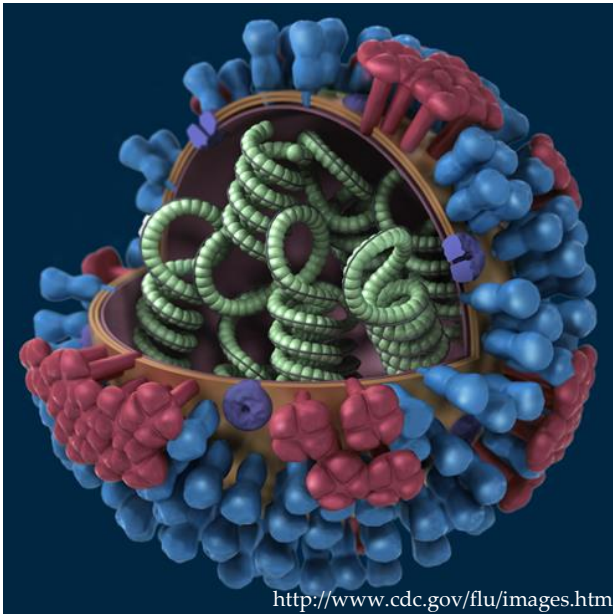


# INFLUENZA IN MARYLAND 2014-2015 SEASON REPORT



September 2014 – May 2015

*This is the final report for the 2014-2015 influenza season, and it contains a summary of the entire season's observations.*

# Influenza in Maryland 2014-2015 Season Report

## SEPTEMBER 28, 2014 TO MAY 23, 2015

### DIFFERENT TYPES OF 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. These systems for the 2014-2015 season are unchanged from the 2013-2014 season. They are described below.

#### Syndromic Surveillance

Syndromic surveillance is surveillance that looks for cases based on clinical syndromes (combinations of signs and symptoms) rather than laboratory diagnoses. Influenza-like illness (ILI) is the syndrome we use as a surrogate indicator for influenza during the influenza season in the absence of laboratory testing. The additional tracking of ILI, rather than only influenza cases confirmed by laboratory tests, gives us access to much more information about the impact of influenza in the community. Two of these four syndromic surveillance systems (ILINet; ESSENCE) monitor visits to outpatient providers. The other two (MRITS; Google Flu Trends) do not rely on healthcare visits and, therefore, can provide information on people who do not seek healthcare.

#### ILINet

The U.S. Outpatient Influenza-like Illness Surveillance Network (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 38 sentinel providers participated in ILINet during the 2014-15 influenza season.

**ILINet ILI = Fever +  
Cough and/or Sore Throat**

#### ESSENCE

The Office of Preparedness and Response (OPR) at DHMH uses the Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE) to keep track of visits to emergency departments for ILI. For this system, the definition of

**ESSENCE ILI = Fever +  
Cough and/or Sore Throat  
OR  
Chief Complaint of “Influenza”**

ILI is similar to the one used in ILINet. A person with a chief complaint of fever along with a cough or a sore throat, or complaining of “influenza” is classified as an ILI case in ESSENCE. Each week, OPR epidemiologists analyze the data reported from 45 emergency departments and share their findings with DHMH’s influenza surveillance coordinator. Both the ILINet and ESSENCE systems will detect only people who are sick enough to seek health care, and have access to it.

### 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

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

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. This information can also be updated as necessary.

### Google Flu Trends

Google Flu Trends analyzes queries made to the Google web search engine to determine if the user making the query is experiencing ILI. This is done through a computerized algorithm that determines if the search terms (e.g., “Flu Symptoms”), the time of

**Data from ILINet from previous influenza seasons was used to calibrate the computer algorithm used in Google Flu Trends.**

the search (e.g., February vs. August) and the location of the search (e.g., an area known to have elevated influenza activity) indicate that the user has ILI. The system is hosted by Google and the data were freely available for download throughout the 2014-2015 influenza season. In the summer of 2015, Google Flu Trends stopped publishing current estimates. However, historical estimates are still publicly available at <http://google.org/flutrends>.

## Laboratory Surveillance

There are many different types of laboratory tests available to detect influenza. The most simple and widely available tests 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). This season, 42 clinical laboratories agreed to report the total number of rapid tests performed each week along with the results.

The Maryland DHMH State Laboratories Administration performs complex laboratory tests on respiratory specimens to detect and identify influenza virus. These tests are polymerase chain reaction (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 DHMH 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 46 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, and for whom no other disease or condition can be established.

During the 2014-2015 influenza season, one such case was reported to DHMH. 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 of any kind are reportable. 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 influenza’s geographic spread. 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 <http://www.cdc.gov/flu/weekly/WeeklyFluActivityMap.htm>

Beginning with the 2008-2009 influenza season, CDC has been reporting the level of intensity of influenza-like illness 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>

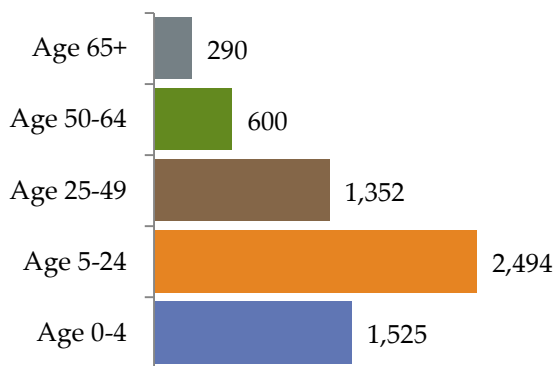
## INFLUENZA SURVEILLANCE DATA RESULTS

In the following sections, the data collected during the 2014-2015 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 more data are reported from the participants in the different systems.

