CDC Influenza Division Key Points

March 6, 2015

In this document:

Summary Key Messages

- This week's FluView report indicates that flu activity remains elevated overall, however most of the country has returned to low or minimal levels of flu-like illness.
- Most indicators used to track severity are declining or leveling off; however, hospitalizations and pediatric deaths continue to be reported.
  - The proportion of deaths attributed to pneumonia and influenza (P&I) based on the 122 Cities Mortality Reporting System is declining; it decreased from a high of 9.3% five weeks ago to 7.2% in the current week. (During recent previous flu seasons characterized as "moderately severe" with H3N2 viruses predominating, P&I has reached 10.4% [2003-2004] and 9.9% [2012-2013].)
  - The hospitalization rate for people 65 years and older is now 266.1 per 100,000 people, up slightly from 258.0 per 100,000 the prior week. The hospitalization rate for the ≥65 year old age group is always highest; this season's rate is the highest recorded since this type of record-keeping began in 2005. (During the 2012-2013 season—the last H3N2-predominant season—the hospitalization rate for week 8 was 164.9 per 100,000. The final hospitalization rate for that season was 183.2 per 100,000 people.)
  - This week, six pediatric deaths were reported, one of which occurred during the 2013-2014 season. The total number of flu-associated pediatric deaths reported so far this season is 97. (Since 2004 when flu-associated pediatric deaths became a nationally notifiable condition, the number of deaths reported to CDC each season has ranged from 37 to 171.)
- More hospitalizations and deaths are typical of H3N2 seasons, which tend to hit young children and older people harder. (CDC estimates that an average of 28,909 people have died from flu during H3N2-predominant seasons, compared to 10,648 people during non-H3N2 predominant seasons.)
- Flu activity so far this season continues to be most similar to the 2012-2013 season, the last season when H3N2 viruses predominated.

- Flu activity may continue in parts of the country for a few more weeks, however most states are on the downward curve of flu activity and nationally, flu activity has peaked.
- H3N2 viruses continue to be most common, though in parts of the country an increasing proportion of influenza B viruses are being detected.
- Second waves of influenza B activity have occurred during many seasons.
- More than two-thirds of the H3N2 viruses circulating this season are different or "drifted" from the H3N2 vaccine virus, but most B viruses are like the vaccine viruses.
- The predominance of drifted H3N2 viruses is probably responsible for the reduced protection offered by this season's vaccine.
- The reduced protection offered by flu vaccine this season makes the appropriate use of influenza antiviral (or "anti-flu") medications more important than usual.
- Antiviral drugs are a second line of defense against influenza and can be used to treat flu illness.
- CDC recommends that all hospitalized and high risk patients (either hospitalized or outpatient) with suspected influenza should be treated as soon as possible with one of three available influenza antiviral medications, without waiting for confirmatory influenza testing.
- While antiviral drugs work best when given early, therapeutic benefit has been observed even when treatment is initiated later.
- On March 4, 2015, the Food and Drug Administration's Vaccines and Related Biologics Advisory Committee endorsed the WHO Northern Hemisphere flu vaccine strain selection for use in the upcoming 2015-2016 flu vaccine. (See section "WHO Consultation Meeting Recommendations.")
- A March 6, 2015, a Morbidity and Mortality Weekly Report entitled "Update: Influenza Activity — United States, September 28, 2014–February 21, 2015" was published at http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6408a2.htm. (See section "MMWR Update" below.)

FluView Activity Update

- According to this week's FluView, influenza activity is still elevated but continues to decrease in the United States. The number of states with widespread or high flu activity is decreasing, however, another six flu deaths in children were reported this week, bringing the total number of flu-associated pediatric deaths reported so far this season to 97.
- While H3N2 viruses remain most common, an increase in influenza B viruses has been detected in parts of the country.

- Flu activity has been elevated for 15 consecutive weeks nationally. The average length of a flu season for the past 13 seasons has been 13 weeks. Because this season started relatively early, it is expected to last longer.
- Below is a summary of the key flu indicators for the week ending February 28, 2015:
    - For the week ending February 28, the proportion of people seeing their health care provider for influenza-like illness (ILI) decreased from 3.0% to 2.5% but remains above the national baseline (2.0%) for the fifteenth consecutive week. Seven of 10 U.S. regions reported ILI activity at or above region-specific baseline levels. For the past 13 seasons ILI has remained at or above the national baseline for between one and 19 weeks each season.
    - Puerto Rico and six states experienced high ILI activity; a decrease from 11 states during the previous week. States reporting high ILI activity for the week ending February 28, 2015 include Connecticut, Kansas, Mississippi, New Jersey, North Carolina, and Oklahoma. Four states (Arkansas, Idaho, Louisiana, and Texas) experienced moderate ILI activity; an increase from three states during the previous week. Ten states (Alabama, Arizona, Colorado, Georgia, Hawaii, Missouri, New Mexico, South Carolina, South Dakota, and Wyoming) experienced low ILI activity. New York City and 30 states experienced minimal ILI activity and the District of Columbia did not have sufficient data to calculate an activity level. ILI activity data indicate the amount of flu-like illness that is occurring in each state.
    - Widespread influenza activity was reported by Guam and 12 states (California, Connecticut, Indiana, Maine, Maryland, Massachusetts, Mississippi, New Hampshire, New Jersey, New York, Oklahoma, and Vermont); a decrease from 20 states during the previous week. Puerto Rico, the U.S. Virgin Islands and 30 states (Alabama, Arizona, Arkansas, Florida, Georgia, Hawaii, Idaho, Illinois, Iowa, Kansas, Kentucky, Louisiana, Michigan, Missouri, Montana, Nebraska, New Mexico, North Carolina, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Utah, Virginia, Washington, Wisconsin, and Wyoming) reported regional geographic influenza activity. Local flu activity was reported by the District of Columbia and six states (Colorado, Delaware, Minnesota, Nevada, South Dakota, and West Virginia). Sporadic flu activity was reported by two states (Alaska and Oregon). Geographic spread data show how many areas within a state or territory are seeing flu activity.
    - A total of 14,644 laboratory-confirmed influenza-associated hospitalizations have been reported through the Influenza Hospitalization Surveillance Network (FluSurv-NET) since October 1, 2014. This translates to a cumulative overall rate of 53.5 hospitalizations per 100,000 population. This is higher than seen for the same week during the 2012-2013 season when the overall hospitalization

