute care hospitals and their associated laboratories. This data was used, with 2020 Census data, to calculate crude rates of in-hospital positive tests on the city-level.
- Mapping these rates may offer insight into the relative flu burden faced by local jurisdictions.
- Central Falls and Providence experienced particularly high rates of in-hospital positive influenza tests (1208.87 in-hospital positive tests per 100,000 population and 818.61 in-hospital positive tests per 100,000 population, respectively ).
- Geospatial analysis was performed on hospitalization data, but was unable to be displayed in this report due to RIDOH's Small Numbers Policy

# All Hospital Influenza Positives:
## Geospatial Analysis



# All Hospital Influenza Positives:
## Rate per 100,00 population by municipality

| City | Count | Crude Rate (per 100,000)* |
|---|---|---|
| Barrington | 31 | 180.73 |
| Bristol | 64 | 284.53 |
| Burrillville | 56 | 346.58 |
| Central Falls | 273 | 1,208.87 |
| Charlestown | 20 | 250.09 |
| Coventry | 174 | 487.56 |
| Cranston | 363 | 437.70 |
| Cumberland | 87 | 238.98 |
| East Greenwich | 51 | 356.34 |
| East Providence | 206 | 437.01 |
| Exeter | 13 | |
| Foster | 13 | |
| Glocester | 23 | 230.60 |
| Hopkinton | 13 | |
| Jamestown | 16 | |
| Johnston | 126 | 426.14 |
| Lincoln | 82 | 363.98 |
| Middletown | 97 | 568.08 |
| Narragansett | 23 | 158.27 |
| Newport | 165 | 655.72 |
| North Kingstown | 94 | 338.96 |
| North Providence | 188 | 551.09 |
| North Smithfield | 37 | 293.93 |
| Pawtucket | 560 | 740.70 |
| Portsmouth | 58 | 324.55 |
| Providence | 1563 | 818.61 |
| Richmond | 13 | |
| Scituate | 52 | 500.77 |
| Smithfield | 53 | 239.62 |
| South Kingstown | 74 | 231.75 |
| Tiverton | 24 | 146.71 |
| Warren | 41 | 367.81 |
| Warwick | 350 | 422.59 |
| West Greenwich | 30 | 459.56 |
| West Warwick | 183 | 590.09 |
| Westerly | 65 | 278.27 |
| Woonsocket | 268 | 619.80 |

*Note: Counts are only displayed if greater than 5 and rates are only displayed if numerator is greater than 20 per RIDOH's Small Numbers Policy. More information can be found here: health.ri.gov/publications/policies/SmallNumbersReporting.pdf.

Little Compton had fewer than 5 in-hospital positive influenza tests and, as a result, is not represented in this table.

Little Compton, Exeter, Foster, Hopkinton, Jamestown, and Richmond had a denominator less than 20 and, as a result, are not represented in the map.

# Lifespan Respiratory Pathogen Panel and Rapid Respiratory Assays:
## Inpatient, ER and Outpatient Tests

- Lifespan Laboratories utilize a multi-target respiratory pathogen panel (RP2) to diagnose respiratory infections, particularly in hospitalized individuals. These data are reported weekly to RIDOH along with data from all rapid molecular respiratory tests conducted at Lifespan Laboratories.

- The RP2 and rapid molecular test graphs includes all positive COVID tests at Lifespan facilities (combined under SARS-CoV-2, in black).

- Includes specimens collected from inpatients, ER visits and outpatient visits.

- These data allow RIDOH to track circulating respiratory pathogens other than influenza, with a particular emphasis on RSV.

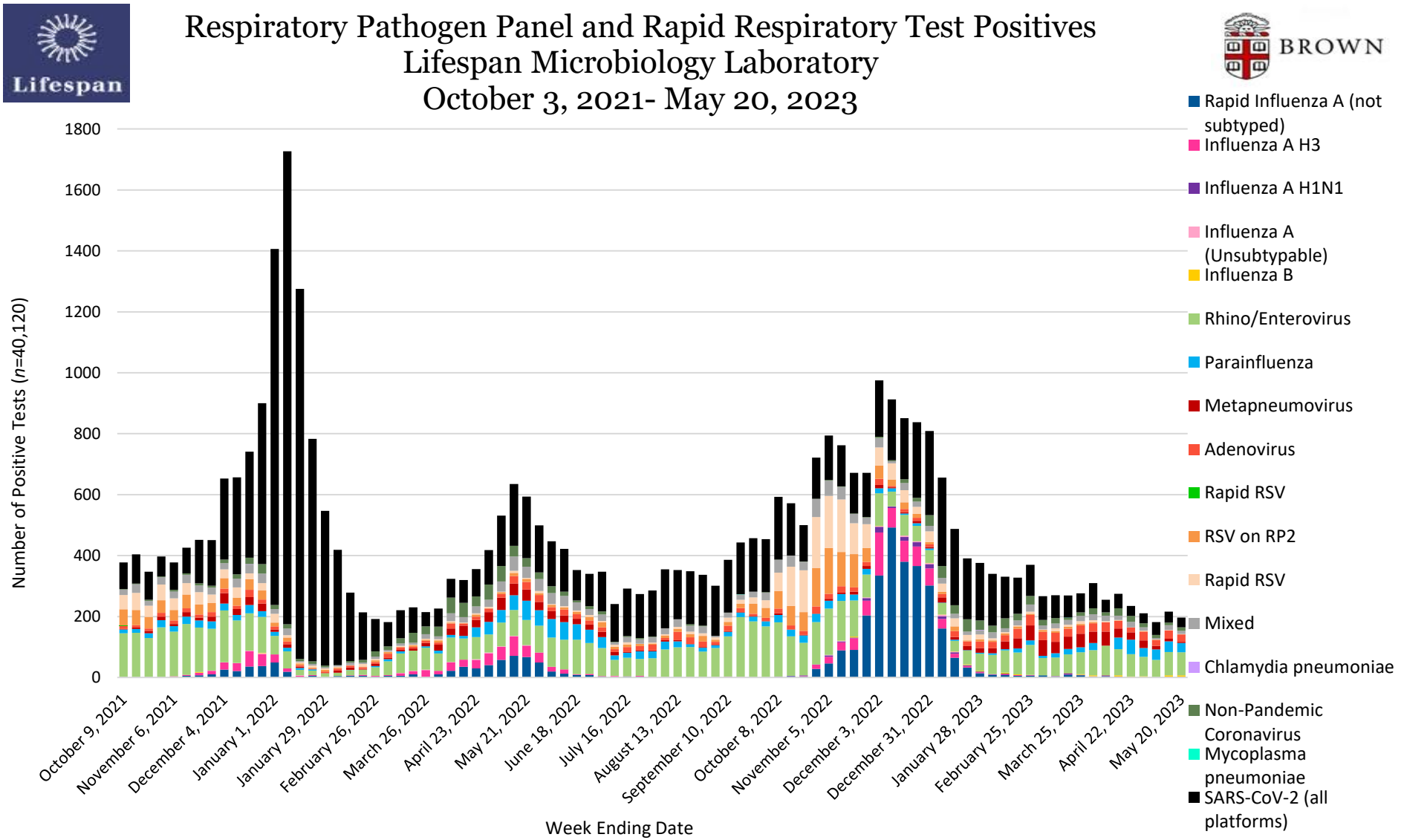
- This source of RSV data is used to guide recommendations around pre-exposure RSV prophylaxis for vulnerable children in Rhode Island.

