INFLUENZA IN MARYLAND 2018–2019 SEASON REPORT

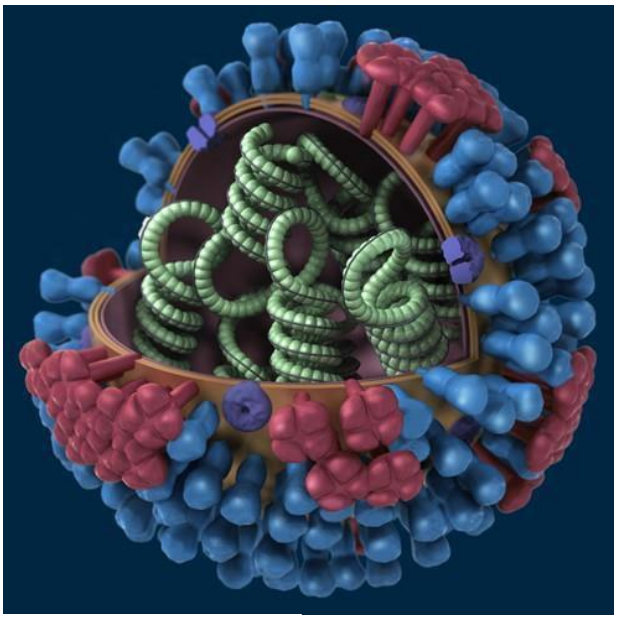

Image source: www.cdc.gov

September 2018–May 2019

Influenza in Maryland 2018-2019 Season Report

SEPTEMBER 30, 2018 TO MAY 18, 2019

INFLUENZA SURVEILLANCE

Surveillance is the systematic collection and analysis of data, and the distribution of the information derived from that data to support public health action and decision making. Maryland uses several different systems to collect influenza data.

Syndromic Surveillance

Syndromic surveillance refers to the process of looking for cases based on clinical syndromes (combinations of signs and symptoms), rather than laboratory diagnoses. Influenza-like illness (ILI) is the syndrome used during the influenza season as a surrogate indicator for influenza in the absence of laboratory testing. The definition of ILI varies by surveillance system (see subsections below for individual definitions), but generally consists of fever combined with either cough or sore throat. Tracking of ILI, in addition to influenza cases confirmed by laboratory tests, provides access to broader information about the impact of influenza on the community. Two of these syndromic surveillance systems the U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet) and the Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE), monitor visits to outpatient providers. The other system, the Maryland Resident Influenza Tracking Survey (MRITS), does not rely on healthcare visits and, therefore, can provide information on people who had not sought healthcare for their current illness.

ILINet

ILINet is a network of healthcare providers ("sentinel providers") who report, on a weekly basis, the total number of patients visiting their practices for influenza-like illness. For this system, ILI is defined as a fever (greater than or equal to 100 degrees Fahrenheit) accompanied by a cough and/or a sore throat. The Centers for Disease Control and Prevention (CDC) manage ILINet in collaboration with the influenza surveillance coordinators in states and territories. In Maryland, a total of 28 sentinel providers participated in ILINet during the 2018–2019 influenza season.

ILINet ILI definition
Fever +
Cough and/or Sore Throat

ESSENCE

The Office of Preparedness and Response (OPR) at the Maryland Department of Health (MDH) uses ESSENCE to track visits to emergency departments for ILI.

ESSENCE ILI definition
Fever +
Cough and/or Sore Throat
OR
Chief Complaint of "Influenza"

For this system, a person with a chief complaint of fever and cough or a sore throat, or complaining of "influenza" is classified as an ILI case. Each week, OPR epidemiologists analyze the data reported from 49 emergency departments and 22 urgent care facilities and share their findings with MDH's influenza surveillance coordinator. Both the ILINet and ESSENCE systems detect only people with ILI who seek and access healthcare.

MRITS

The Maryland Resident Influenza Tracking Survey (MRITS) is an email-based surveillance system where participants who register with the system are asked once a week if they experienced any symptoms of ILI. If they respond in the affirmative, they are then asked if they sought any medical care for their symptoms, if they traveled in the week prior to the onset of their symptoms, and if they missed any regular daily activities as a result of their symptoms. Upon registering, and also at the beginning of each influenza season, participants are asked about their influenza vaccination status and whether or not they work in a healthcare setting.

MRITS captures a subset of the population who might not be interacting with healthcare but are reporting symptoms electronically.

Laboratory Surveillance

There are many different respiratory viruses that commonly circulate around the same time as influenza and cause similar symptoms. Analyzing trends in laboratory testing and test results allows assessment of whether the ILI activity being reported is due to influenza. There are two surveillance systems used to track influenza test results: clinical laboratories and the Maryland Department of Health (MDH) Laboratories Administration.

Clinical Laboratories

During the 2018–2019 influenza season, more than 60 clinical laboratories agreed to report the total number of influenza tests performed each week along with the test results. The most commonly reported tests performed are called rapid influenza diagnostic tests (RIDTs). These tests are fast, easy to perform, and the results are interpreted as "positive" or "negative." In most cases, the rapid test can differentiate between type A and type B influenza. Rapid tests cannot distinguish between different subtypes of influenza (e.g., H1N1 vs. H3N2). The reliability of RIDTs depends largely on the conditions under which they are used. False-positive (and true-negative) results are more likely to occur when the disease prevalence in the community is low, which is generally at the beginning and end of the influenza season and during the summer. While most results reported to MDH were from RIDTs, there are a handful of reporting laboratories that use polymerase chain reaction (PCR) tests, which are typically more reliable than RIDTs.

Maryland State Laboratories Administration

The MDH Laboratories Administration performs complex laboratory tests on respiratory specimens to detect and identify influenza virus. These tests are PCR and viral culture. Both PCR and culture provide the ability to determine the subtype of the influenza virus in the specimen. PCR testing can also provide information about antiviral resistance.

Influenza-Associated Hospitalizations

The Emerging Infections Program (EIP) at MDH conducts active surveillance for laboratory-confirmed, influenza-associated hospitalizations in Maryland. A person with an overnight hospital stay along with a positive influenza test of any kind (e.g., RIDT or PCR) is considered an "influenza-associated hospitalization" for purposes of influenza surveillance. All 49 acute care hospitals participate in weekly reporting of influenza-associated hospitalizations.