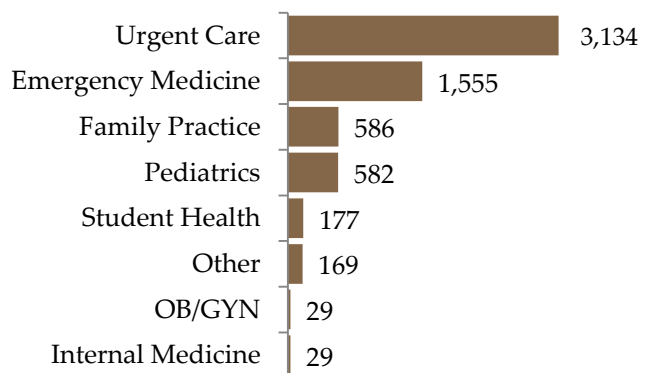
### ILINet

During this season, a total of 38 sentinel providers participated in ILI surveillance. There are sentinel providers in all regions of the state, including in Baltimore City, as well as in Allegany, Anne Arundel, Baltimore, Calvert, Cecil, Charles, Frederick, Howard, Montgomery, Prince George’s, Somerset, Washington, Wicomico, and Worcester counties.

Of the 395,051 total visits to all sentinel providers during the season, 6,261 (1.6%) were for ILI. The largest proportion of the ILI visits were in the 5-24 age group, followed by the 0-4 age group and the 25-49 age group. The 50-64 and over 65 age groups together made up only 14% of all ILI visits to sentinel providers.

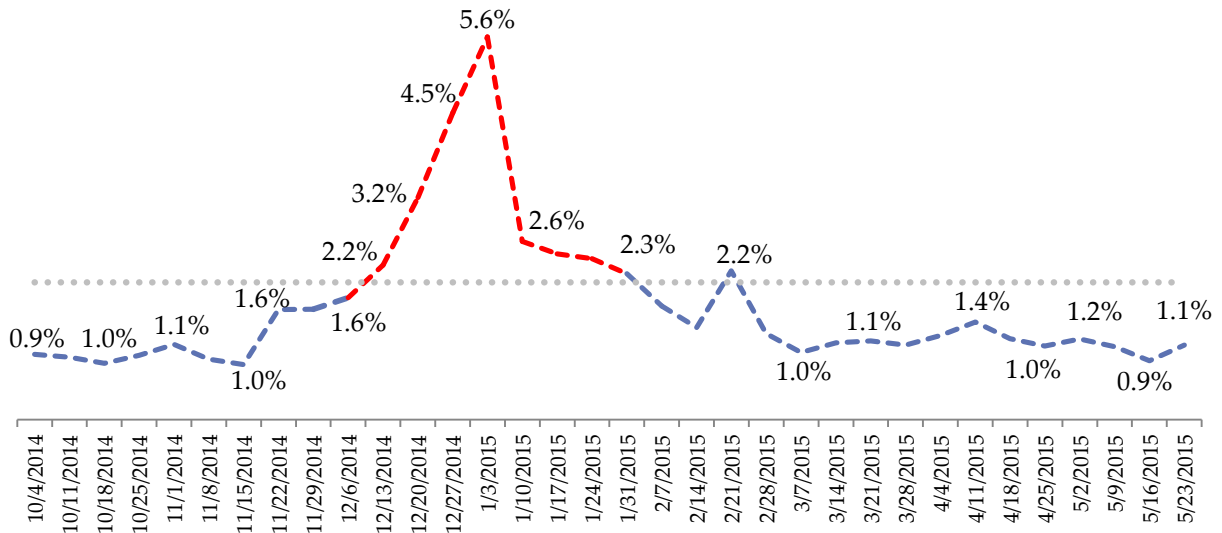


NUMBER OF ILI VISITS TO SENTINEL PROVIDERS BY AGE GROUP



NUMBER OF ILI VISITS TO SENTINEL PROVIDERS BY PRACTICE TYPE

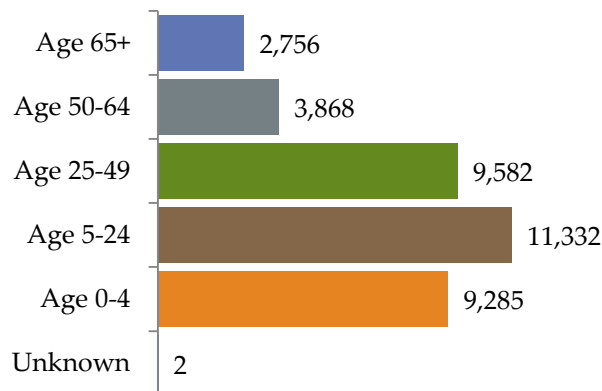
For the 2014-2015 influenza season, the baseline proportion of visits for ILI was 2.0% for Maryland (represented by the horizontal dotted line on the graph below). Broken down by week, we can see that the proportion of visits to sentinel providers for ILI began to rise in mid-November 2014 and the first week that this proportion was above baseline was for the week ending December 13. The proportion of visits for ILI continued to climb through December, and then peaked during the week ending January 3, 2015, at 5.6%.



