



Bureau of Infectious Disease Control Infectious Disease Surveillance Section (IDSS)

2019-20 Influenza Season Summary Report for New Hampshire September 29, 2019 – May 16, 2020

In New Hampshire (NH), influenza is not a reportable disease, but surveillance systems are in place to help determine the extent of influenza morbidity and mortality in the State. During each influenza season (beginning of October through mid-May), a weekly influenza surveillance report is posted on the NH Department of Health and Human Services' website at the following link: <http://www.dhhs.nh.gov/dphs/cdcs/influenza/activity.htm>. In addition, a weekly assessment of influenza activity in NH is submitted to the Centers for Disease Control and Prevention (CDC) for inclusion in the weekly U.S. influenza surveillance report.

This report summarizes outpatient illness surveillance data reported by NH participants in the U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet) and by the Automated Hospital Emergency Department Data (AHEDD) system, virologic surveillance data from both the NH Public Health Laboratories (PHL) and participating Hospital Clinical Laboratories, and pneumonia and influenza mortality data from the NH Division of Vital Records Administration.

New Hampshire Surveillance

Outpatient Illness Surveillance

The two components of outpatient illness surveillance in New Hampshire are as follows:

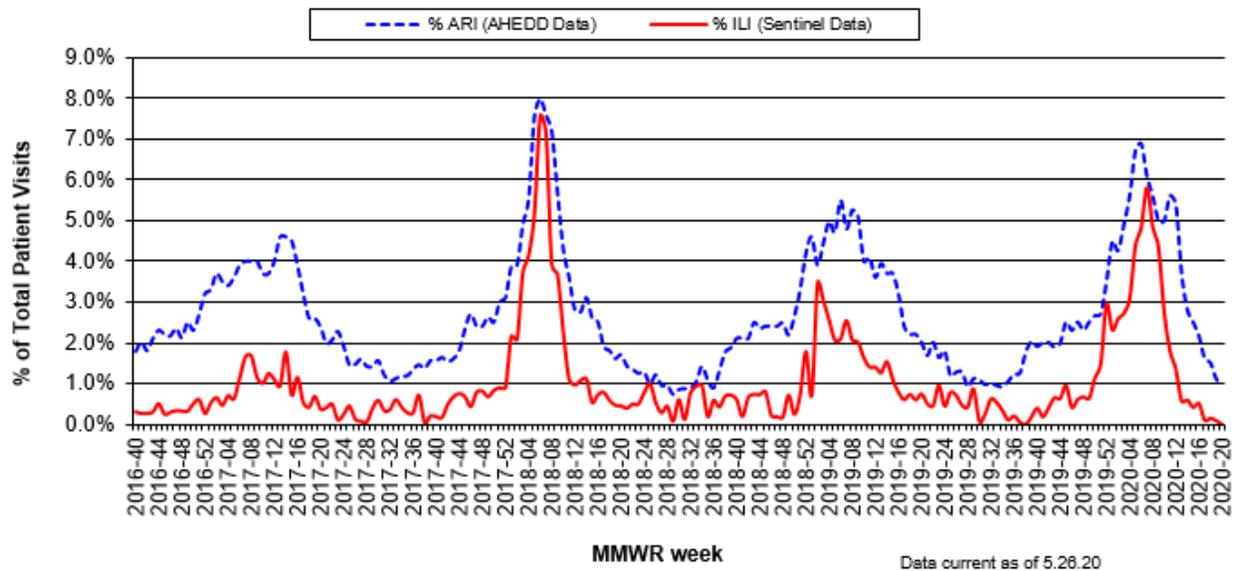
1. **U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet):** Beginning in 1997, NH has participated in this collaborative effort between the Centers for Disease Control and Prevention, state and local health departments, and health care providers. For the 2019-20 influenza season, 17 NH health care providers were enrolled. ILINet sentinel providers reported the proportion of patients who presented with influenza-like illness (ILI) on a weekly basis. ILI is defined as 1) a fever and 2) cough and/or sore throat, in the absence of another known cause. Participating providers were also asked to collect respiratory specimens from select patients and submit them to the PHL for viral subtyping.
2. **The Automated Hospital Emergency Department Data (AHEDD) system:** This system is a collaborative effort between NH acute care hospitals and the NH DHHS. The goal is for all 26 acute care hospitals in the State to participate in this system. For the 2019-20 influenza season, all 26 acute care hospitals electronically transmitted real-time data each week from emergency department encounters throughout the day to NH DHHS hospitals per week. However, data could only be used in a meaningful way for 19 of the reporting hospitals due to key changes in how some hospitals report chief complaint text into AHEDD (i.e., changes in method of reporting resulted in challenges at comparing to historical data for determining if respiratory illness was elevated). Chief complaint text within the system was queried for complaints of acute respiratory illness (ARI) in patients seen in emergency departments. While ARI includes encounters that fit the definition of ILI above, it also includes encounters for complaints such as acute bronchitis or otitis media. Because these two systems collect information using different methods and represent different patient populations, it is expected that the proportions of ILI

and ARI seen in these systems will differ. However, the overall trend of activity is expected to be similar.