Influenza-Associated Pediatric Mortality

Maryland participates in national tracking of deaths of persons under 18 years of age who had a positive influenza test during their course of illness leading to death.

During the 2018–2019 influenza season, four such cases were reported to MDH. Due to confidentiality considerations, details of these cases are not discussed in this report. Please refer to the additional readings section at the end of this report for more information on influenza-associated pediatric deaths in the United States.

Outbreaks of Respiratory Disease in Institutional Settings

In Maryland, disease outbreaks are reportable to the local health departments and to MDH. For influenza surveillance, data collected during the investigation of outbreaks of influenza, ILI, pneumonia, and other respiratory diseases are analyzed. The investigation of outbreaks is done in collaboration with local health departments and staff at the facilities where the outbreaks occur.

Influenza Geographic Spread and Intensity

Every week, the influenza surveillance coordinator consults with the state epidemiologist to determine the extent of geographic spread of influenza in Maryland. This geographic spread is based on a number of variables, including the number of laboratory-confirmed cases, the proportion of visits for ILI to sentinel providers, and the locations of these cases. There are five levels of geographic spread, ranging from "no activity" to "widespread." These levels do not indicate the severity of the influenza season, only where influenza may be active. Current and historical geographic spread data may be accessed at https://gis.cdc.gov/grasp/fluview/FluView8.html.

Since the 2008–2009 influenza season, CDC reports the level of intensity of ILI in each state for every week of the influenza surveillance season. This "ILI Activity Level" has 10 levels from "minimal" to "high." This level is determined by comparing the number of ILI cases reported through ILINet with the season's "baseline" level. Current and historical intensity data can be accessed at http://gis.cdc.gov/grasp/fluview/main.html.

INFLUENZA SURVEILLANCE DATA RESULTS

In the following sections, the data collected during the 2018–2019 influenza season with the systems described above will be displayed. It should be noted that the data are subject to change even after the final drafting of this report, as additional data may be reported.

ILINet

During the 2018–2019 influenza season, a total of 28 sentinel providers participated in ILI surveillance. There are sentinel providers in all regions of the state, including in Baltimore City, and Allegany, Anne Arundel, Baltimore, Calvert, Cecil, Charles, Frederick, Howard, Montgomery, Prince George's, Somerset, Washington, Wicomico, and Worcester counties.

Of the 250,172 total visits to all sentinel providers during the 2018–2019 season, 5,285 (2.1%) were for ILI. Figure 1 shows the largest proportion of the ILI visits were in the 5-24 age group (42%), followed by the 0-4 age group (33%) and the 25-49 age group (13%). The 50-64 and over 65 age groups combined comprised only 12% of all ILI visits to sentinel providers.

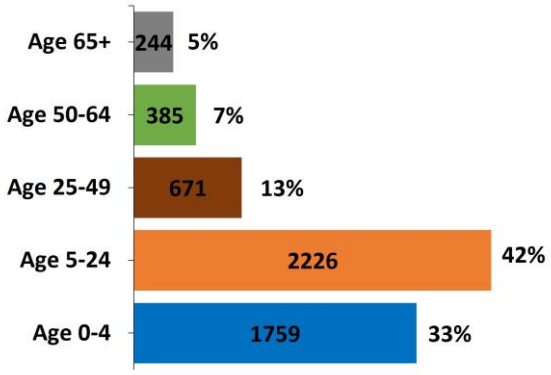

Figure 1. NUMBER AND PERCENTAGE OF ILI VISITS TO SENTINEL PROVIDERS BY AGE GROUP

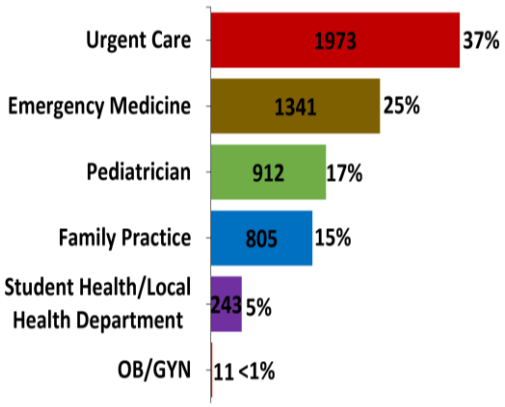

Figure 2. NUMBER AND PERCENTAGE OF ILI VISITS TO SENTINEL PROVIDERS BY PRACTICE TYPE

Of the sentinel facilities that reported, the highest number of ILI visits came from urgent care facilities and emergency departments, as shown in Figure 2.

The baseline proportion of ILI is the average proportion of patient visits for ILI during non-influenza weeks. The baseline is calculated using data from the three prior seasons. For the 2018–2019 influenza season, the baseline proportion of visits for ILI was 2.0% for Maryland (represented by the horizontal dotted line in Figure 3). This is similar to the baseline assigned to Maryland for the 2017–2018 season.

The week ending December 22, 2018 saw the first ILI elevation (2.4%) above baseline, which then rose gradually but with some week-to-week variation, and peaked at 4.4% for the week ending March 16, 2019. ILI remained above baseline levels for a total of 15 weeks (December 22, 2018 through March 30, 2019). The sentinel providers reported being below baseline for the final seven weeks of the surveillance season.