# Lifespan Respiratory Pathogen Panel and Rapid Respiratory Assays:
## 2021-2023 Summary

- Influenza circulation returned to pre-pandemic levels in the 2022-2023 season.
- SARS-CoV-2 peaked in January 2022, with the Omicron surge. This spike in COVID levels may have suppressed influenza activity, leading to a two-peaked, yet mild 2021-2022 influenza season.
- In contrast, in the 2022-2023 season, influenza A positivity peaked in December 2022, overtaking COVID levels at that time.
- RSV positivity rates were uncharacteristically high during the late summer and early fall of 2021, peaking in September 2021. Notably, this phenomenon followed the minimal RSV activity of the 2020-2021 season.
- RSV positivity again peaked during the fall of 2022, reaching unprecedented levels of disease activity even compared to pre-pandemic seasons.
- It is unclear how respiratory disease activity may further develop during future seasons, in the context of a more endemic SARS-CoV-2 virus.

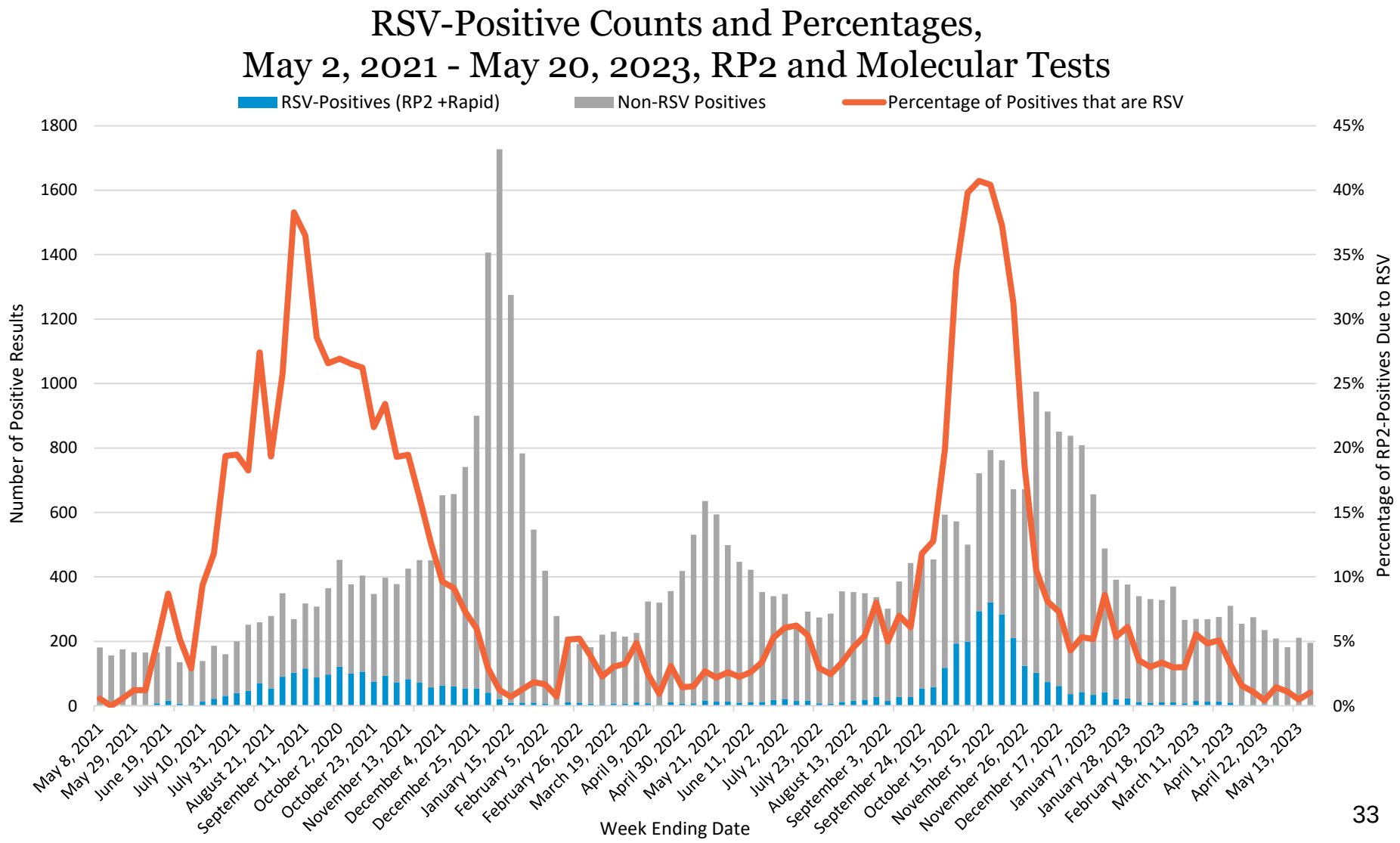
# Lifespan Laboratories:

## Lifespan Respiratory Pathogen Panel and Rapid Molecular Test Results

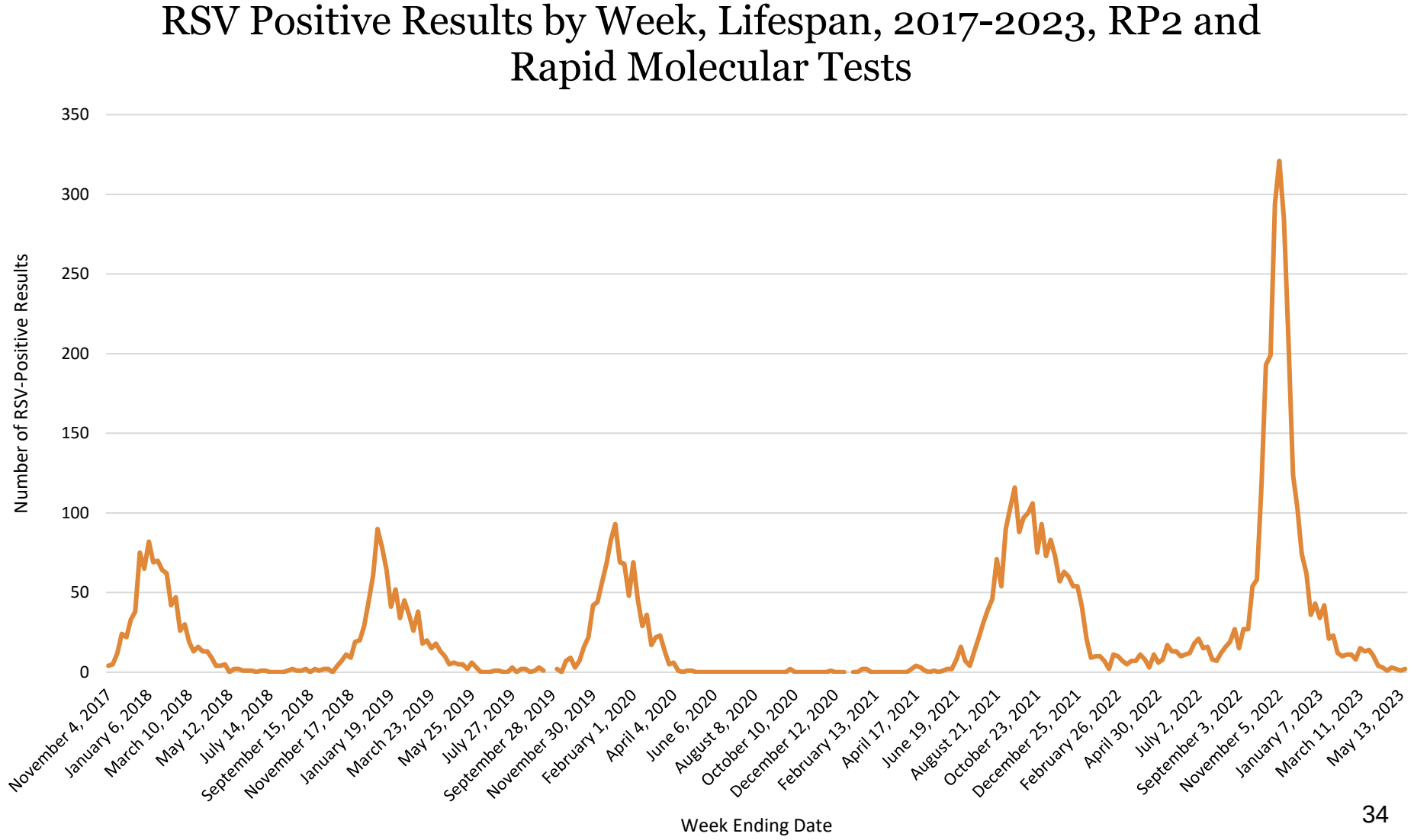


# Lifespan Laboratories:

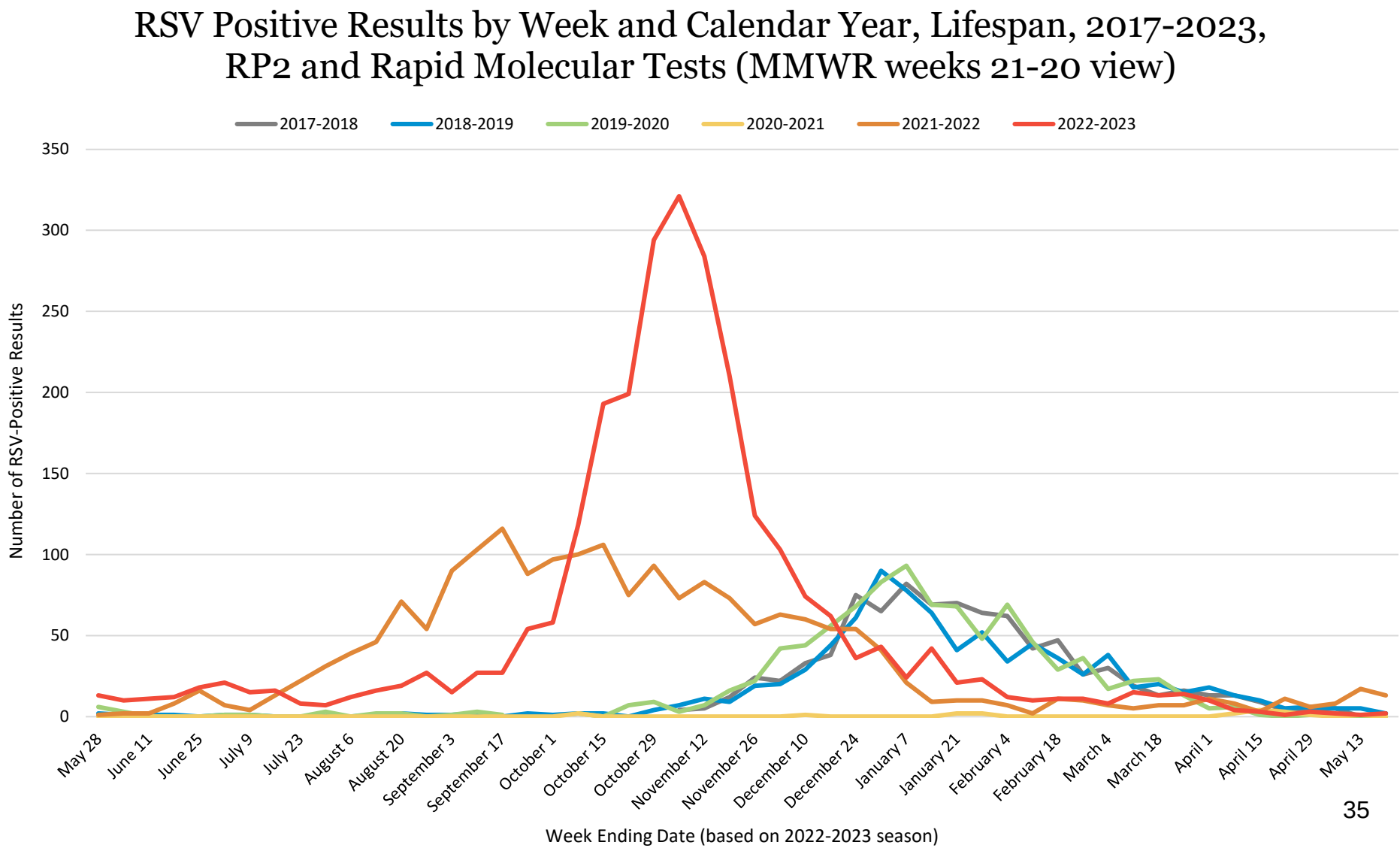
## RSV Results on All Platforms:
## Counts and Percentage of All Positives



# Lifespan Laboratories:
## RSV Results on All Platforms: Season Comparison



# Lifespan Laboratories:
## RSV Results on All Platforms: Comparison Between Seasons



# Syndromic Surveillance

## Electronic Surveillance System for the Early Notification of Community-Based Epidemics (ESSENCE)

# Syndromic Surveillance: ESSENCE

- RIDOH utilizes the Electronic Surveillance System for the Early Notification of Community-Based Epidemics (ESSENCE) to collect and analyze emergency room data from all 10 acute-care hospitals in the state.

- ESSENCE queries the **chief complaint and discharge diagnosis** fields for each record to determine if the visit was due to a particular syndrome, such as Influenza-like illness (ILI) or COVID-diagnosed Illness (CODI).
  - CODI consists of select ICD-10 and SNOMED CT codes related to COVID-19 from the discharge diagnosis.
  - ILI consists of a fever AND (cough or sore throat) and excludes a COVID discharge diagnosis.
  - The RSV query pulls visits with chief complaints containing word combinations of RSV, bronchiolitis, or syncytial virus, along with select ICD-10 and SNOMED CT codes from the discharge diagnosis.

- The percentages of weekly visits due to ILI, CODI or RSV are calculated to determine the burden of those conditions in Rhode Island hospital emergency departments.

- Syndromic surveillance provides RIDOH a timely system for detecting and monitoring various health events.