For the 2019-20 season, reported ILI activity in NH reached its highest levels during MMWR week 7 (week ending February 15, 2020), when the peak percentage of patient visits to NH ILINet providers with patients presenting with ILI was 5.8%. The highest percentage of patient visits due to ARI reported through the AHEDD system was during week 6 (week ending February 8, 2020) when 6.9% of patient encounters in hospital emergency departments were due to ARI.

Using percent ARI and ILI together as indicators for when flu activity was highest, activity for the 2019-20 season peaked during weeks 6 and 7, when ARI and ILI were at 6.9% and 5.8%, respectively, which for ILI activity is later compared to the time when it peaked during the previous 2018-19 season (i.e., week 2 at 3.2%). ARI activity peaked at the same time as previous 2018-19 season when it peaked during week 6 (at 5.5%). The peak of activity for the 2019-20 season was within the timeframe that has been typically observed during previous seasons. The 2019-20 season was more intense compared to the previous 2018-19 season, as indicated by comparing the peaks for ARI and ILI. However, looking at the previous three seasons the highest levels of ARI and ILI occurred during the 2017-18 season when they peaked at 8.0% and 7.6%, respectively. See Figure 1 below for ILI and ARI reported during the 2019-20 season and the previous three influenza seasons.

Figure 1: Acute Respiratory Illness (ARI) & Influenza-like Illness (ILI) as a Percentage of Total Patient Visits Reported through the Automated Hospital Emergency Department Data (AHEDD) System and by NH ILINet Providers, 10/02/16-5/16/20



Reported Influenza-like Illness (ILI) by Age Group & Practice Type

During the 2019-20 influenza season, persons in the 5-24 year age group accounted for the greatest percentage (57.7%) of patients presenting with ILI reported by NH ILINet providers, followed by the 0-4 year age group (23.5%), then by the 25-49 year age group (10.2%). The next highest percentage ILI by age category was in the 50-64 year age group (6.4%) followed by the 65-plus year age group (2.2%). The percentages of ILI cases by age categories were observed to follow the same order of ranking compared

to the previous 2018-19 season. Reported ILI by age groups for the 2019-20 influenza season is shown in Figure 2 and Table 1 below.

Each year there are typically some changes in NH healthcare providers who participate in the U.S. ILINet program. For the 2019-20 influenza season there were 17 providers enrolled in the ILINet program, which is a slight decrease compared to the previous season which had 18. At least 14 (82%) of the 17 providers reported on a regular basis throughout the season. The majority were family practice offices where patients of all ages are seen. There were more patient visits within the family practice category compared to other practice types, such as pediatrics, however, the percentage of visits that were due to ILI tended to be much lower in patients seen at family practices, which explains the observed higher percentages of ILI for the pediatric age groups in table 1 and Figure 2 below.

Figure 2: Influenza-like Illness (ILI) by Age Group and Practice Type as Reported by NH ILINet Providers, 2019-20 Influenza Season (9/29/19–5/16/20)