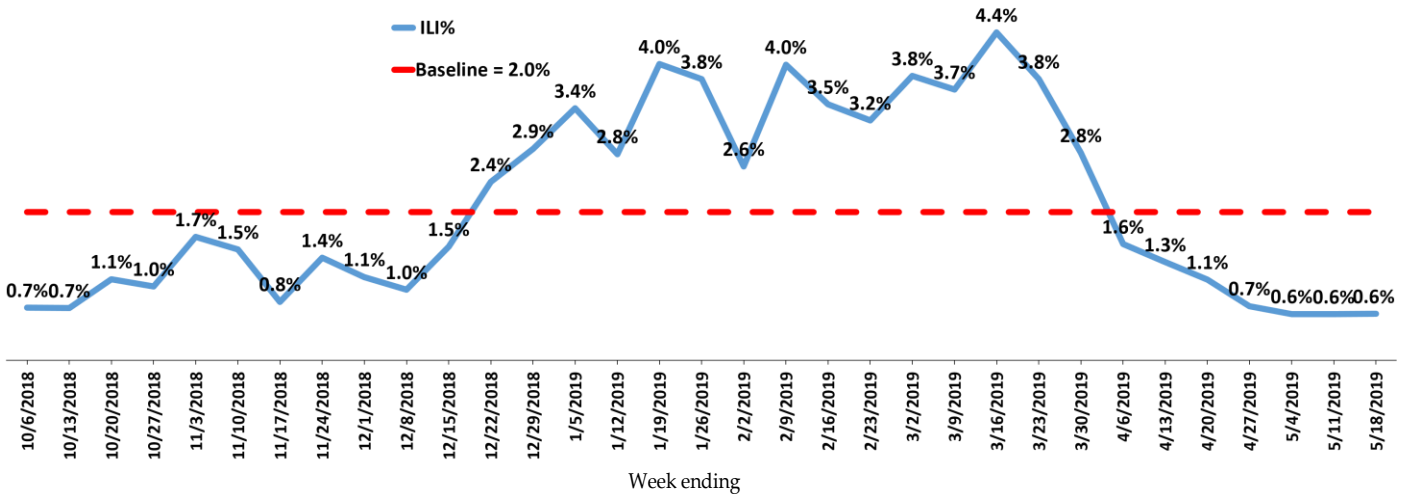

Figure 3. PROPORTION OF VISITS TO SENTINEL PROVIDERS FOR ILI BY WEEK (RED DOTTED LINE INDICATES BASELINE)

ESSENCE ILI Surveillance

There were a total of 1,896,249 visits to emergency departments reported this season through ESSENCE. Of those, 68,120 (3.6%) were visits for ILI. Figure 4 shows that the largest number of ILI visits was by those in the 5-24 age group (31%), followed by the 25-49 (30%) and the 0-4 (19%) age groups.

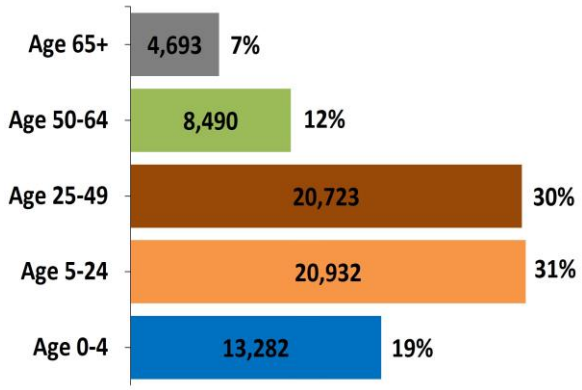

Figure 4. NUMBER OF VISITS TO EMERGENCY DEPARTMENTS FOR ILI BY AGE GROUP

Figure 5 shows the proportion of visits to emergency departments for ILI began rising at the end of December, 2018 and continued until peaking at 6.9% for the week ending February 23, 2019. Following this peak, activity declined, but remained elevated into April. The surveillance season ended with ILI activity at 1.8%.

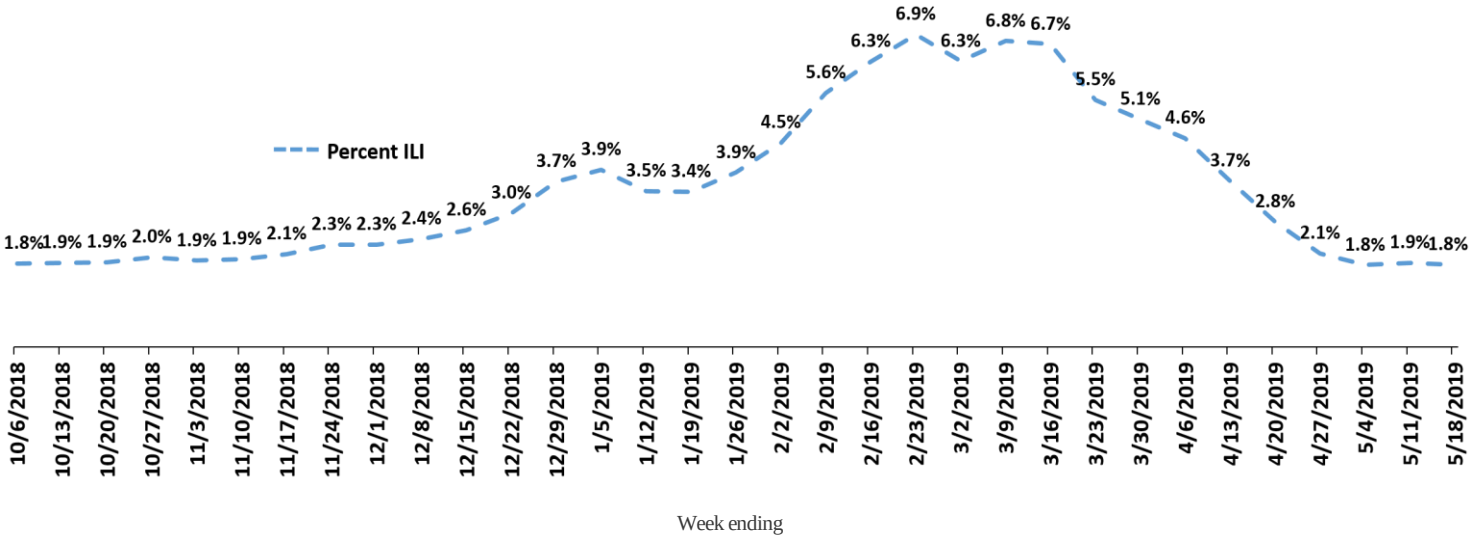

Figure 5. PROPORTION OF VISITS TO EMERGENCY DEPARTMENTS WITH CHIEF COMPLAINT OF ILI BY WEEK

Maryland Resident Influenza Tracking Survey (MRITS)

There were 2,694 participants enrolled in MRITS over the course of the 2018–2019 influenza season, with an average of 559 (20.7%) reporting each week. Over the course of the season, ILI symptoms were reported for 234 (1.3%) of 18,439 surveys MDH received, causing respondents to miss greater than 326 cumulative days of work, school, and/or other regular daily activities. Figure 6 shows ILI activity reported through MRITS was highly variable throughout the season. It peaked the week ending March 9, 2019 when 3.0% of respondents reported ILI symptoms. As with the other two syndromic indicators, ILI activity reported in MRITS was generally greater in February and March.