# Syndromic Surveillance: Summary

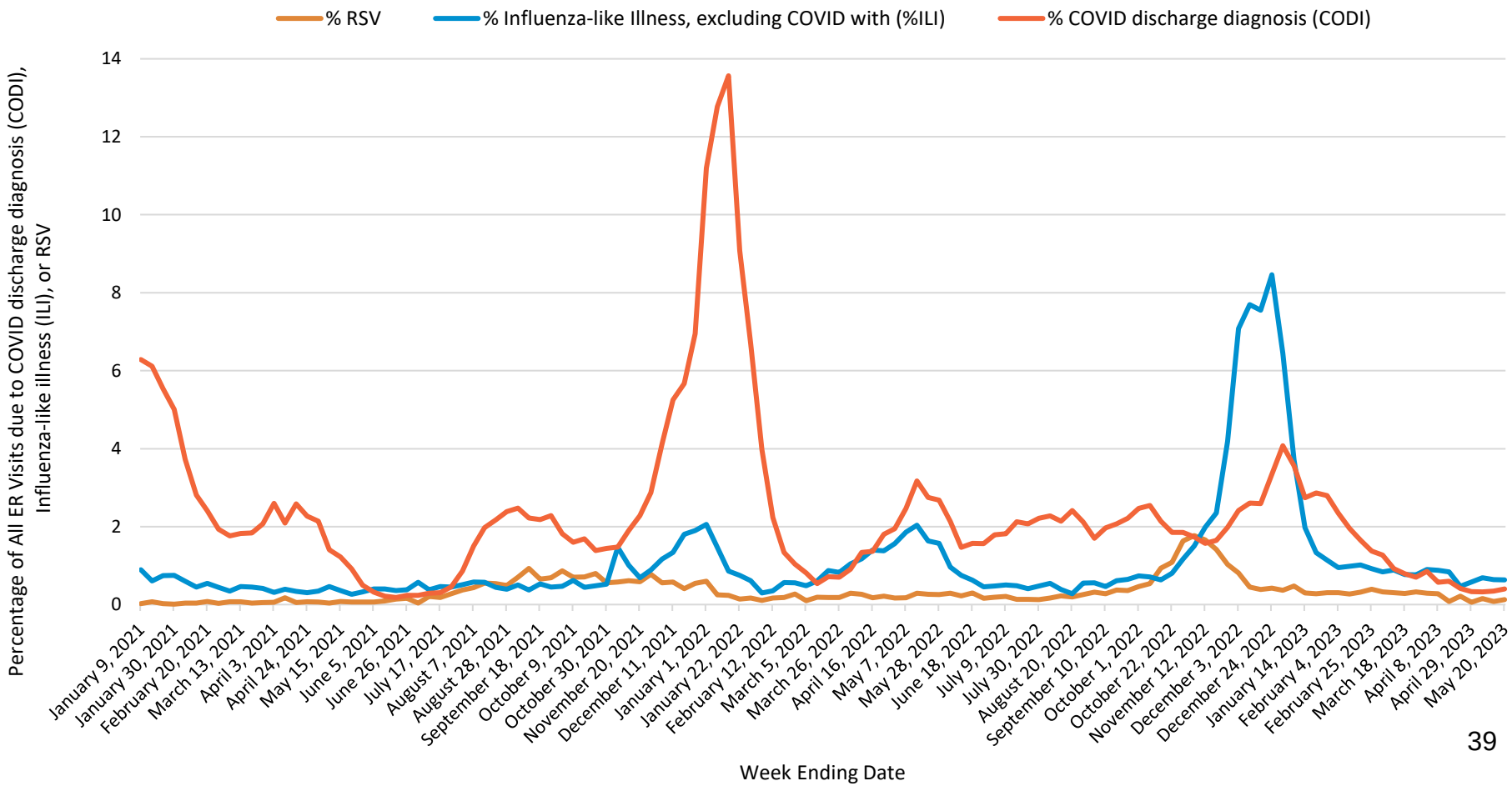
- The percentage of ED visits due to influenza-like illness peaked during December 2022, surpassing rates of ED visits due to COVID and RSV.
  - The percentage of ED visits due to COVID remained considerably lower during the 2022-2023 season, compared to its peak in January 2022 (2021-2022 season).

- Rates of influenza-like illness visits in ERs appear to have returned to pre-pandemic levels (peaking at 8.46% of ER visits during the 2022-2023 season, similar to 8.59% of ER visits during the 2019-2020 season).

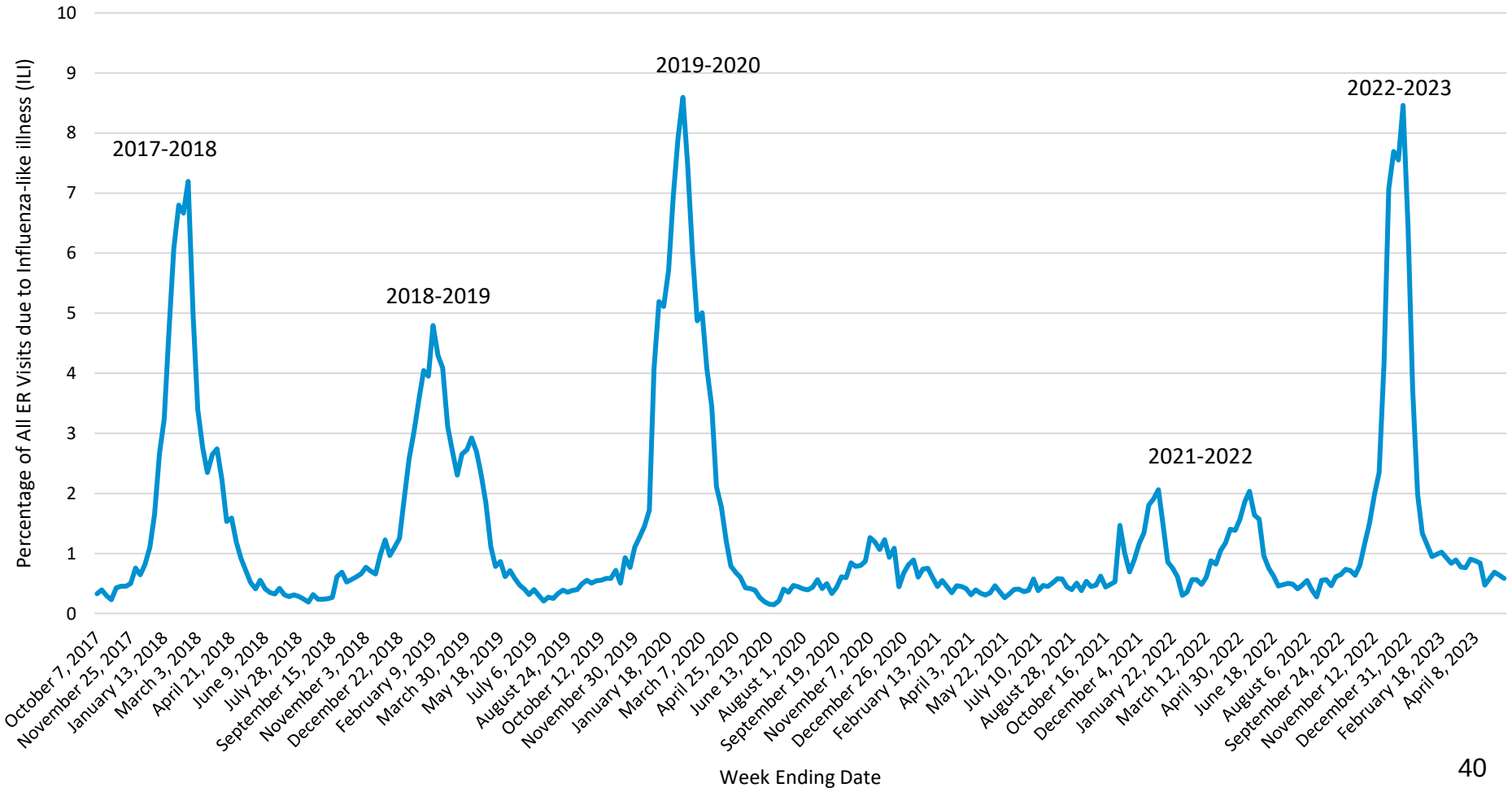
- Weekly counts of RSV visits peaked in November 2022, surpassing counts observed during recent seasons (peaking at 191 weekly visits during the 2022-2023 season, compared to 135 weekly visits during the 2019-2020 season.)