PROPORTION OF VISITS TO SENTINEL PROVIDERS FOR ILI BY WEEK (RED LINE INDICATES WEEKS ABOVE BASELINE)

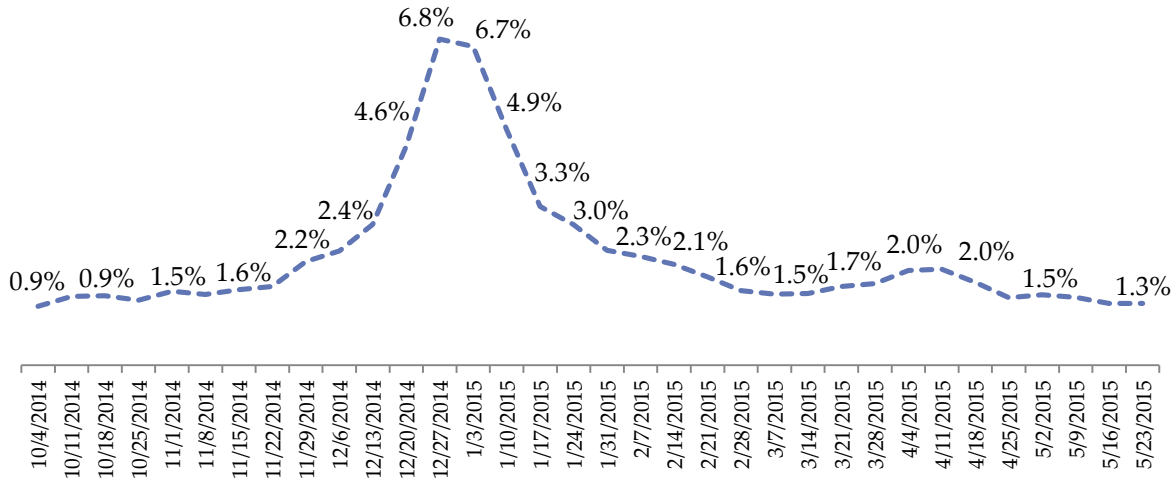
### ESSENCE ILI Surveillance

There were a total of 1,591,834 visits to emergency departments reported this season through ESSENCE. Of those, 36,825 (2.3%) were visits for ILI. The largest number of ILI visits was by people in the 5-24 age group, followed by the 25-49 and the 0-4 age groups.



VISITS TO EMERGENCY DEPARTMENTS FOR ILI BY AGE GROUP

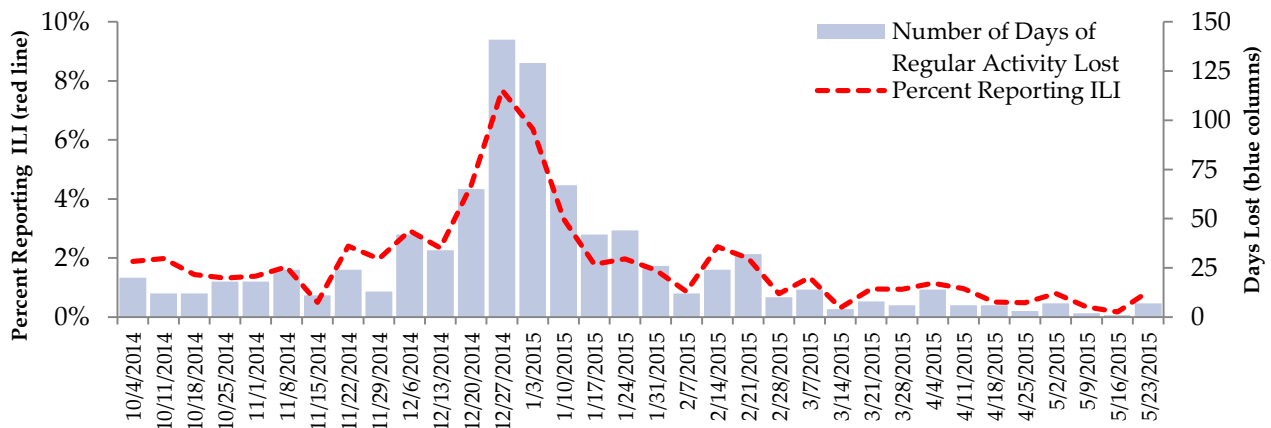
Looking at the data by week (below), the proportion of visits to emergency departments for ILI rose slowly from early October to mid-November 2014. In the week ending November 29, the rate of increase began accelerating, with visits for ILI peaking at 6.8% in the week ending December 27. For ten straight weeks following this peak, the proportion of emergency room visits for ILI continued to drop until late March when activity began to increase again due to influenza type B.