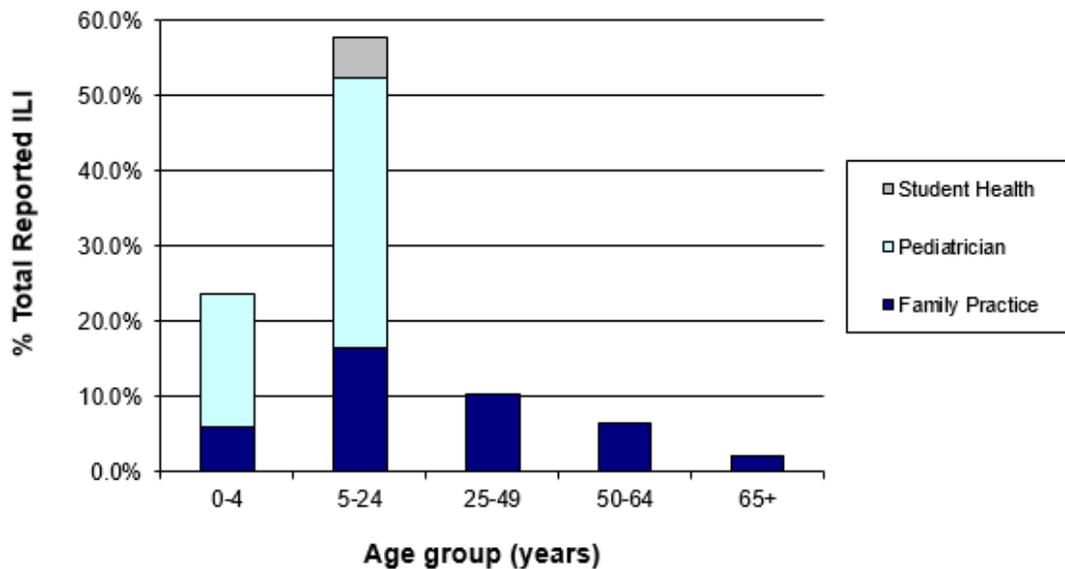


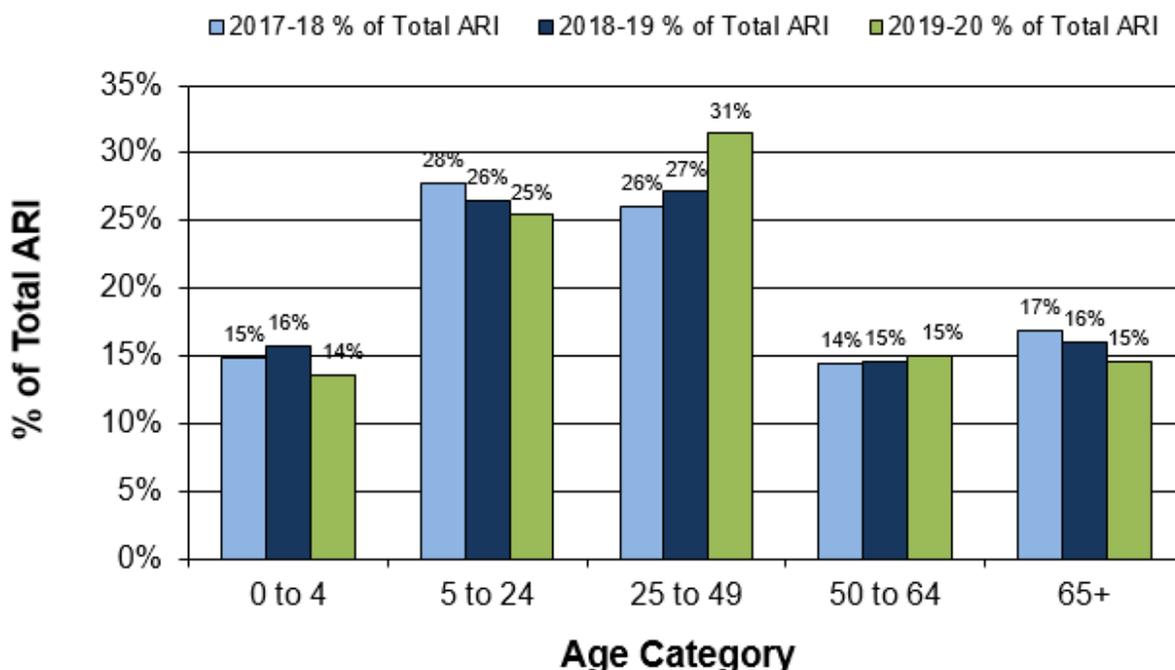
Table 1: Patient Visits for Influenza-like Illness (ILI) by Age Group and Practice Type, NH ILINet Providers, 2019-20 Influenza Season (9/29/19–5/16/20)

Practice type	Age Group (years)					Total ILI	Total Patient Visits
	0-4	5-24	25-49	50-64	65+		
Family Practice	63	174	109	68	23	437	45,218
Pediatrics	188	383	0	0	0	571	11,363
Student Health	0	58	0	0	0	58	1,388
Total	251	615	109	68	23	1066	57,969
% of total ILI	23.5%	57.7%	10.2%	6.4%	2.2%		

Reported Acute Respiratory Illness (ARI) by Age Group

During the 2019-20 influenza season, persons in the 25-49 and 5-24 year age groups accounted for the largest percent of all ARI encounters in hospital emergency departments at 31% and 25%, respectively (see Figure 3 below). Age groups with the next highest percentage of ARI encounters include 50-64 (15%), 65-plus (15%), and 0-4 (14%). As seen in Figure 3, compared to the 2018-19 influenza season the percentage distributions by age category was higher in the 25-49 year age group, the same in the 50-64 year age group, and slightly lower in the 0-4, 5-24, and 65-plus age categories.

Figure 3: Acute Respiratory Illness (ARI) by Age Group as Reported by NH Automated Hospital Emergency Department Data (AHEDD) System, 2019-20 Influenza Season (9/29/19-5/16/20; N = 13,777), 2018-19 Influenza Season (9/30/18 – 5/18/19; N = 15,140), and 2017-18 Influenza Season (10/01/17-5/19/18; N = 14,329 encounters),