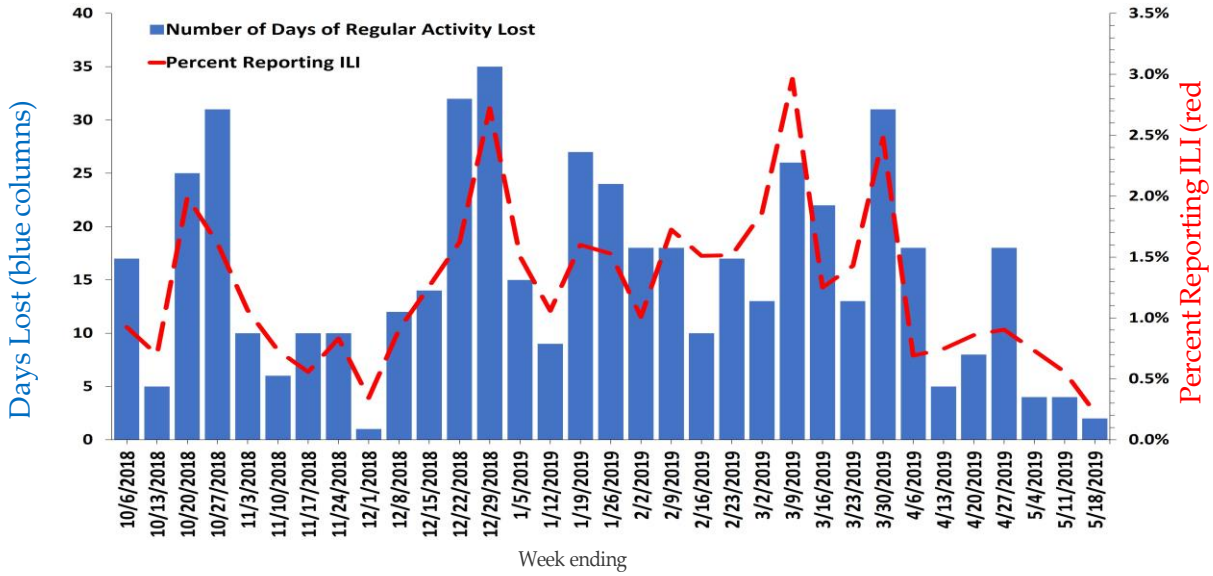

Figure 6. PERCENT OF RESPONDENTS REPORTING ILI & NUMBER OF DAYS OF REGULAR ACTIVITY LOST BY WEEK

Clinical Laboratory Testing

This season, an average of 62 clinical laboratories agreed to report the total number of influenza tests they performed, along with the number of positive tests and the proportion of positives that were type A or type B. The results of 131,505 influenza diagnostic tests were reported during the 2018–2019 influenza season, with 20.1% of specimens testing positive. Of those specimens testing positive, 88% were influenza type A and 12% were type B. Laboratory testing confirmed that true influenza activity peaked through the same period and gradually declined throughout April and May as the season drew to a close (Figure 7). The graph below shows the number of positive influenza tests reported each week.

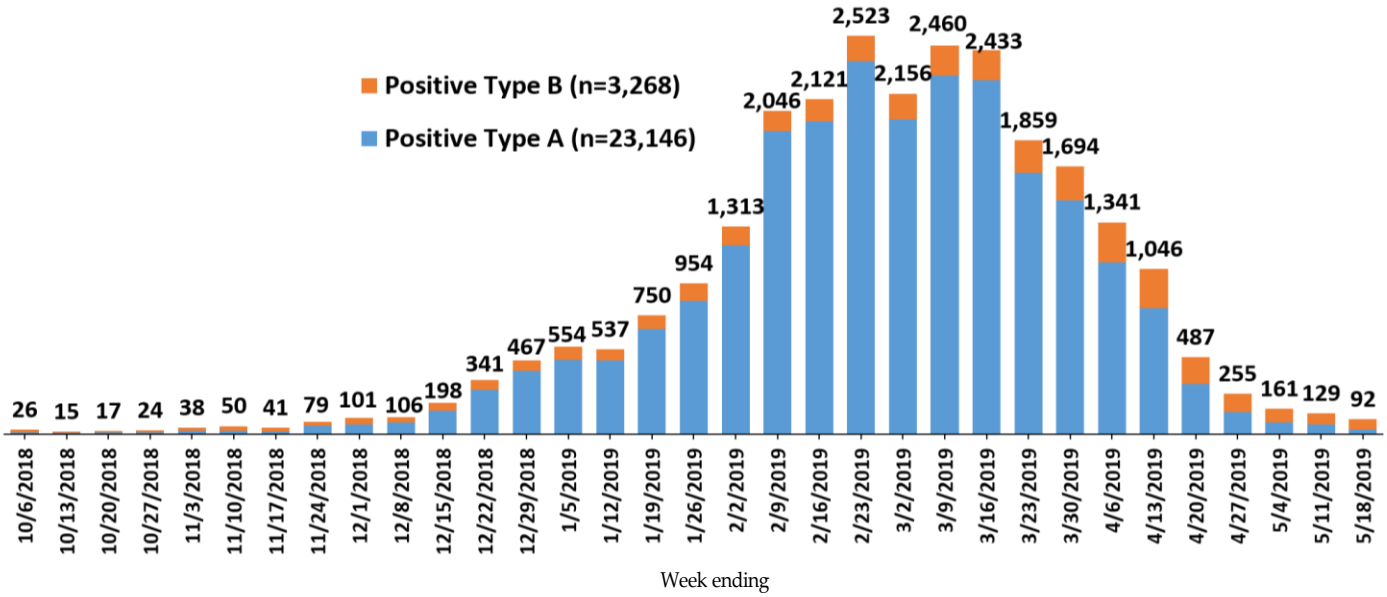

Figure 7. TOTAL NUMBER OF POSITIVE INFLUENZA TESTS REPORTED BY CLINICAL LABS BY WEEK BY TYPE

Figure 8 shows the proportion of influenza tests that were positive reported by clinical laboratories by week. High proportions indicate that a high proportion of ILI activity is due to influenza virus rather than other respiratory pathogens producing similar symptomatology. While there were influenza B cases throughout the season, influenza A was predominant throughout the 2018–2019 influenza season.