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

### Maryland Resident Influenza Tracking Survey (MRITS)

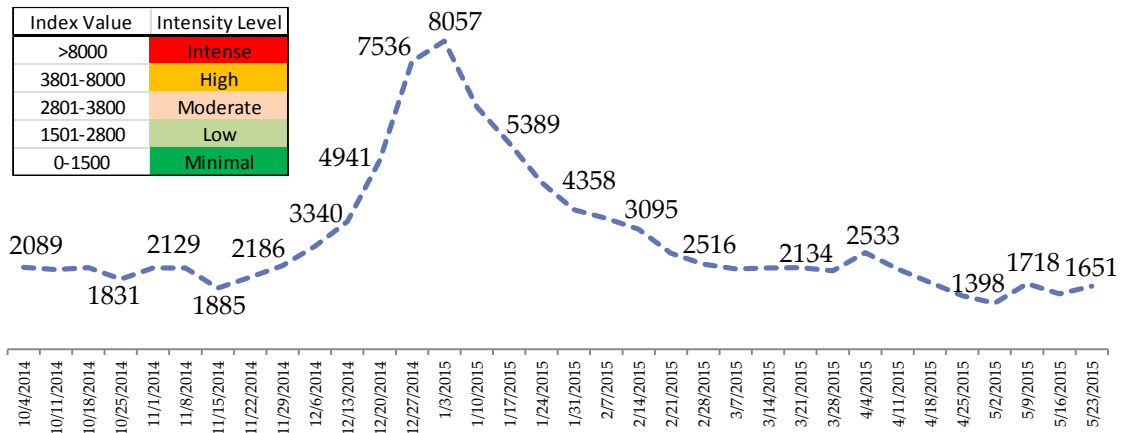
There was an average of 2,318 participants enrolled in MRITS over the course of the 2014-2015 influenza season, with an average of 615 (26.5%) reporting per week. Over the course of the season, ILI symptoms were reported for 392 (1.9%) of 20,907 surveys DHMH received, causing respondents to miss a cumulative 898 days of work, school, and/or other regular daily activities. ILI activity reported through MRITS was highly variable throughout the season, but peaked for the week ending December 27, 2014, when 7.7% of respondents reported ILI symptoms.



PROPORTION OF RESPONDENTS REPORTING ILI & NUMBER OF DAYS OF DAILY ACTIVITY LOST BY WEEK

## Google Flu Trends

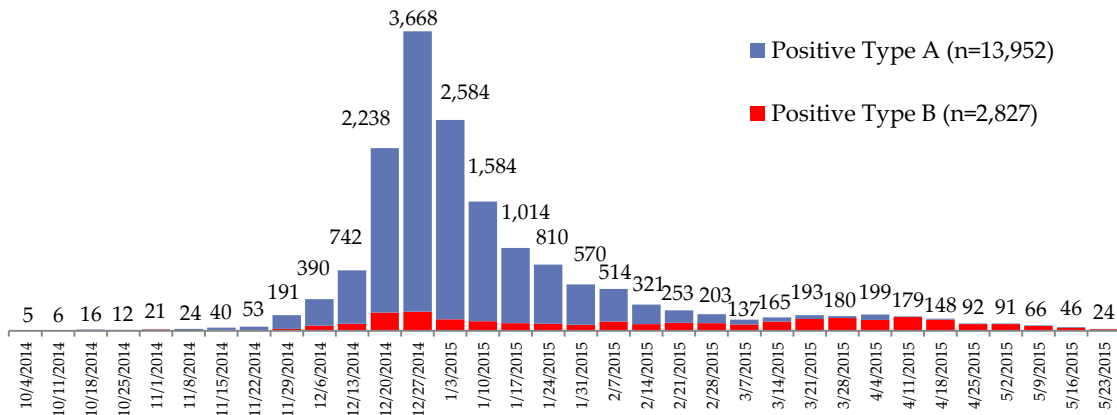
The Google Flu Trends activity index remained steady through late November when an increase in ILI- and influenza-related web searches began to be detected. This upward trend continued for the next several weeks, peaking during the week ending January 3, 2015. From then on, the activity decreased steadily, returning to “low” activity by the end of February. To access an interactive tool for visualizing Google Flu data, please visit <http://google.org/flutrends>. (There are other tools on that site to visualize other syndromes being tracked via Google, including some experimental visualizations.)



GOOGLE FLU ILI ACTIVITY INDEX BY WEEK

## Clinical Laboratory Testing

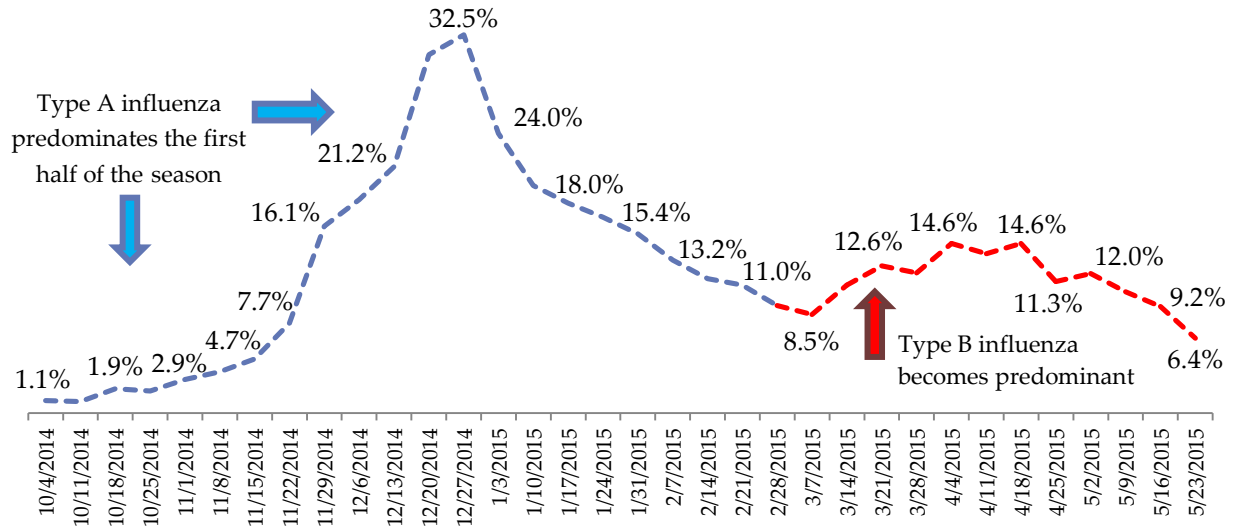
This season, 42 clinical laboratories agreed to report the total number of influenza tests they performed, along with the number of positive tests and the proportion of positives that were type A or type B. The results of 87,881 influenza diagnostic tests were reported over the entire 2014-2015 influenza season, with 16,779 (19.1%) specimens testing positive. Of those specimens testing positive 13,952 (83.2%) were influenza type A and 2,827 (16.8%) were type B.