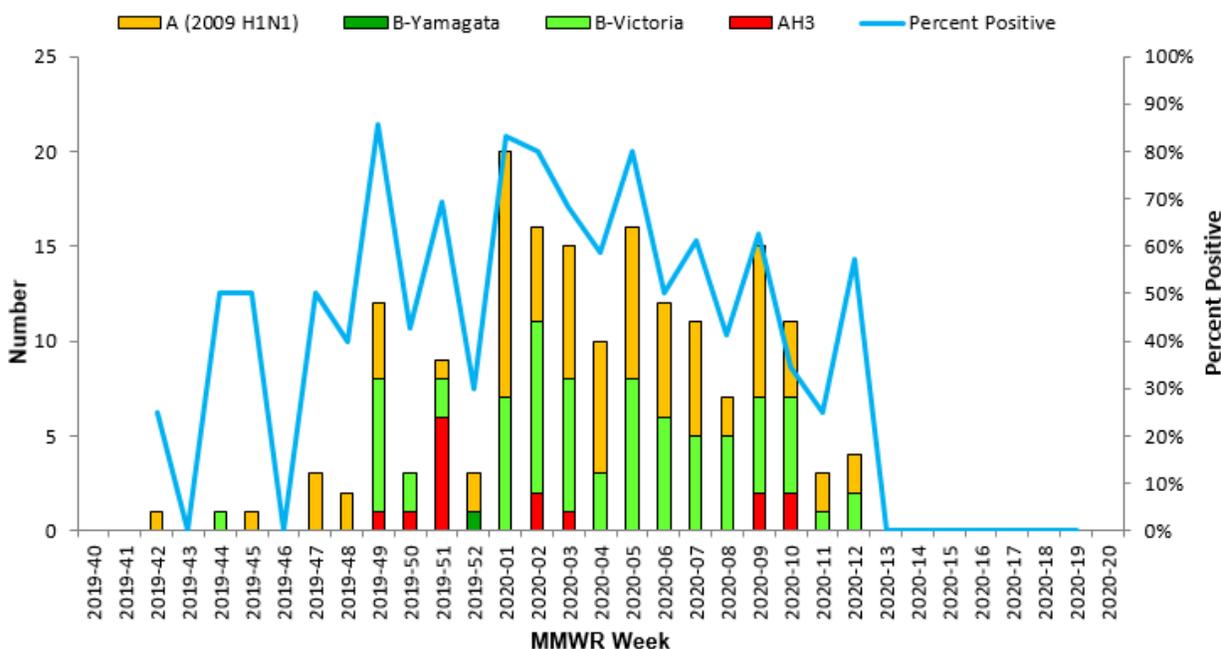
Laboratory Surveillance

The PHL receives respiratory specimens for influenza testing from ILINet providers, other health care providers and hospitals throughout the State, and from respiratory outbreak settings such as in long-term care facilities. Testing is important to identify circulating influenza viral subtypes, and to confirm specimens that test positive by rapid test. Typically, a large majority of specimens submitted to the PHL have previously tested positive by rapid test in health care provider offices or hospital laboratories. Therefore, it is expected that a high percentage of specimens received by the PHL for influenza testing will be positive. This was observed in the previous three influenza seasons (2016-17 through 2018-19) when between 57% - 66% of total submitted specimens, respectively, tested positive. During the 2019-20 season 52% (n=175) of 337 specimens submitted tested positive for influenza.

The number of positive specimens and subtypes reported for each MMWR week of the 2019-20 season is shown in Figure 4. The first positive specimen was detected at the start of the flu season during

MMWR week 42 in mid-October, when a specimen tested positive for influenza A(H1N1) pdm09. Figure 4 depicts the peak for the number of positive specimens (n=20) was during week 1 (ending January 4, 2020). Weeks 2 and 5 (ending January 11, 2020 and February 1, 2020) had the second highest number of positive specimens at n=16 each, which is in line with what is typically seen during other regular flu seasons when the highest number of positives tend to occur in the months of January or February. The peak week for positive specimens (week 1) occurred 5-6 weeks prior to when ILI and ARI activity peaked (during weeks 6 and 7). Although we might normally expect to see such peaks occur closer to the peak week of ILI/ARI, it is noted that both ILI and ARI began to increase significantly in the weeks that followed (i.e., weeks 2 through 6). The reasons for this peak in number of positive specimens not mirroring the peak in respiratory illness is unclear, but for weeks 1 and 2 may be at least partially attributable to children being home for school vacation. One very noticeable difference between this chart of positive results compared to previous seasons is the marked early decline in observed positive results, dropping significantly after MMWR week 10 to less than five positive specimens per week during weeks 11 and 12, and then zero positive specimens per week for the remainder of the season (i.e., weeks 13 – 20). This earlier than usual decrease may likely be attributed at least in part to changes in health care seeking behavior due to COVID-19, including increasing use of telemedicine, recommendations to limit ED visits to severe illnesses, and increased social distancing.

Figure 4: Influenza Virus Isolates, by Viral Subtype, NH Public Health Laboratories, 2019-20 Influenza Season (9/29/19-5/16/20) (N = 337)



The different viral subtypes that circulated in NH during the 2019-20 influenza season are presented in table 2. Positive isolates consisted of 8.6% influenza A (H3), 48.0% influenza A (H1N1)pdm09, 42.9% influenza B/Victoria, and 0.6% B/Yamagata (both B virus lineages combined composed 43.5% of the positive specimens). In comparison during NH's 2018-19 season positive isolates consisted of 25.8% influenza A (H3), 65.2% influenza A (H1N1)pdm09, 2.5% influenza B/Victoria, and 6.2% B/Yamagata (both B virus lineages combined composed 8.7% of the positive specimens). Compared to the previous 2018-19 season a lower percentage of specimens tested positive for influenza A (H3), influenza A