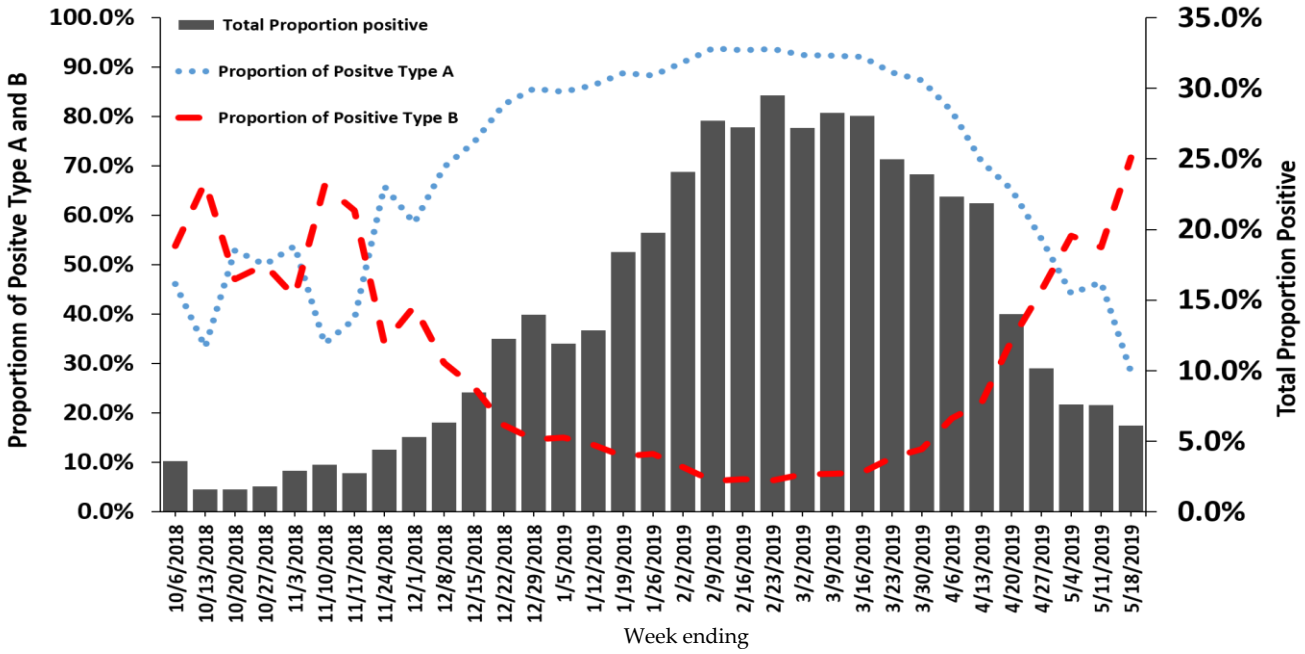

Figure 8. PROPORTION OF POSITIVE INFLUENZA TESTS BY WEEK

Influenza Testing at the Maryland Laboratories Administration

The MDH Laboratories Administration performed a total of 6,363 PCR tests for influenza during the 2018–2019 influenza season. PCR testing is more reliable than rapid influenza diagnostic testing, which is what many clinical laboratories use. Much of the testing at the MDH laboratory is to confirm positive results from other facilities and to test patients in an outbreak setting.

The number of positive specimens reported each week by the MDH laboratory is presented in Figure 9 below. The first two PCR-positive specimens of the surveillance season were collected on September 30, 2018 and October 2, 2018. As with the clinical laboratory testing, MDH laboratory activity was low throughout the first few months of the season but saw substantially higher levels from January through March. The number of specimens testing positive peaked during the week ending March 16, 2019, when 549 specimens tested positive for influenza. Of the 4,136 specimens that tested positive at the MDH laboratory, type A (H1N1) was the predominant strain, accounting for 60% of the positive tests.

Type B influenza accounted for 4% of the positive specimens, with a majority of those being the Victoria lineage. Additionally, there were nine (<1%) specimens that were positive for dual type A (H1/H3). Type A (H3N2), the predominant subtype during the 2017–2018 season, was detected in only 36% of the positive specimens during the 2018–2019 influenza season.