NUMBER OF POSITIVE INFLUENZA TESTS REPORTED BY CLINICAL LABS BY WEEK



The graph below shows that the proportion of positive tests began to increase rapidly in late November 2014, peaking at 32.5% during the week ending December 27. Similar to the trend observed in the ESSENCE data, the proportion of positive tests decreased for ten straight weeks following this peak, until activity began to rise again in March due to influenza type B.



PROPORTION OF POSITIVE INFLUENZA TESTS BY WEEK (RED LINE INDICATES WEEKS WITH TYPE B INFLUENZA PREDOMINANCE)

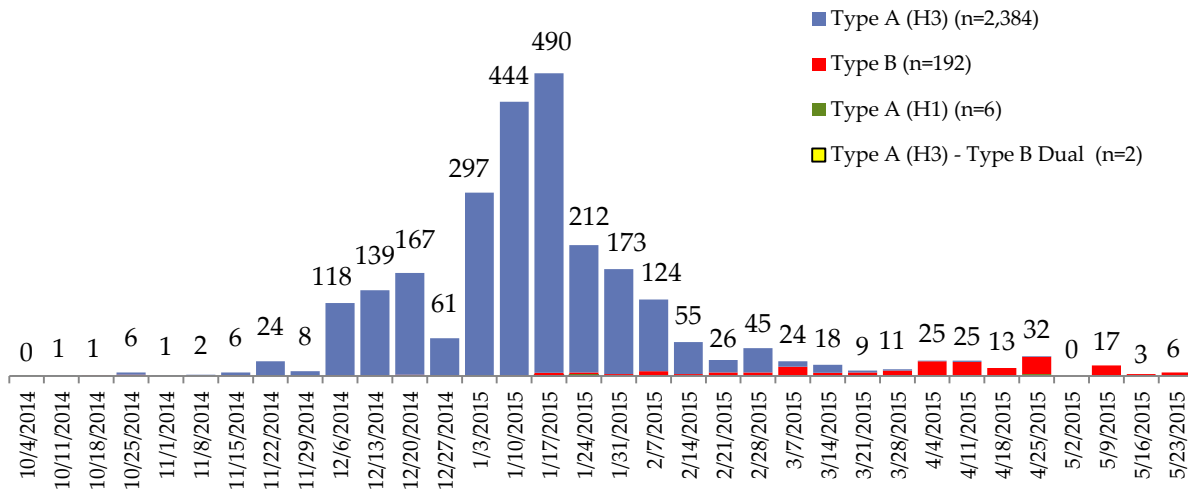
### Influenza Testing at the State Laboratories Administration

The DHMH State Laboratories Administration performed a total of 5,566 PCR tests for influenza. PCR testing is more reliable than rapid influenza diagnostic testing, which is what many of the clinical laboratories use. Of those specimens tested by the state lab, 2,584 (46.4%) were positive.

The number of positive specimens reported each week by the state lab is presented in the graph below. The first PCR-positive specimen of the surveillance season was collected on October 1, 2014. As with several of the other indicators already discussed, activity saw a substantial increase beginning in early December. The number of specimens testing positive peaked during the week ending January 17, 2015, when 490 specimens tested positive for influenza. Similar to the rapid testing results, the number of type B influenza positive specimens exceeded the number of type A positive specimens beginning in March. Type B influenza remained the predominant strain for the rest of the season.

Of the 2,584 specimens that tested positive at the state lab, Type A (H3N2) was the predominant strain, accounting for 2,384 (92.3%) of the positive tests. Type B influenza accounted for 192 (7.4%) of the positive specimens, and there were two (<1%) specimens that were positive for both type B

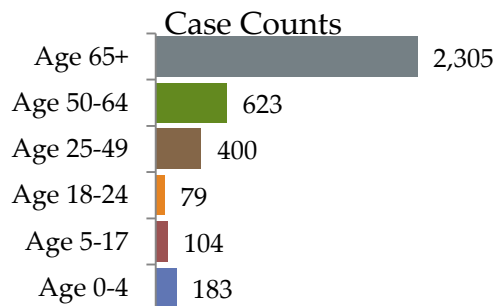
and type A (H3N2). Type A (H1N1), the strain that predominated last season, was detected in six (<1%) of the positive specimens.