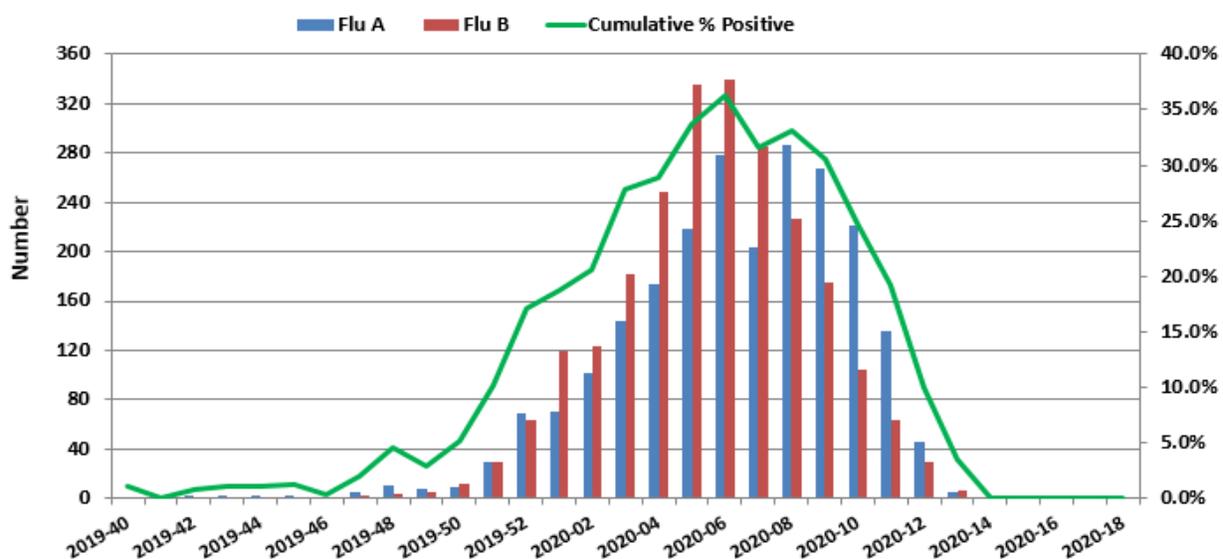
(H1N1)pdm09, and influenza B/Yamagata. The 2019-20 season saw a much higher percentage of influenza B/Victoria compared to the previous season. In stark contrast to many seasons where influenza B tends to circulate more prominently toward the end of the season, influenza B/Victoria began to circulate prominently beginning in week 49 (week ending December 8, 2019) and continued to make up a substantial percentage of the total positive specimens for the remainder of the season. The percentage of total positive specimens comprised of influenza B (43.5%) is above the range of that observed during the previous five influenza seasons (4%-37%).

Table 2: Results of Specimens Received by NH Public Health Laboratories, 2019-20 Influenza Season (9/29/19-5/16/20)

Results	# Specimens	% of total positive
Influenza A (H3)	15	8.6%
2009 influenza A (H1N1)	84	48.0%
Influenza B Victoria	75	42.9%
Influenza B Yamagata	1	0.6%
Negative for influenza	162	
Total	337	

Additional influenza test results are received on a weekly basis from 14 participating hospital clinical laboratories. Supplemental influenza test results reported by participating laboratories are generated by a variety of assays, including real-time polymerase chain reaction (RT-PCR) or rapid influenza diagnostic tests (RIDT). Results reported from clinical laboratories throughout the season allow for determining the weekly percentage of specimens that test positive in our patient population, since these are not pre-screened prior to testing. A summary of weekly results reported for specimens

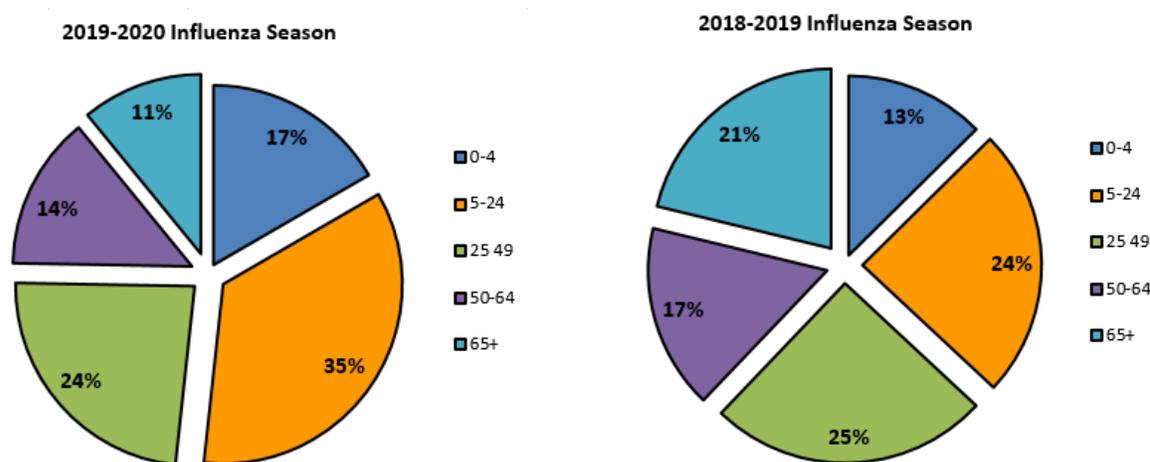
Figure 5: Influenza Positive Tests Reported to NH DHHS by Hospital Clinical Laboratories, 2019-20 Influenza Season (9/29/19-5/16/20) (N = 21,559)



collected throughout the 2019-20 season (a total of 21,559 specimens tested) are summarized in Figure 5, below. The highest percentage (36.2%) specimens tested positive during week 6 (ending February 8, 2020), which is the same week as when ARI peaked. Similar to what was observed with results generated by PHL, there was a steep early decline in the percentage of specimens testing positive, beginning at week 9 (week ending February 29, 2020), and dropping to zero percent by week 14 where it stayed for the remainder of the season.