- RSV visits were driven by the youngest age group, children aged 0-4 years. Young children are at high risk for severe illness due to RSV.

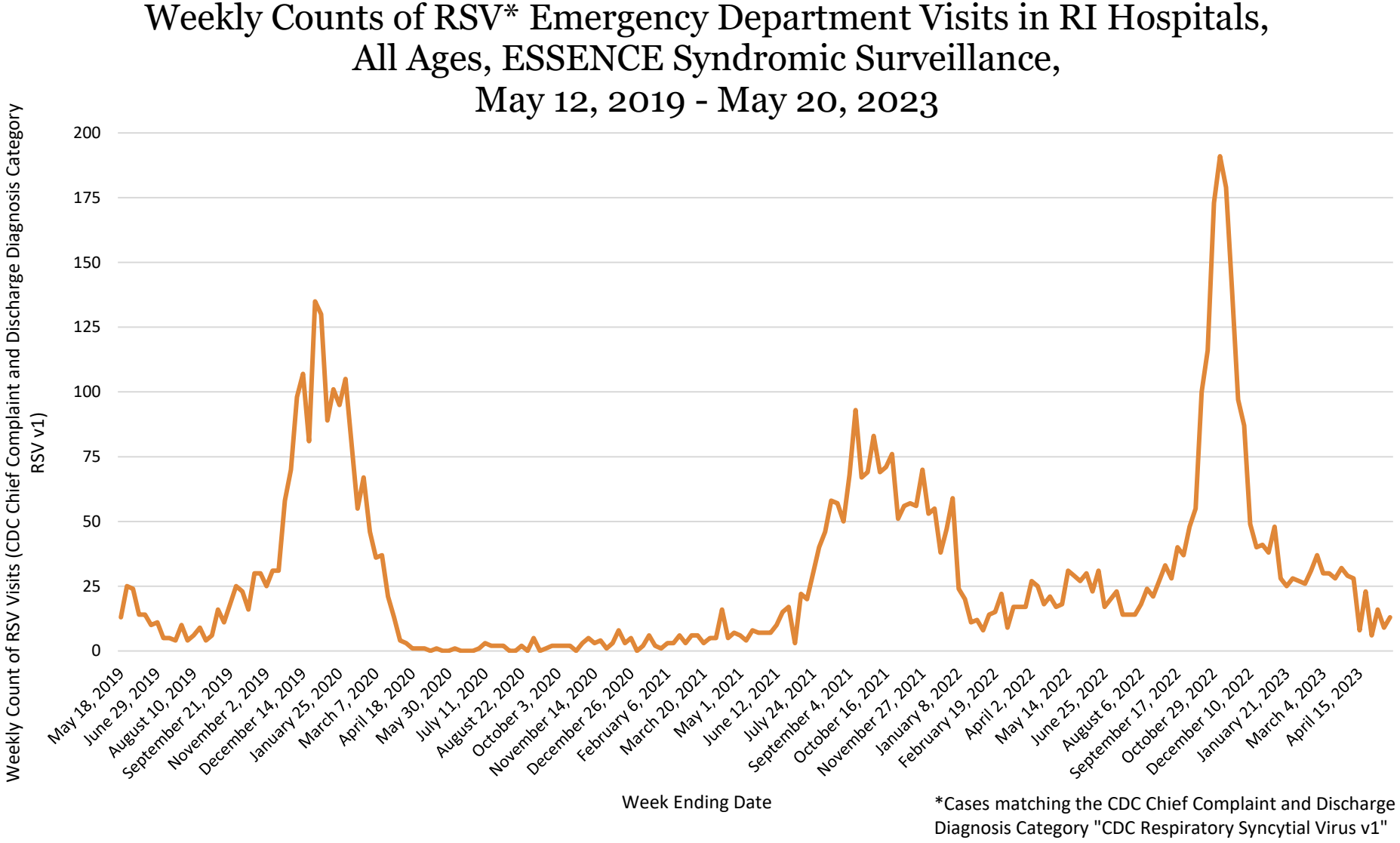
# Syndromic Surveillance:
## Percentage of ED Visits Due to COVID, ILI, and RSV



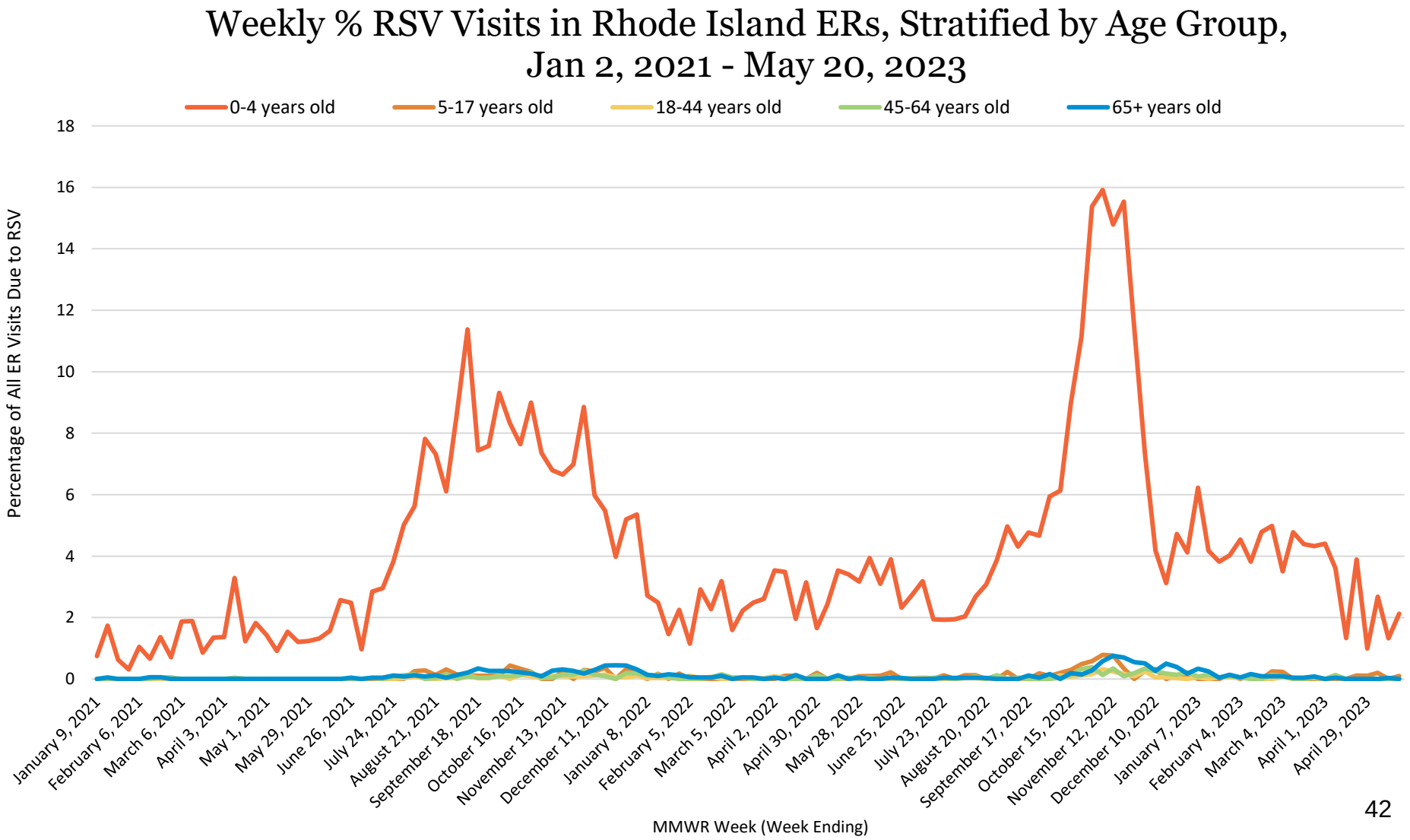
# Syndromic Surveillance:
## Percentage of ED visits due to influenza-like illness (excluding COVID), 2017-2023