NUMBER OF PCR-POSITIVE TESTS BY INFLUENZA TYPE AND SUBTYPE AND WEEK REPORTED BY THE DHMH LABORATORIES ADMINISTRATION

### Influenza-Associated Hospitalizations

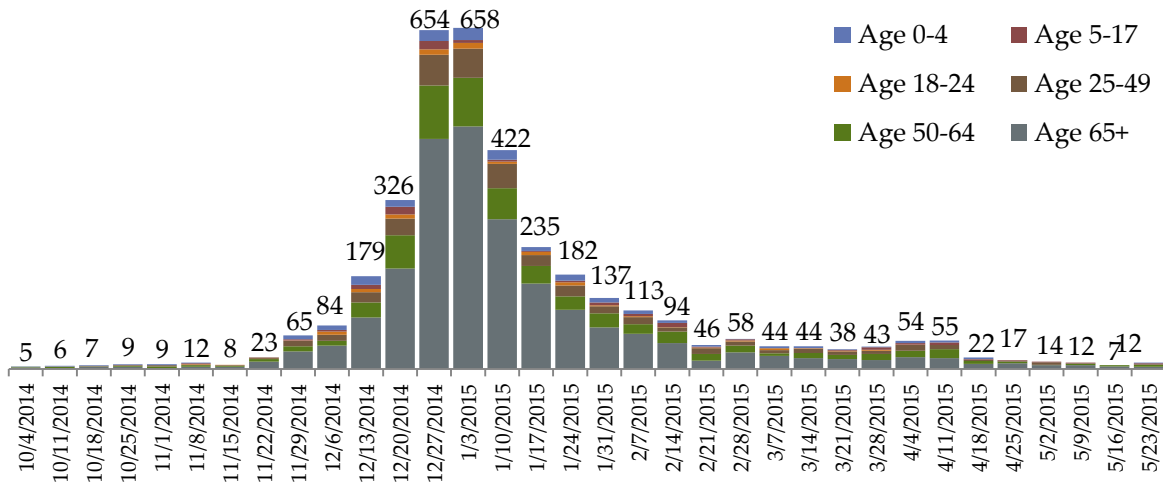
A total of 3,694 influenza-associated hospitalizations were reported to the Emerging Infections Program at DHMH during the season. The 65 and older age group had by far the greatest proportion of hospitalized cases, accounting for 62% of the reported cases. The second greatest proportion of hospitalized cases was reported in the 50-64 age group, with 17% of all cases. The 0-4, 5-17, and 18-24 age groups combined accounted for only about 10% of all influenza-associated hospitalizations.



INFLUENZA-ASSOCIATED HOSPITALIZATIONS BY AGE GROUP

The number of reported hospitalizations began to rise steadily starting in late November and then increased sharply throughout December. The peak occurred during the week ending January 3, when 658 influenza-associated hospitalizations were reported. Reported hospitalizations dropped

precipitously during January, before leveling-off in February. The graph below shows the number of hospitalizations reported each week by age group.



NUMBER OF INFLUENZA-ASSOCIATED HOSPITALIZATIONS BY AGE GROUP AND WEEK

### Respiratory Outbreaks in Institutional Settings

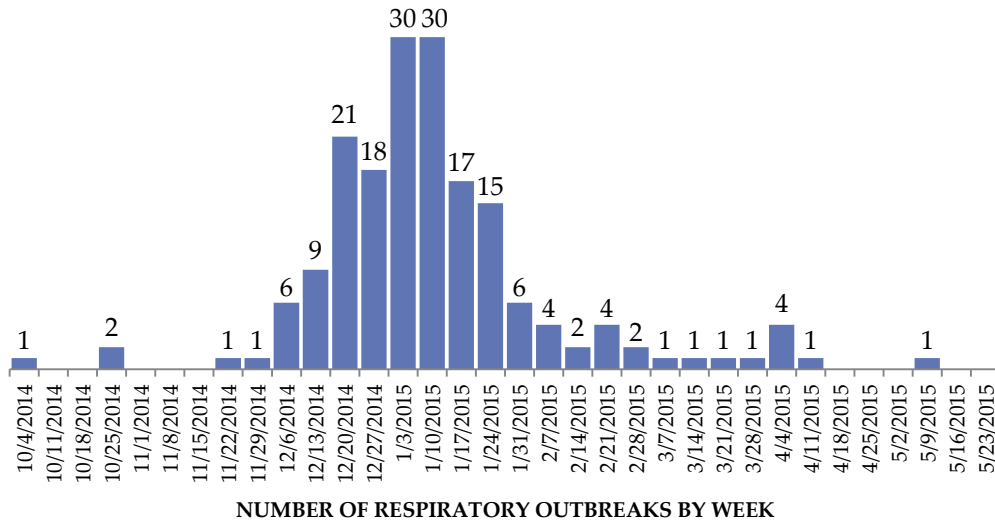
During this season, most of the 179 reported outbreaks of influenza, ILI and pneumonia occurred in nursing homes (103, 58%), followed by assisted living facilities (53, 30%), elementary and secondary schools and daycare centers (10, 6%), and hospitals (5, 3%). Other types of facilities not listed above combined for 8 (4%) of the outbreaks reported this season.