Figure 6 below further describes PHL influenza test results for NH according to different age groups. Compared to the 2018-19 season a higher percentage of positive specimens were observed in the 2019-20 season for the 5-24 year (35% vs 24%) and 0-4 year age groups (17% vs 13%), while a similar percentage was seen for the 25-49 (24% vs. 25%), and slightly lower percentages were observed for the 50-64 (14% vs 17%) and 65+ (11% vs 21%) year age groups.

Figure 6: Age Distribution of Laboratory Confirmed Influenza, NH Public Health Laboratories, 2019-20 Influenza Season (9/29/19-5/16/20) and 2018-19 Influenza Season (9/30/18-5/18/19)



Regional and National Laboratory Surveillance

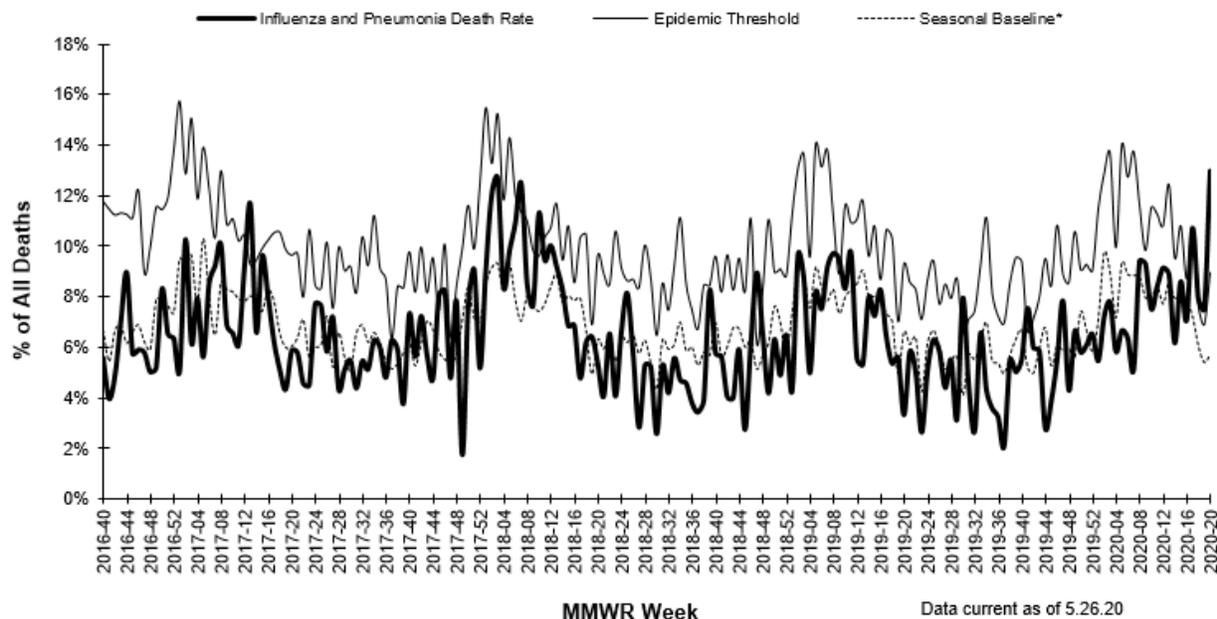
Influenza test results reported by CDC for the New England region as a whole indicated the following percentages of each subtype (denominator equals specimens with known subtypes): 9.2% influenza A (H3), 52.4% influenza A (H1N1)pdm09, 37.3% influenza B/Victoria, and 1.0% influenza B/Yamagata. Compared to regional New England data NH had a similar percentage of total positive for influenza A (H3) (8.6% vs 9.2%) and influenza B/Yamagata (0.6% vs 1.0%), a slightly lower percentage positive for influenza A (H1N1)pdm09 (48.0% vs 52.4%), and a higher percentage positive for influenza B/Victoria (42.9% vs 37.3%). Subtypeable flu results breakdown for the New England Region were slightly different when compared to the national test results, with a higher percentage positive for influenza A (H3) (9.2% vs. 4.6%), a lower percentage positive for influenza A (H1N1)pdm09 (52.4% vs 58.4%), and a similar percentage positive for influenza B/Victoria (37.3% vs. 36.4%) and B/Yamagata (1.0% vs. 0.6%).