# Syndromic Surveillance:
## RSV Counts Over Time



# Syndromic Surveillance: Percent RSV by Age Group



# Respiratory Outbreaks in Congregate Living Settings

# Respiratory Outbreaks:
## Data Summary

- There were 101 non-COVID respiratory outbreaks in 84 different congregate living facilities during the 2022-2023 season, suggesting a return to pre-pandemic patterns. In comparison, there were 26 non-COVID respiratory outbreaks during the 2021-2022 season.

- Outbreaks peaked the second week of December, with 16 outbreaks reported in one week.

- The most common viruses in these outbreaks were influenza A (not subtyped) and influenza A (H3N2), together accounting for 63.4% of all outbreaks.

- 16 outbreaks were caused by more than one virus circulating simultaneously.

- There were an unprecedented number of RSV outbreaks reported during the 2022-2023 season. This is likely due to a combination of an early and severe RSV season and increased multiplex testing.

# Respiratory Outbreaks:
## Congregate Living Surveillance

- Within a congregate living setting, such as a long term care facility, assisted living community, prison or hospital unit, a **respiratory outbreak** is defined as:
  - **One lab-confirmed case of influenza**

    **or**
  - **Two cases of influenza-like illness** (ILI) within 72 hours of each other.
- All respiratory outbreaks are reportable to RIDOH.
- All potential influenza outbreaks with specimens submitted to RISHL are tested for both influenza and SARS-CoV-2. Some facilities have already testing using commercial laboratories prior to reporting to RIDOH and do not have further ill residents to test.
- Only symptomatic residents are swabbed during non-COVID respiratory outbreaks.
- Outbreaks that test negative for influenza and SARS-CoV-2 at RISHL are typically tested on a multitarget respiratory pathogen panel to identify the causative organism.
- COVID outbreaks in congregate living settings are tracked separately and are excluded from the following analyses.

# Respiratory Outbreaks:
## Data Summary Continued

- **Outbreak duration:** the number of days between the first illness onset to 10 days after the last illness onset.
  - The average duration of outbreaks in the 2022-2023 flu season (mean duration=17 days) was similar to the 2018-2019 season average duration (mean duration=16.8 days). This was shorter than the average duration of outbreaks during the 2017-2018 season (mean duration=20 days).

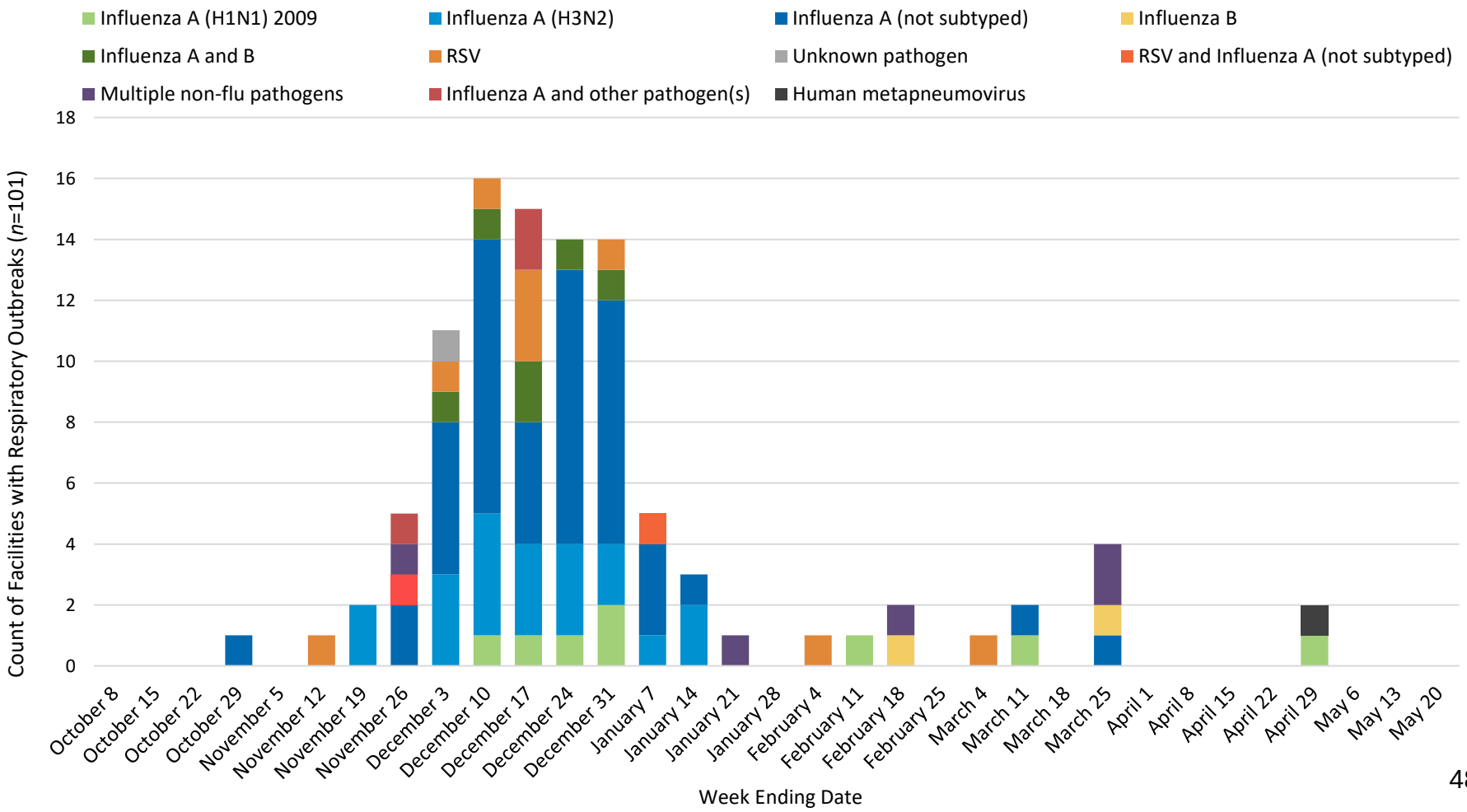
- **Vaccination** among residents (self-reported):
  - Vaccination rates among facilities were lower in the 2022-2023 flu season compared with the 2018-2019 and 2017-2018 seasons.
  - For 2022-2023, the mean vaccination rate was 74% and the median was 83%.
  - For 2018-2019, the mean vaccination rate was 80% and the median was 88%.
  - For 2017-2018, the mean vaccination rate was 87% and the median was 92%.