Type of Setting	Influenza Outbreaks	ILI Outbreaks	Pneumonia Outbreaks	Total Outbreaks
Nursing Homes	87	8	8	103
Assisted Living Facilities	44	5	4	53
Schools / Daycares	2	5	3	10
Hospitals	4	1	0	5
Other	7	1	0	8
<b>Total Outbreaks</b>	<b>144</b>	<b>20</b>	<b>15</b>	<b>179</b>

REPORTED OUTBREAKS OF RESPIRATORY ILLNESS BY TYPE OF SETTING AND TYPE OF OUTBREAK

More respiratory outbreaks were reported this influenza season than in any other, though many outbreaks that occurred during the 2009 H1N1 pandemic happened in the summer months, outside of the official influenza surveillance season. This season, least one outbreak was reported every week between mid-November and early April. The largest number of outbreaks reported in any single week was 30, occurring twice in a row for the weeks ending January 3 and January 10.

By comparison, there were 39 total respiratory outbreaks over the course of the entire 2013-2014 influenza season.

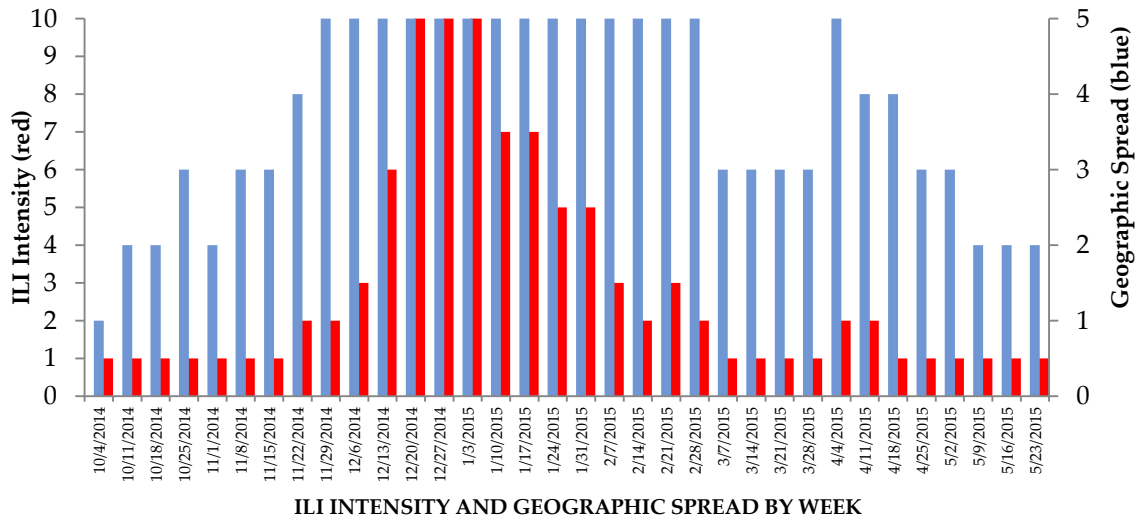


### Geographic Spread and Intensity

The geographic spread and ILI intensity levels for the 2014-2015 influenza season can be seen in the chart below.

This season, influenza began circulating widely throughout Maryland early on, reaching “widespread” geographic activity in late November, where it remained for 14 straight weeks. The geographic activity began to decline in March. There was a brief increase in geographic spread again in April, coinciding with an increase in influenza type B, though this activity declined by the end of April, and remained low for the rest of the season.

The ILI intensity level was at 1 (“minimal”) for the first 10 weeks of the 2014-15 influenza season. It climbed to 6 (“moderate”) the week ending December 13, and peaked at 10 (“high”) for the following three weeks. The intensity returned to “minimal” in early February, where it remained for the rest of the season.



To see the United States map of geographic spread of influenza throughout the season, please visit: <http://www.cdc.gov/flu/weekly/WeeklyFluActivityMap.htm>.

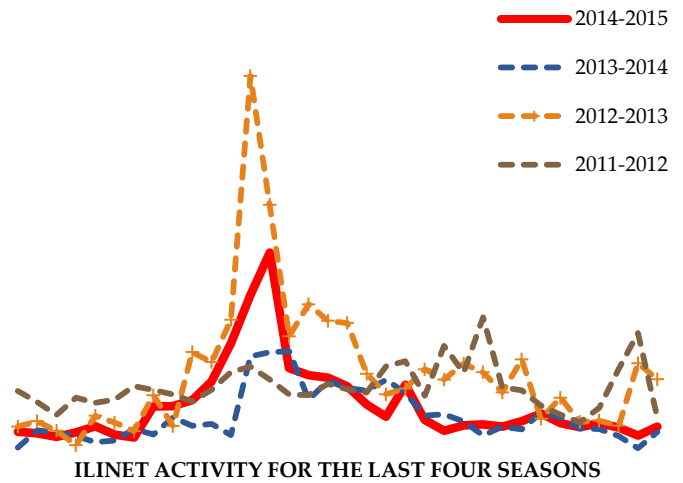
To see an interactive map of the United States showing ILI intensity, please visit: <http://gis.cdc.gov/grasp/fluview/main.html>.