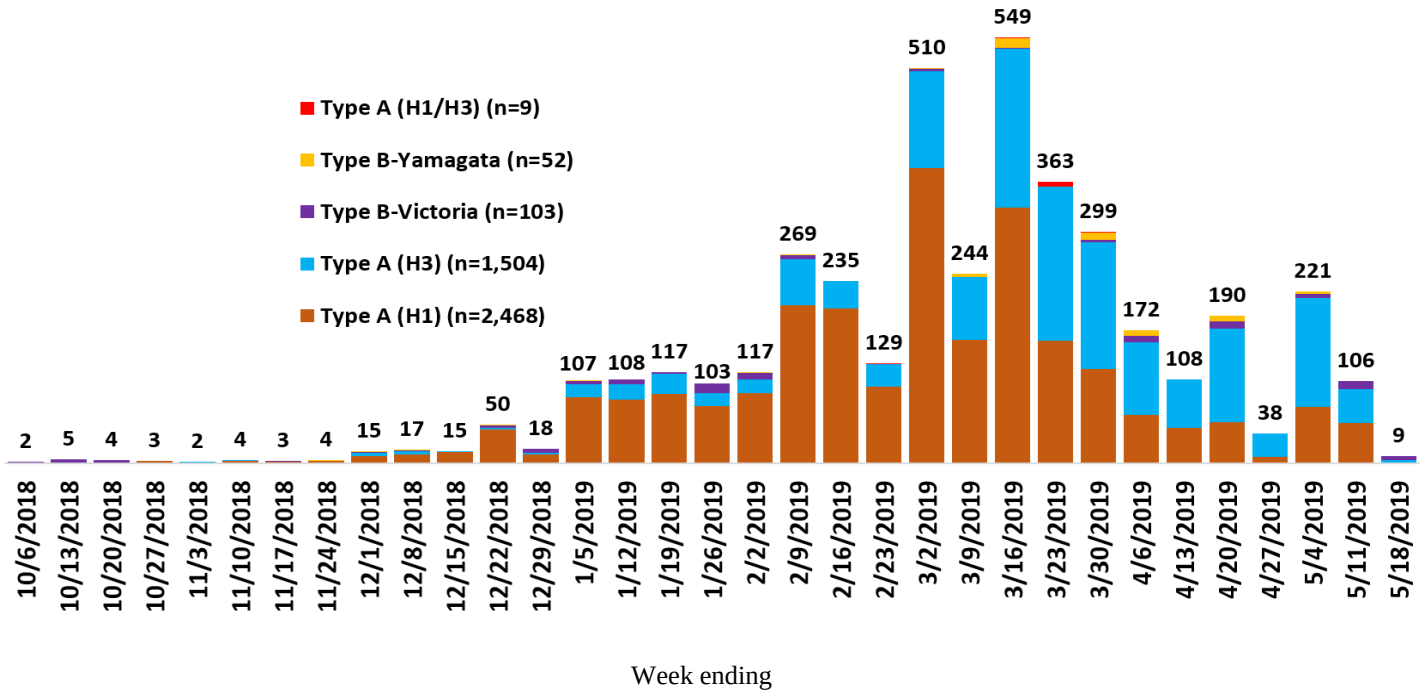

Figure 9. NUMBER OF PCR-POSITIVE TESTS BY INFLUENZA TYPE AND SUBTYPE BY WEEK REPORTED BY THE MDH LABORATORIES ADMINISTRATION

Influenza-Associated Hospitalizations

A total of 3,274 influenza-associated hospitalizations were reported to MDH during the season. This number was 32% less than what was reported during the 2017–2018 season (n=4,783), where the predominant strain was the H3N2 subtype. It is also 10% lower than the 2016-2017 season (n=3,631) and 48% higher than the 2015-2016 season (n=1,704).

As seen in Figure 10, the 65 and older age group had the greatest number of hospitalized cases, followed by the 50-64 age group and the 25-49 age group. The three age groups making up the 0-24 range combined to contribute the remaining 14% of hospitalized cases.

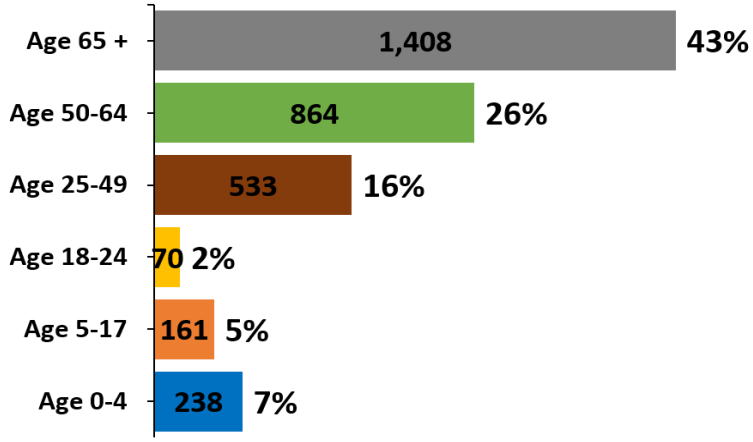

Figure 10. NUMBER AND PERCENT OF INFLUENZA-ASSOCIATED HOSPITALIZATIONS BY AGE GROUP

The number of reported hospitalizations remained relatively low for the first several months of the season, but began rising in late December. Beginning the first week of February, counts increased to 100 or more per week. The peak occurred during the week ending March 16, when 331 influenza-associated hospitalizations were reported. Reported hospitalizations remained elevated but gradually dropped following this peak, and then declined every week until the end of the season. Figure 11 shows the number of hospitalizations reported each week by age group.

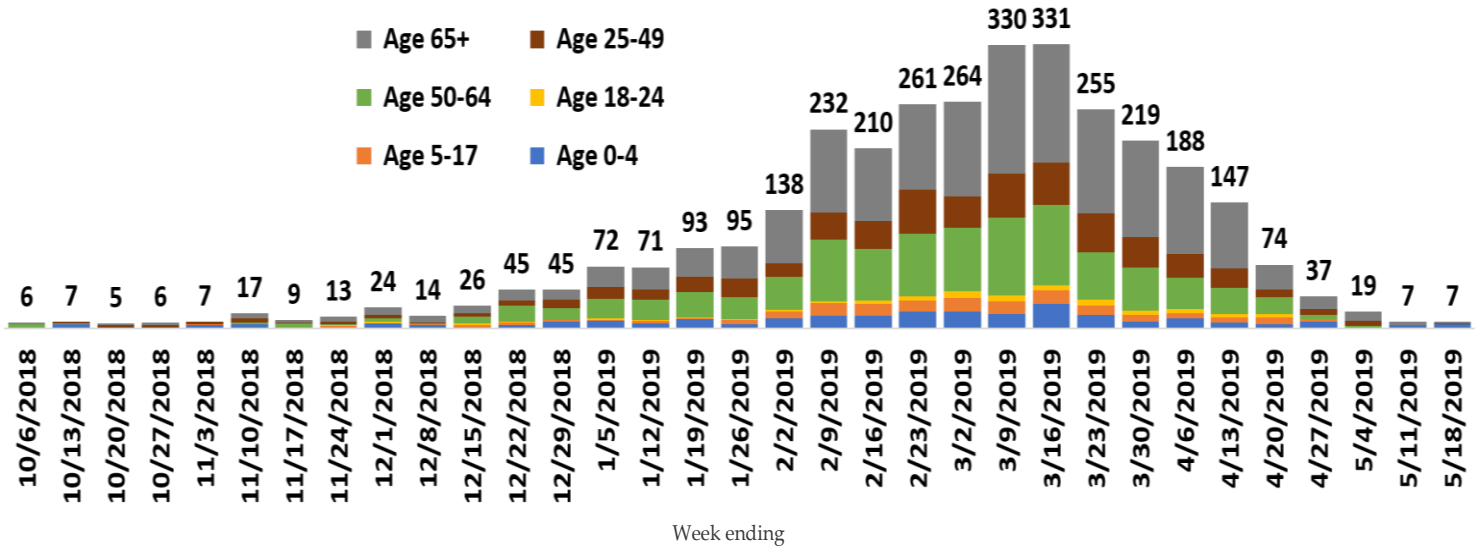

Figure 11. NUMBER OF INFLUENZA-ASSOCIATED HOSPITALIZATIONS BY AGE GROUP AND WEEK REPORTED

Respiratory Outbreaks in Institutional Settings

During the 2018–2019 influenza season, a total of 131 respiratory outbreaks were reported to MDH. Outbreaks of influenza, ILI and pneumonia were most commonly reported in nursing homes (45.8%), followed by elementary and secondary schools and daycare centers (31.3%), assisted living facilities (9.9%) and other institutional settings (7.6%), with hospitals accounting for the remainder (5.3%) of the outbreaks reported this season (Table 1).

