MMWR: Influenza Activity In the United States During The 2017–18 Season and Composition of the 2018–19 Influenza Vaccine

- On Thursday, June 7, 2018, a report titled "Update: Influenza Activity in the United States During the 2017-18 Season and Composition of the 2018-19 Influenza Vaccine," was published in the Morbidity and Mortality Weekly Report (MMWR).
- This report summarizes influenza (flu) activity from October 1, 2017 to May 19, 2018 during the 2017-18 flu season.

Summary of the 2017-2018 Influenza Season

- The 2017-18 influenza season was a high severity, A(H3N2) predominant season. This season was the first to be classified as a high severity season for all age groups.
- While previous influenza A(H3N2)-predominant seasons have also been associated with high severity, increased hospitalizations and deaths, this is the second consecutive season with A(H3N2) viruses predominating – and all severity indicators were higher than the 2016-17 season.
- Influenza activity indicators this season were notable for the sheer volume and intensity of influenza that occurred in most of the country at the same time.
- Influenza activity began to increase in November peaking in early January and February nationally, and remained elevated through the end of March. Flu activity in the United States typically begins to increase in late December or early January and peaks most commonly in February.
- As of early April 2018, indicators of national flu activity are below seasonal baseline levels.
- During the 2017–18 season, influenza-like illness (ILI) peaked at 7.5% in early February, the highest percentage since the 2009 pandemic, which peaked at 7.7%, and the third highest percentage recorded during a season since ILINet was implemented in the 1997-98 season.
- Influenza-like illness (ILI) was at or above the national baseline for 19 weeks this season, making this season one of the longest in recent years.
- Influenza A(H3N2) viruses predominated overall this season, but influenza B viruses became more commonly reported than influenza A viruses in early March through May.
- Overall hospitalization rates (all ages) were the highest ever recorded in this surveillance system, breaking the previously recorded highs recorded during 2014-2015; a high severity H3N2-predominant system.
- The majority of all influenza viruses in specimens sent to CDC for further antigenic characterization were similar to the components of the 2017–18 Northern Hemisphere vaccine.
- CDC vaccine effectiveness (VE) studies for the influenza A(H3N2)-predominant 2017-2018 flu season showed that flu vaccination reduced the risk of getting sick and having to go the doctor because of flu by 36% overall, with vaccine providing better protection against influenza B viruses (42%) than against the most common influenza A(H3N2) viruses (25%).

- While this season's VE results underscore the importance of developing better, more effective flu vaccines, they also show that current flu vaccines do offer substantial public health benefit and increased coverage could provide additional benefit.

- Although summer influenza activity in the United States typically is low, influenza cases and outbreaks can occur during summer months and clinicians should remain vigilant in considering influenza in the differential diagnosis of summer respiratory illnesses.

- CDC recommends prompt treatment with influenza antiviral medications for people who are severely ill and people who are at high risk of serious flu complications who develop flu symptoms

Viral Surveillance:

- Nationally, the percentage of specimens tested by clinical laboratories that were positive for influenza peaked for five consecutive weeks from January 13 (week 2) through February 10 (week 6) and ranging from 26.1% to 26.9%.
- During October 1, 2017– May 19, 2018, of the 224,113 (18.5%) influenza-positive tests reported to CDC by clinical laboratories, 151,413 (67.6%) were influenza A viruses and 72,700 (32.4%) were influenza B viruses.
- During October 1, 2017– May 19, 2018, 38,303 (71.2%) of the 53,790 influenza-positive tests reported to CDC by public health laboratories were influenza A viruses and 15,487 (28.8%) were influenza B viruses. Of the 37,681 seasonal influenza A viruses that were subtyped, 31,977 (84.9%) were H3N2 viruses and 5,704 (15.1%) were (H1N1)pdm09 viruses.
- Influenza B lineage information was available for 11,950 (77.2%) influenza B viruses: 10,612 (88.8%) belonged to the B/Yamagata lineage and 1,338 (11.2%) to the B/Victoria lineage.