## DISCUSSION

The 2014-2015 influenza season was somewhat severe, and comparable to the 2012-2013 influenza season. By most indicators, influenza activity began to rise in late November and quickly climbed, peaking a month later in late December. Activity remained elevated until April 2015, before dropping to inter-seasonal levels by the end of the season.

Influenza type A (H3N2) was first detected by the DHMH laboratory in the second week of the season, and it persisted as the predominant

strain of the 2014-2015 influenza season, accounting for 92% of the specimens testing positive at the state lab. In the past, type A (H3N2)-predominant seasons have been associated with more severe illness, which is consistent with what was observed this season. Type A (H1N1), which predominated the 2013-2014 influenza, was not identified at the state lab until late January, and was only detected in less than 1% of the specimens testing positive at DHMH. Although type B had been detected at low levels since the start of the season, most type B activity was seen in



March and April, after type A (H3N2) activity had subsided. Looking at rapid influenza testing, we can see that there was a bi-modal (i.e., two-peaked) distribution of positive rapid test results, with the first peak attributable to type A and the second peak to type B influenza, which is a common pattern seen in previous influenza seasons.

Seniors were hit especially hard this influenza season. Marylanders age 65 and older accounted for 62% of the nearly 3,700 influenza-associated hospitalizations reported to DHMH this season, while those aged 0–49 years combined for just 21% of these hospitalizations. Nearly 87% of respiratory outbreaks occurred in nursing homes and assisted living facilities. Less than 6% of outbreaks occurred in schools or day care facilities. While we commonly see trends like these, with seniors being impacted the most regardless of which strain is predominant, this effect was even more pronounced this season.

Several factors likely played a role in the severity of the 2014-2015 influenza season and the impact it had on the elderly. One already mentioned is that type A (H3N2) seasons have generally been associated with more severe respiratory manifestations leading to severe outcomes, such as hospitalization and death. The elderly are at a greater risk for contracting and developing complications from influenza, regardless of strain, as older persons often have underlying conditions that make them more susceptible to the illness, and advanced age is itself a risk factor for developing complications.

One additional factor that may have affected the impact of influenza this season was the emergence of an antigenically-drifted type A (H3N2) virus. Influenza viruses use host cells to make copies of themselves in a process known as replication. Imperfections in the replication process lead to mutations that drive the evolution of influenza viruses. Antigenic drift occurs when these mutations gradually accumulate, resulting in distinctly different strains of the virus over time. The drifted type A (H3N2) virus was first detected in the southern hemisphere in spring of 2014, after the production had begun for the 2014-2015 seasonal influenza vaccine for the northern hemisphere. This drifted virus became predominant in the southern hemisphere during the summer of 2014, and went on to account for approximately two-thirds of the type A influenza viruses detected in the United States during the 2014-2015 influenza season. Due to the mismatch between what was included in the vaccine and what was circulating in the community, we may have seen more influenza activity than in seasons with a more closely matched vaccine.

Surveillance for influenza and other respiratory conditions is year-round, not just in Maryland but around the world. We will continue to work with our colleagues at all levels to monitor everything from single cases of disease to clusters and outbreaks, both within and beyond Maryland's borders.

## ADDITIONAL READINGS

- “What You Should Know for the 2015-2016 Influenza Season” Centers for Disease Control and Prevention, available at:  
<http://www.cdc.gov/flu/about/season/flu-season-2015-2016.htm>
- “Flu Activity & Surveillance” Centers for Disease Control and Prevention, available at:  
<http://www.cdc.gov/flu/weekly/fluactivitysurv.htm>
- “CDC Resources for Pandemic Flu” Centers for Disease Control and Prevention, available at:  
<http://www.cdc.gov/flu/pandemic-resources/index.htm>
- “CDC Reports About 90 Percent of Children Who Died From Flu This Season Not Vaccinated” Centers for Disease Control and Prevention, available at:  
<http://www.cdc.gov/flu/spotlights/children-flu-deaths.htm>
- Blanton, et al. (2012). Neurologic Disorders Among Pediatric Deaths Associated With the 2009 Pandemic Influenza. *Pediatrics*, 130(3), pp. 390-396, available at:  
<http://pediatrics.aappublications.org/content/130/3/390.long>
- Lombardo, et. al. (2004). ESSENCE II and the Framework for Evaluating Syndromic Surveillance Systems. *Morbidity and Mortality Weekly Report*, 53, pp. 159-165, available at:  
<http://www.cdc.gov/Mmwr/preview/mmwrhtml/su5301a30.htm>
- “The Compelling Need for Game-Changing Influenza Vaccines: An Analysis of the Influenza Vaccine Enterprise and Recommendations for the Future” Center for Infectious Disease Research and Policy, available at:  
<http://www.cidrap.umn.edu/cidrap/center/mission/articles/ccivi-landing.html>
- “Influenza: Seasonal Flu Activity and Surveillance” Centers for Disease Control and Prevention, available at: <http://www.cdc.gov/flu/weekly/fluactivitysurv.htm>
- “H5 Viruses in the United States” Centers for Disease Control and Prevention, available at:  
<http://www.cdc.gov/flu/avianflu/h5/index.htm>
- “H7N9 Situation and CDC Response” Centers for Disease Control and Prevention, available at: <http://www.cdc.gov/flu/spotlights/h7n9-cdc-response.htm>