Type of Setting	Influenza Outbreaks	Influenza-like Illness Outbreaks	Pneumonia Outbreaks	Total Outbreaks
Assisted Living	10	2	1	13
Hospital	5	2	-	7
Nursing Home	42	8	10	60
Schools/Daycares	27	11	3	41
Other	10	-	-	10
Total Outbreaks	94	23	14	131

Table 1. NUMBER OF REPORTED OUTBREAKS OF RESPIRATORY ILLNESS BY TYPE OF SETTING AND TYPE OF OUTBREAK

There were a total of 131 respiratory outbreaks reported in the 2018–2019 influenza season, compared to 192 during the 2017–2018 season, and 151 in the 2016–2017 season. In the 2018–2019 influenza season there were only 2 weeks with ten or more respiratory outbreaks, compared to 7 weeks in the 2017–2018 season where the season peaked at 25 respiratory outbreaks (Figure 12). The largest number of outbreaks reported in any single week was 16, which occurred only once during the week ending March 2, 2019.

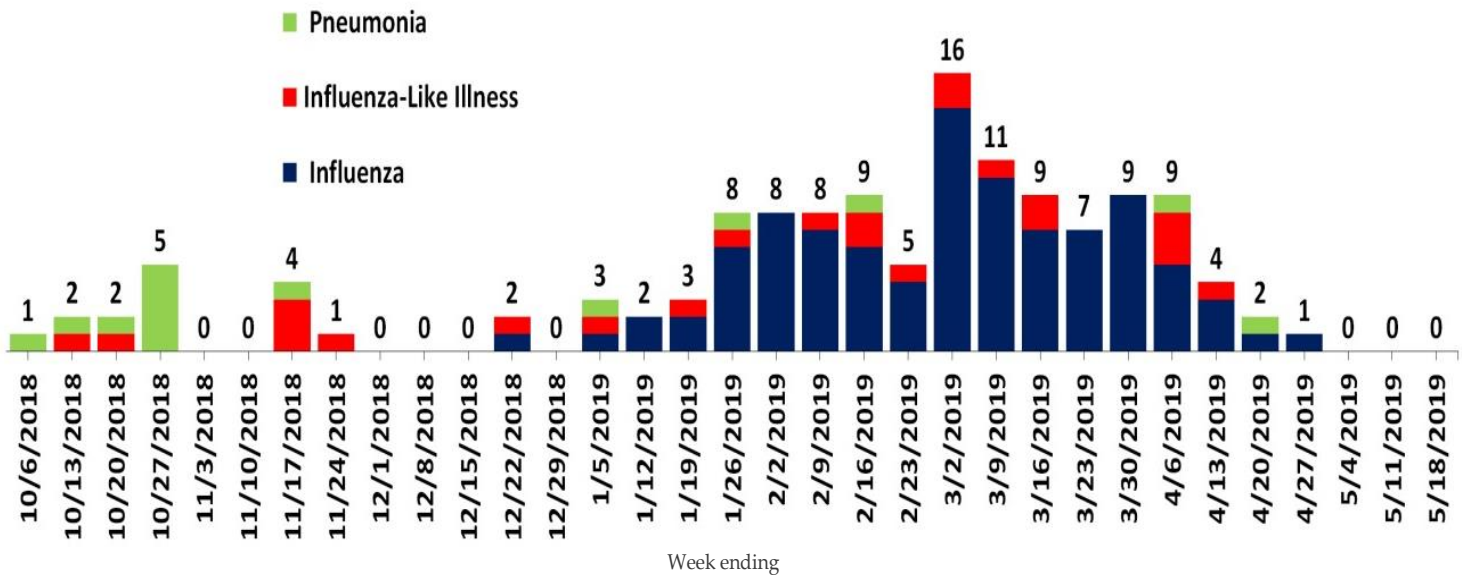

Figure 12. NUMBER OF RESPIRATORY OUTBREAKS BY TYPE AND WEEK

Geographic Spread and Intensity

The geographic spread and ILI intensity levels for the 2018–2019 influenza season can be seen in figure 13 below.

Geographic activity is determined by assessing ILINet, outbreak and laboratory data by geographic region. It is not a direct measure of the severity of influenza activity, but rather an indication of where the disease is located in Maryland.

The level of geographic spread was at "sporadic", "local" or "regional" for the first fifteen weeks of the season and again the last six weeks. It was sustained at the "widespread" level for twelve weeks during the peak of the season.

The level of ILI intensity was at "minimal" for the first 11 weeks of the season. It was variable between the weeks ending December 29, 2018 to March 2, 2019 at "low", "moderate" or "high", thereafter it was "moderate" for 4 weeks and "minimal" from week ending April 6, 2019 through the remainder of the season.