Antigenic and Genetic Characterization of Influenza Viruses:

- CDC genetically characterized 3,329 influenza viruses (832 influenza A(H1N1)pdm09, 1,313 influenza A(H3N2), and 1,184 influenza B viruses) collected by U.S. laboratories since October 1, 2017.

- The majority of the influenza viruses collected from the United States during October 1, 2017 through April 28, 2018 were characterized antigenically and genetically as being similar to the cell-grown reference viruses representing the 2017–18 Northern Hemisphere influenza vaccine viruses.

- The majority of U.S. influenza vaccines use egg-adapted viruses which contain mutations that may contribute to differences in antigenicity compared to circulating viruses. Although this can occur in all types/subtypes, it was most evident in circulating A(H3N2) viruses where half of viruses tested showed reduced inhibition to antisera to egg-adapted viruses.

- The majority of B/Victoria lineage viruses characterized this season contained the V1A.1 hemagglutinin (HA) with evidence of antigenic drift from the vaccine reference virus B/Brisbane/60/2008. Viruses with the V1A.1 HA reacted well with antisera to the cell-propagated reference virus B/Colorado/06/2017, representing the 2018-19 recommended B/Victoria lineage vaccine virus.

Antiviral drug susceptibility testing:

- Since October 1, 2017, CDC has tested 1,147 influenza A(H1N1)pdm09, 2,354 influenza A(H3N2), and 1,118 influenza B viruses for resistance to antiviral medications (i.e., oseltamivir, zanamivir, or peramivir). While the majority of the tested viruses showed susceptibility to the antiviral drugs, 11 (1.0%) H1N1pdm09 viruses were resistant to both oseltamivir and peramivir, but were sensitive to zanamivir.
- These results indicate that these antiviral drugs continue to be recommended treatment options for illness caused by currently circulating influenza viruses.

Visits to healthcare providers for flu-like illness:

- Nationally, the weekly percentage of visits to healthcare providers for flu-like illness was at or above the national baseline for 19 consecutive weeks during the 2017–18 influenza season. Over the past five seasons, ILI has remained at or above baseline for 16 weeks on average with 20 weeks being the longest.
- This season, the peak percentage of visits to healthcare providers for flu-like illness was 7.5%, occurring in early February.
- Nationally, visits to healthcare providers for flu-like illness declined and fell below baseline during week 14 (the week ending April 7, 2018), signaling the season was drawing to a close, although regional differences in activity continued to be reported.
- From the week ending December 30, 2017 through February 24, 2018, more than half of the 53 jurisdictions (50 states, District of Columbia, New York City, and Puerto Rico) experienced high ILI activity each week, with the highest number of jurisdictions (46) experiencing high ILI activity during the weeks ending January 27 and February 19, 2018 (weeks 4-6).

Geographic spread of influenza activity:

- State and territorial epidemiologists report the geographic distribution of influenza in their jurisdictions through a weekly influenza activity code.
- During the 2017–18 season, the peak number of jurisdictions reporting widespread activity in a single week was 50 (93%); this occurred for 3 consecutive weeks (weeks ending January 6, January 13, and January 20, 2018).
- During the previous five influenza seasons, the peak number of jurisdictions reporting widespread activity in a single week during each season has ranged from 41 (76%) in the 2015–16 season to 48 (89%) during the 2012–13 season.

Hospitalizations:

- From October 1, 2017 through April 28, 2018, 30,453 laboratory–confirmed influenza-related hospitalizations were reported, with a cumulative incidence for all age groups of 106.6 per 100,000 population.
- The highest hospitalization rate was among people 65 years (460.9 per 100,000), followed by adults aged 50-64 years (115.7 per 100,000), and younger children aged 0-4 years (74.3 per 100,000). During most seasons, adults 65 years and older have the highest hospitalization rates, followed by children 0-4 years.
- People 65 years and older accounted for approximately 58% of reported influenza-associated hospitalizations.