Pneumonia and Influenza (P&I) Mortality

Pneumonia and Influenza (P&I) deaths in New Hampshire are identified through review of electronically filed death certificates by looking at the causes of death listed on each death certificate. The following graph, which shows the proportion of deaths attributed to P&I, represents all deaths recorded by NH's

Division of Vital Records Administration. This includes resident and non-resident deaths that occurred within the State, and may not include deaths of NH residents that occurred out-of-state, or cases being investigated by the Medical Examiner's Office.

Figure 7: Pneumonia and Influenza Mortality, New Hampshire, MMWR Week 40 2016 to MMWR Week 20 2020 (10/02/16-5/16/20)



*Seasonal baseline is calculated using the previous 5 years of data. If the proportion of P&I deaths for a given week exceeds the baseline value for that week by a statistically significant amount (1.645 standard deviations), then P&I deaths are said to be above the epidemic threshold, and the proportion of deaths above threshold are considered attributable to influenza.

During the 2019-20 influenza season, the percent of all deaths recorded in NH that were reported as due to P&I remained below the weekly epidemic threshold, except for five different weeks, including MMWR weeks 41 of 2019, and MMWR weeks 17-20 of 2020, when respective thresholds were exceeded (see Table 3 below). The elevated P&I related deaths during weeks 17-20 (April 26 – May 16, 2020) coincided

Table 3. Percent of Total Reported Deaths in NH Attributed to Pneumonia and Influenza (P&I) Above the Epidemic Threshold by MMWR Week, 2019-20 Influenza Season (9/29/19-5/16/20)

MMWR Week	Dates	P&I Deaths (% of Total Deaths)	Weekly Epidemic Threshold
2019-41	10/06/19 - 10/12/20	7.6%	6.7%
2020-17	4/19/20-4/25/20	10.7%	10.6%
2020-18	4/26/20-5/02/20	7.9%	7.6%
2020-19	5/03/20-5/09/20	7.5%	6.9%
2020-20	5/10/20-5/16/20	13.0%	9.0%

closely with the timeframe when deaths identified due to COVID-19 plateaued as observed in the NH COVID-19 [Trends Dashboard](#), supporting that elevated P&I deaths during these weeks were likely to be attributable to COVID-19.

Based on electronic surveillance of death certificates a total of 33 influenza-associated NH deaths (deaths where influenza is specifically listed as a cause or contributing cause of death on the death certificate) were observed during the 2019-20 influenza season, which is within the range of similar type deaths observed during the previous five influenza seasons. All 33 influenza-associated deaths were in adults (i.e., no pediatric influenza-related deaths identified during the 2019-20 season). These influenza-related deaths were identified in eight of the ten counties (all except for Belknap and Grafton counties).

Influenza Activity in New Hampshire as Assessed by the State Epidemiologist

Influenza activity levels in NH are reported each week to CDC to be included in the national weekly influenza surveillance report. Such activity levels help to describe the degree of geographic distribution of influenza activity. CDC defines influenza activity levels as follows:

- **No Activity:** Low ILI activity and no laboratory-confirmed cases of influenza.
- **Sporadic:** Low ILI activity and isolated laboratory-confirmed influenza cases or a single influenza outbreak has been reported.
- **Local:** Increased ILI activity or influenza outbreaks in a single region of the state, and recent laboratory-confirmed influenza in that region.
- **Regional:** Increased ILI activity or influenza outbreaks in ≥ 2 , but less than half of state regions, and recent laboratory-confirmed influenza in affected regions.
- **Widespread:** Increased ILI activity or influenza outbreaks in at least half of state regions, and recent laboratory-confirmed influenza in the state.

In NH, the reported influenza activity level is based on ILI and ARI reported by the Sentinel Providers and the AHEDD surveillance systems respectively, reports of laboratory confirmed influenza, and reported outbreaks in facilities.

In the 2019-20 season, geographic distribution of influenza activity was at a level of either no activity, sporadic, or local activity for weeks 40-49, with the first sign of clearly increased activity observed at week 50 (week ending December 14, 2020), when it reached regional activity. Starting week 50 of 2019, activity remained at either regional or widespread for a span of 18 weeks, lasting through week 15 of 2020 (week ending April 11, 2020). Activity declined to local activity for week 16, before dropping to no activity for the remainder of the season. The decline to a level of no activity occurred much earlier than what has typically been seen in previous seasons, which commonly have either sporadic or local activity extending into the month of May.

National Surveillance

The 2019-20 influenza season was characterized as moderate to low severity overall (i.e., all ages combined), however, it posed a much greater severity to children. Children 0-4 years of age were observed to have very high hospitalization rates. For example, according to data displayed in [CDC FluView Interactive website](#), by MMWR Week 17 the hospitalization rate for children 0-4 years of age

was 93.8 per 100,000 which is the highest reported rate for this age group when compared to the previous 10 influenza seasons.