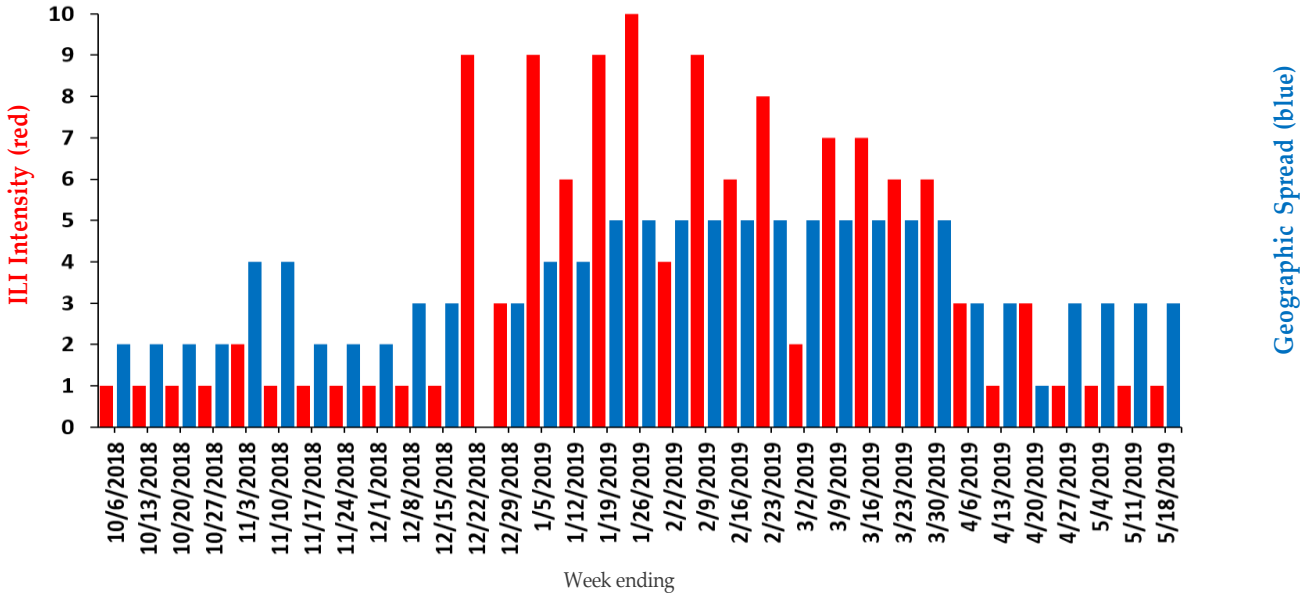

Figure 13. LI INTENSITY AND GEOGRAPHIC SPREAD BY WEEK

To see the United States map of geographic spread of influenza throughout the season, please visit:
https://gis.cdc.gov/grasp/fluview/FluView8.html

To see the United States map of ILI intensity, please visit:
https://gis.cdc.gov/grasp/fluview/main.html

DISCUSSION

Maryland saw a moderately severe 2018–2019 season compared to the previous season. The first influenza viruses detected at the MDH laboratory during this season were an influenza type A (H1N1) virus and type B (Victoria). Influenza type A (H1N1) was the predominant strain during the 2018–19 influenza season, replacing influenza type A (H3N2) which was predominant in the 2017–18 season. Although this was a predominantly type A (H1N1) season, a closer look indicates that Maryland experienced two different waves of influenza A viruses.

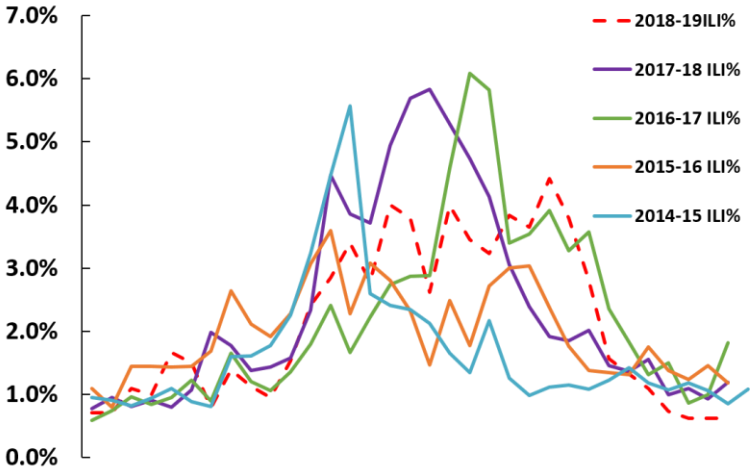

Figure 14. ILINET ACTIVITY FOR THE LAST FIVE SEASONS

The start of the season to week ending March 16th, 2019 was a predominantly type A (H1N1) season. Beginning the week ending March 23, 2019 Maryland became predominantly type A (H3N2), with the exception of the week ending May 11, 2019. Influenza type A (H3N2) tends to be more severe than influenza type A (H1N1) and hence the second wave of predominantly type A (H3N2) facilitated in prolonging higher levels of intensity.

Historically, the dominance of influenza type A and type B over the course of the season occurs in two waves where influenza type A often dominates during the earlier part of the influenza season, and influenza type B dominates later on. The past five influenza seasons beginning 2013–2014 to 2017–2018 type B influenza has predominated the second half of the season between 8 and 12 weeks. But during the 2018–2019 season, there were only 3 weeks of dominantly type B influenza in the later part of the season. This can be attributed to the end of season shift of type A subtypes from type A (H1N1) to type A (H3N2).

Surveillance for influenza and other respiratory infections will continue year-round in Maryland. MDH will continue to work with colleagues to monitor influenza cases, clusters, and outbreaks.

ADDITIONAL READINGS

- "Frequently Asked Flu Questions 2018-2019 Influenza Season" Centers for Disease Control and Prevention, available at: https://www.cdc.gov/flu/season/flu-season-2018-2019.htm
- "Prevention and Control of Seasonal Influenza with Vaccines, 2018-19", Centers for Disease Control and Prevention, available at: https://www.cdc.gov/flu/professionals/acip/index.htm
- "Flu Activity & Surveillance" Centers for Disease Control and Prevention, available at: http://www.cdc.gov/flu/weekly/fluactivitysurv.htm
- "Weekly U.S. Influenza Surveillance Report" Centers for Disease Control and Prevention, available at: http://www.cdc.gov/flu/weekly/
- "Influenza: Preventive Steps" Centers for Disease Control and Prevention, available at: http://www.cdc.gov/flu/consumer/prevention.htm
- "Influenza Information for Specific Groups" Centers for Disease Control and Prevention, available at:http://www.cdc.gov/flu/groups.htm
- "Influenza: Flu News & Spotlights" Centers for Disease Control and Prevention, available at: https://www.cdc.gov/flu/spotlights/index.htm
- Jorquera PA, Mishin VP, Chesnokov A, et al. Insights into the antigenic advancement of influenza A(H3N2) viruses, 2011-2018. *Sci Rep*. 2019;9(1):2676. Published 2019 Feb 25. doi:10.1038/s41598-019-39276-1