- Overall hospitalization rates (all ages) were the highest ever recorded in this surveillance system, breaking the previously recorded highs recorded during 2014-2015; a high severity H3N2-predominant system.
- Among 6,910 hospitalized adults with information on underlying medical conditions, 6,385 (92.4%) had at least one reported underlying medical condition that placed them at high risk for influenza-associated complications.
- The most commonly reported underlying medical conditions among adults were cardiovascular disease (46.3%), metabolic disorders (43.3%), obesity (36.5%), and chronic lung disease (29.6%).
- While the hospitalization rates for children this season did not exceed the rates reported during the 2009 pandemic, the rates surpassed the previously reported values seen in high severity A(H3N2)-predominant seasons.

Mortality:

- The percentage of deaths attributed to pneumonia and influenza (P&I) was at or above the epidemic threshold for 16 consecutive weeks this season.
- Nationally, mortality attributed to P&I peaked exceeded 10.0% for four consecutive weeks, peaking at 10.8% during the week ending January 20, 2018 (week 3).
- The percentage of mortality attributed to P&I is the highest reported since National Center for Health Statistics (NCHS) mortality data was presented for routine influenza surveillance purposes in the 2014-15 season.

Pediatric Mortality:

- As of June 8, 2018, a total of 172 pediatric deaths were reported to CDC during the 2017-18 season. Excluding the 2009 pandemic, this number matches the 2012-2013 season, which previously set the record for the highest number of flu-related deaths in children reported during a single flu season.
- Of these 172 deaths, 36 were associated with an influenza A(H3N2) virus infection, 32 with an influenza A(H1N1)pdm09 virus infection, 36 with an influenza A virus for which no subtyping was performed, 64 with an influenza B virus infection, two with an influenza virus co-infection, and two with an influenza virus for which the type was not determined.
- Among the 138 children who were eligible for influenza vaccination (≥6 months of age at date of onset) and for whom vaccination status was known, only 30 (22%) had received any flu vaccine this season before the onset of illness.
- Since flu-associated deaths in children became a nationally notifiable condition in 2004, the total number of flu-associated deaths among children in one season has ranged from 37 to 171; this excludes the 2009 pandemic, when 358 pediatric deaths from April 15, 2009 through October 2, 2010 were reported to CDC.

2017-18 Flu Vaccine Effectiveness

- The overall vaccine effectiveness (VE) of the 2017-2018 flu vaccine against both influenza A and B viruses was estimated to be 36% (95% confidence interval (CI): 27%-44%).
- In practical terms, this means the flu vaccine reduced a person's overall risk of having to seek medical care at a doctor's office for flu illness by 36%.

- VE against illness caused specifically by the predominant influenza A (H3N2) viruses was estimated to be 25% (95% CI: 13%-36%).
- VE against influenza B viruses was estimated to be 42% (95% CI: 25%-56%).
- These interim estimates were similar to those for the 2016-17 influenza vaccine.

Composition of the 2018-2019 Influenza Vaccine:

- The Food and Drug Administration's Vaccines and Related Biologic Products Advisory Committee (VRBPAC) recommended that the 2018–19 influenza trivalent vaccine to be used in the United States contain an A/Michigan/45/2015 A(H1N1)pdm09-like virus, an A/Singapore/INFIMH-16-0019/2016 A(H3N2)-like virus, and a B/Colorado/06/2017-like (B/Victoria lineage) virus.
- It was recommended that quadrivalent vaccines, which have two influenza B viruses, contain the viruses recommended for the trivalent vaccines, as well as a B/Phuket/3073/2013-like (B/Yamagata lineage) virus.
- The B recommendation represents a change in the influenza B/Victoria lineage component recommended for the 2017-2018 Northern Hemisphere and 2018 Southern Hemisphere influenza vaccines.
- The A(H3N2) recommendation represents an update to the 2017-2018 Northern Hemisphere vaccines, but is the same A(H3N2) virus recommended for the 2018 Southern Hemisphere vaccines.
- These vaccine recommendations were based on a number of factors, including global influenza virologic and epidemiologic surveillance, genetic and antigenic characterization, human serology studies, antiviral susceptibility, and the availability of candidate influenza viruses.

More information is available on the FDA VRBPAC web site (https://www.fda.gov/advisorycommittees/committeesmeetingmaterials/bloodvaccinesandotherbiologics/vaccinesandrelatedbiologicalproductsadvisorycommittee/ucm596509.htm)