# Respiratory Outbreaks: Pathogen Counts and Percentages

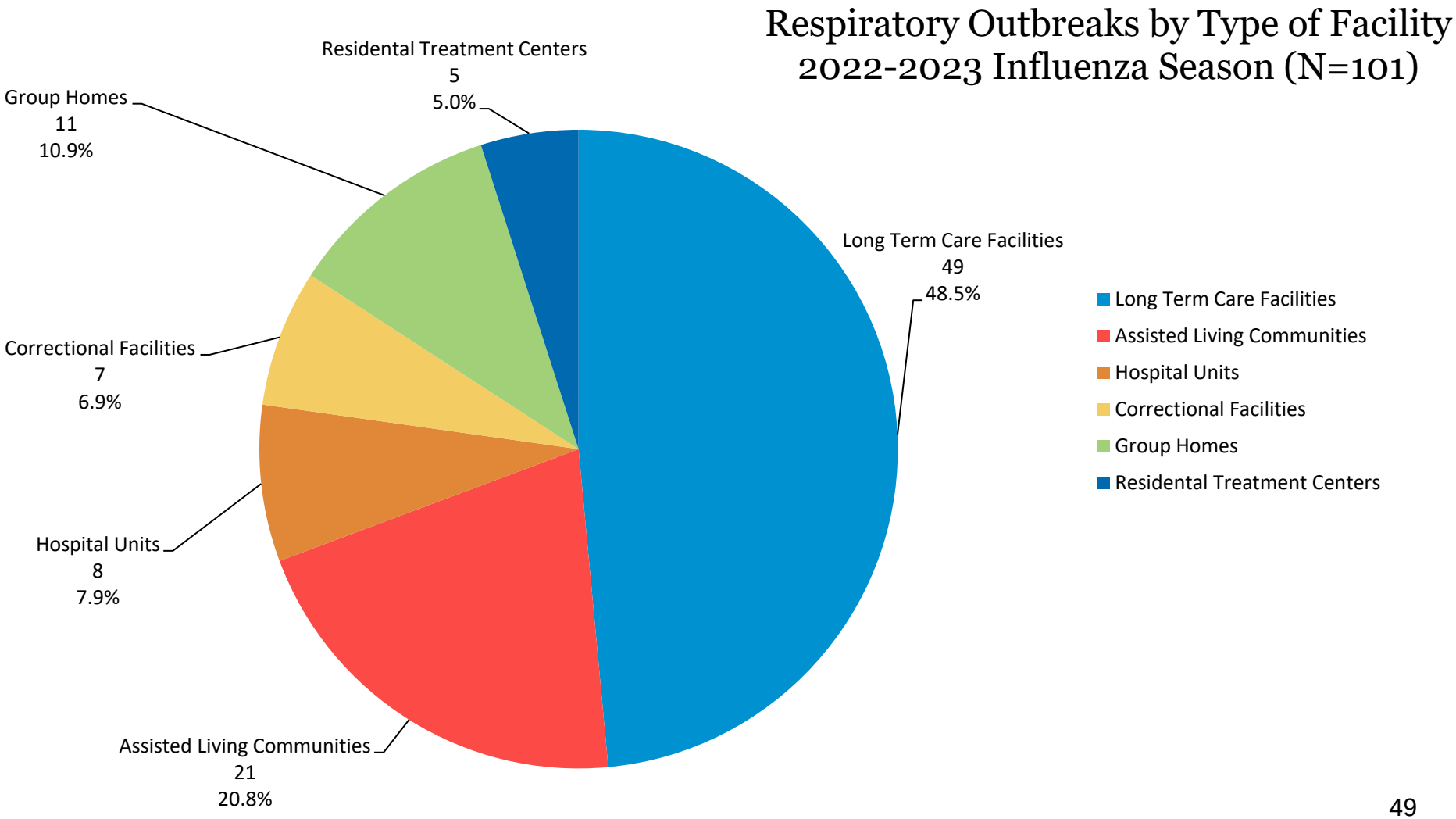
| Respiratory Outbreaks by Pathogen | | |
|---|---|---|
| **Strain** | **2022-23 Season (n=101)** | |
| | N | % |
| Influenza A (not subtyped) | 44 | 43.6% |
| Influenza A (H3N2) | 20 | 19.8% |
| Influenza A (H1N1) 2009 | 8 | 7.9% |
| Influenza A and B | 6 | 5.9% |
| Influenza B | 2 | 2.0% |
| RSV and Influenza A (not subtyped) | 2 | 2.0% |
| RSV | 9 | 8.9% |
| Human metapneumovirus | 1 | 1.0% |
| Influenza A and other pathogen(s) | 3 | 3.0% |
| Multiple non-flu pathogens | 5 | 5.0% |
| Unknown pathogen | 1 | 1.0% |

# Respiratory Outbreaks: Pathogen Counts by MMWR Week

## Respiratory Outbreaks in Congregate Living Facilities, by Strain and MMWR Week, 2022-2023



# Respiratory Outbreaks: Facility Type



# Influenza-Associated Deaths

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- In the 2022-2023 flu season, there were 32 influenza-associated deaths, consistent with pre-COVID influenza seasons. In comparison, there were 3 deaths during the 2021-2022 season.

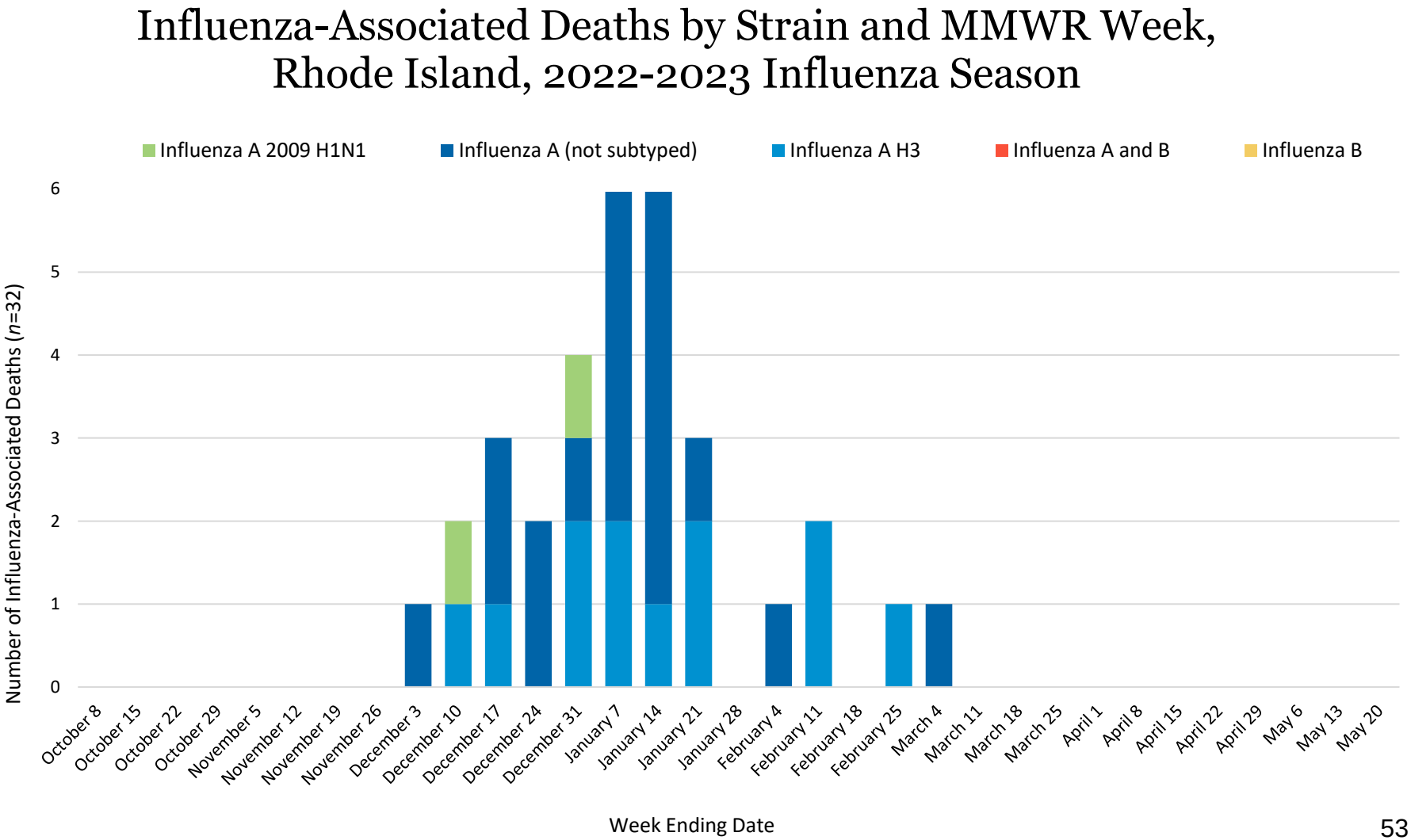
- An influenza-associated death is defined, for surveillance purposes, as the following:
  - a death resulting from a clinically compatible illness that was confirmed to be influenza by an appropriate laboratory or rapid diagnostic test. There should be no period of complete recovery between the illness and death.