During the 2019-20 season, looking at results of all specimens tested at clinical laboratories and reported to CDC, there was a higher percentage of influenza A viruses nationally (54%) compared to influenza B viruses (46%). Looking at results for specimens that were subtyped at Public Health Laboratories, there was a higher percentage of influenza A (H1N1)pdm09 (92.8%) compared to influenza A (H3) (7.2%). Of the influenza B viruses for which lineage were determined, B/Victoria lineage (98.4%) predominated over B/Yamagata lineage (1.6%). Compared to the previous 2018-19 season, there was much less influenza A (54% vs 95%) and more influenza B (46% vs 5%) that circulated. Also compared to the previous season a much higher percentage of influenza A was composed of A(H1N1)pdm09 (93% vs 56%) and a much lower percentage of A(H3) (7% vs 44%). Looking at influenza B a higher percentage was composed of B/Victoria (98% vs 65%) and a lower percentage was composed of B/Yamagata (2% vs 35%).

Nationally, the 2019-20 influenza season saw influenza B/Victoria viruses initially predominate through December of 2019, followed by predominance of influenza A (H1N1)pdm09 for the remainder of the season. The number of specimens that tested positive for influenza decreased earlier in the season than what has typically been observed in previous seasons, such that only a small number of positive specimens were reported by Public Health Laboratories starting MMWR week 15 onward. This early decrease in number of positive specimens may likely be attributed at least in part to changes in health care seeking behavior due to COVID-19, including increasing use of telemedicine, recommendations to limit ED visits to severe illnesses, and increased social distancing.

Based on the percentage of specimens testing positive by clinical laboratories for influenza the national peak of influenza activity occurred during week 5 (week ending February 1, 2020), when 30.1% of specimens tested positive. Region 1 (comprised of the six New England states) also peaked during week 5, when 38.4% of specimens tested positive.

Antigenic Characterization

Antigenic characterization results, shown below, indicate if the circulating strains are the same as the strains that were used to make the vaccine. However, these results do not reflect how effective the vaccine is at creating an immune response.

Federal CDC has antigenically characterized and reported results for 547 influenza viruses for the 2019-2020 influenza season, including 212 A(H1N1)pdm09 viruses, 86 A(H3N2) viruses, 201 B/Victoria lineage viruses, and 48 B/Yamagata lineage viruses. CDC stopped reporting results for antigenic characterization after week 14, however, results reported up to that point were as follows.

- 83% of influenza A(H1N1)pdm09 viruses match the vaccine strain (A/Brisbane/02/2018- like).
- 47% of the influenza A(H3N2) viruses match the vaccine strain (A/Kansas/14/2017-like).
- 60% of influenza B/Victoria lineage viruses match the vaccine strain (B/Colorado/06/2017-like).
- 100% of influenza B/Yamagata lineage viruses match the vaccine strain (B/Phuket/3073/2013-like).

With the exception of influenza A/H3N2 and influenza B/Victoria, which were a relatively poor match to their corresponding vaccine reference viruses, the other viruses characterized during the season were

antigenically similar to the reference virus components of the 2019-20 Northern Hemisphere influenza vaccine.

Influenza Mortality

During the 2019-20 season, based on data from CDC's National Center for Health Statistics Mortality Reporting System, the proportion of deaths attributed to P&I was at or above the epidemic threshold for 20 consecutive weeks, spanning from week 1 through week 20. The percentage of deaths attributable to P&I peaked at 15.8% during week 15 (week ending April 11, 2020), when it far exceeded the threshold of 7%. It is likely that this extremely high observed P&I was largely attributable to circulation of the COVID-19.

Regarding pediatric influenza associated mortality, at the time of this report's completion, there were 188 pediatric influenza-related deaths reported nationally, matching the highest recorded number for pediatric flu deaths during a regular flu season (same number of such deaths were reported during 2017-18 season). Of the 188 pediatric deaths, 43% (81) were in children <5 years old and 57% (107) were in children 5-17 years old. Nearly two-thirds of the deaths were attributed to influenza B infections. This tragic milestone underscores how serious flu can be and serves as a reminder of the importance of an annual flu vaccine. In 2019-2020, only 21 percent of these children who were eligible for vaccination and who died due to influenza were fully vaccinated against flu.

Influenza-like Illness Outpatient Visits

Based on national data reported to CDC via ILINet, for the 2019-20 influenza season, influenza activity as measured by percentage of outpatient visits for ILI peaked nationally during week 52 (week ending December 28, 2019) at 7.1%. Interestingly there were two smaller peaks that occurred later in the season, the first which occurred during weeks 4 -5 (at 6.7 – 6.6%) and the second during week 12 (at 6.4%). Systems monitoring ILI were likely influenced by more recent changes in health care seeking behavior due to the COVI-19 pandemic, including increasing use of telemedicine, recommendations to limit emergency department (ED) visits to severe illnesses, and increased social distancing.

General information about seasonal influenza, novel influenza, influenza surveillance, and influenza prevention can be found at <http://www.cdc.gov/flu/>.

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All data in this report are based upon information provided to the New Hampshire Department of Health and Human Services under specific legislative authority. The numbers reported may represent an underestimate of the true absolute number and incidence rate of cases in the state. The unauthorized disclosure of any confidential medical or scientific data is a misdemeanor under New Hampshire law. The department is not responsible for any duplication or misrepresentation of surveillance data released in accordance with this guideline.