- Influenza-associated deaths became reportable by regulation in Rhode Island in 2013.

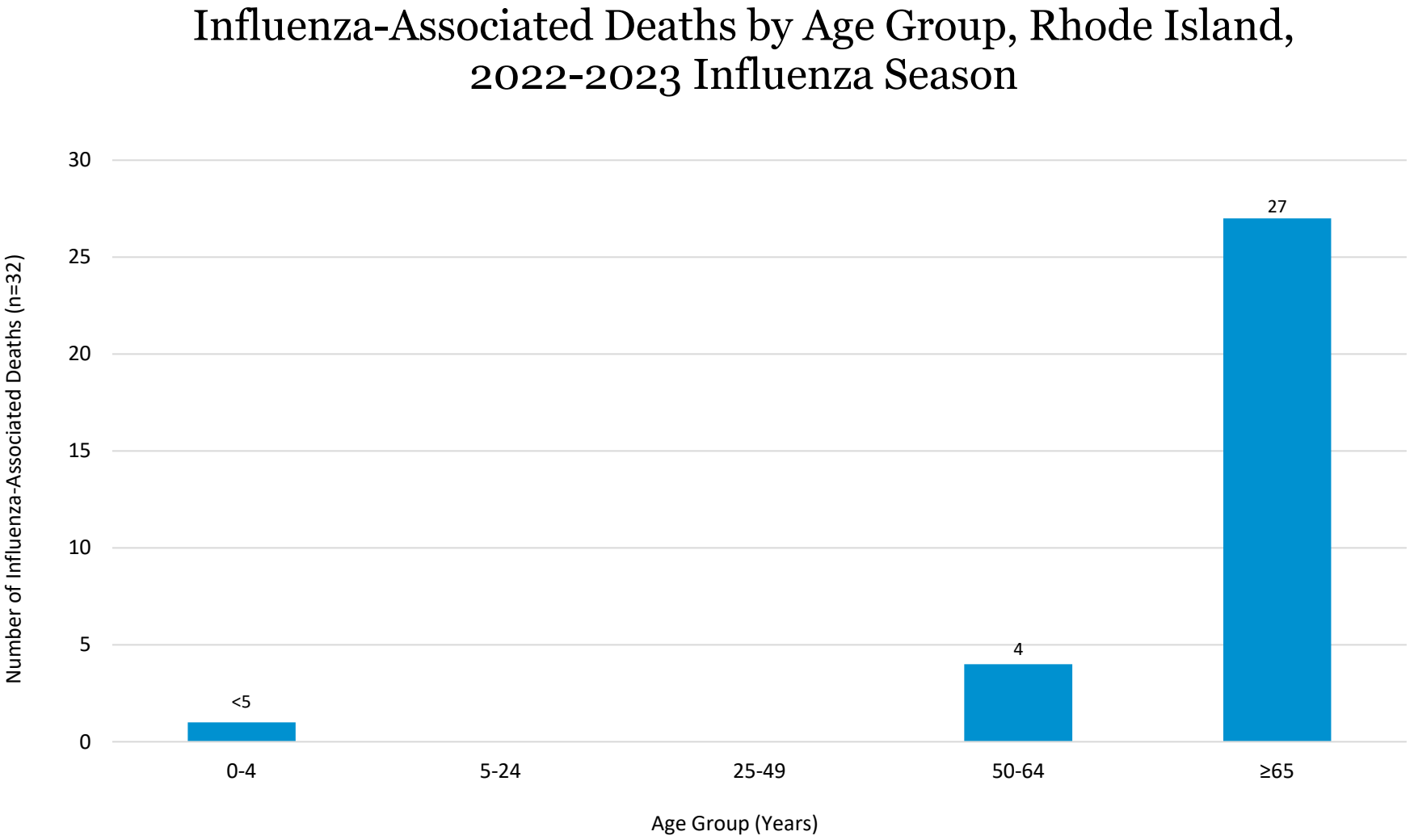
# Influenza-Associated Deaths:
## Data Summary

- Of the 26 individuals with known vaccination status, 19 had received vaccine in the 2022-2023 flu season (73%).
- 84% of deaths occurred in adults 65 years or older.
- 97% of deaths occurred in adults 50 years or older.
- All deaths were associated with influenza A viruses.
- Individuals with underlying conditions are at increased risk of influenza mortality. Of the 30 individuals with a known medical history, common conditions included:
  - Hypertension (63%)
  - COPD (47%)
  - Hyperlipidemia (30%)
  - Cancer (23%)
  - Atrial fibrillation (23%)
  - Diabetes (23%)
  - Alzheimer's/dementia (23%)
  - Coronary artery disease (20%)
  - Congestive heart failure (20%)

# Influenza-Associated Deaths:
## Strain and MMWR Week



# Influenza-Associated Deaths:
## Age Group



# Influenza-Associated Deaths

| Influenza Season | Total Number of Influenza-Associated Deaths* |
|---|---|
| **2022-2023** | **32** |
| 2021-2022 | 3 |
| 2020-2021 | 0 |
| 2019-2020 | 20 |
| 2018-2019 | 39 |
| 2017-2018 | 60 |
| 2016-2017 | 33 |
| 2015-2016 | 14 |

*Defined as a death resulting from a clinically compatible illness that was confirmed to be influenza by an appropriate laboratory or rapid diagnostic test. There should be no period of complete recovery between the illness and death.

# Acknowledgements


- Rhode Island's strong influenza surveillance system depends upon earnest participation by clinicians, laboratorians, administrators and staff at hospitals, long term care facilities, universities, and urgent cares. Thank you for all that you do.

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- Questions can be directed to Abby Berns by emailing abby.berns@health..ri.gov or by calling 401-222-2577

# Methods and References

- Rhode Island real-time influenza data
- Summary of U.S. Influenza Surveillance System
- CDC's weekly FluView
- Overview of available influenza laboratory tests
- CDC preliminary estimates of 2022-2023 seasonal influenza vaccine effectiveness
- RIDOH summaries of the 2018-2019, and 2020-2021 influenza seasons