rate was 38.1 per 100,000 people. Last week, the overall cumulative rate was 51.7 hospitalizations per 100,000 population.

- The hospitalization rate in people 65 years and older is 266.1 per 100,000, which is the highest hospitalization rate recorded since data collection on laboratory-confirmed influenza-associated hospitalization in adults began during the 2005-2006 season. This is the highest rate of any age group. Last week, the hospitalization rate in people 65 years and older was 258.0 per 100,000. Previously, the highest recorded hospitalization rate was 183.2 per 100,000, which was the cumulative hospitalization rate for people 65 years and older for the 2012-13 season. (The 2012-2013 season was the last H3N2-predominant season.)
- The hospitalization rate for children 0-4 years is 47.8 per 100,000 population. During 2012-2013, the hospitalization rate for that age group during the same week was 54.6 hospitalizations per 100,000 population.
- Hospitalization data are collected from 13 states and represent approximately 9% of the total U.S. population. The number of hospitalizations reported does not reflect the actual total number of influenza-associated hospitalizations in the United States.

- The proportion of deaths attributed to pneumonia and influenza (P&I) based on the 122 Cities Mortality Reporting System decreased to 7.2% this week and was at the epidemic threshold of 7.2% after nine consecutive weeks of being at or above the epidemic threshold. Last week, P&I-associated deaths was 7.4%. (The highest P&I this season was 9.3% and occurred during week 2. During 2012-2013, P&I peaked at 9.9%. This is comparable to recorded percentages for past severe seasons, including the 2003-2004 season when P&I reached 10.4%.).
- Six influenza-associated pediatric deaths were reported to CDC during the week ending February 28.
  - Five deaths were associated with an influenza A (H3) virus and occurred during weeks 52, 3, 5, 6, and 7 (the weeks ending December 27, 2014, January 24, February 7, February 14, and February 21, 2015, respectively). One death was associated with an influenza A (H1N1)pdm09 virus and occurred during the 2013-14 season and brings the total number of reported pediatric deaths occurring during the 2013-14 flu season to 110.
  - A total of 97 influenza-associated pediatric deaths have been reported for the 2014-2015 season at this time.
- Nationally, the percentage of respiratory specimens testing positive for influenza viruses in the United States during the week ending February 28 decreased from 12.1% to 10.9%. For the most recent three weeks, the regional percentage of

respiratory specimens testing positive for influenza viruses ranged from 8.2% to 19.4%.

- Influenza A (H3N2) viruses have been the dominant circulating viruses in the United States this season accounting for more than 99% of all subtyped influenza A viruses. However an increasing proportion of influenza B viruses have been detected in recent weeks and the proportion of influenza B viruses increased to 38.5% this week. Influenza A (H1N1) pdm09 viruses have been detected rarely this season.
- CDC has antigenically or genetically characterized 1,033 influenza viruses, including 27 influenza A (H1N1)pdm09, 814 influenza A (H3N2) viruses and 192 influenza B viruses, collected in the United States since October 1, 2014.
    - All 27 influenza A (H1N1)pdm09 viruses tested were characterized as A/California/7/2009-like. This is the influenza A (H1N1) component of the 2014-2015 Northern Hemisphere quadrivalent and trivalent influenza vaccines.
    - 229 (28.1%) of the 814 influenza A (H3N2) viruses tested have been characterized as A/Texas/50/2012-like. This is the influenza A (H3N2) component of the 2014-2015 Northern Hemisphere quadrivalent and trivalent influenza vaccine.
    - The remaining 585 (71.9%) influenza A (H3N2) viruses tested were different from A/Texas/50/2012. The majority of these 585 influenza A (H3N2) viruses were antigenically similar to A/Switzerland/9715293/2013, the influenza A (H3N2) component of the 2015 Southern Hemisphere influenza vaccine.
    - 138 (95.2%) of the 145 B/Yamagata-lineage viruses were characterized as B/Massachusetts/2/2012-like, which is included as an influenza B component of the 2014-2015 Northern Hemisphere trivalent and quadrivalent influenza vaccines. Seven (4.8%) of the B/Yamagata-lineage viruses tested showed reduced titers to B/Massachusetts/2/2012.
    - Forty-three (91.5%) of the 47 other influenza B viruses belonged to the B/Victoria lineage of viruses, and were characterized as B/Brisbane/60/2008-like. This is the recommended influenza B component of the 2014-2015 Northern Hemisphere quadrivalent influenza vaccine. Four (8.5%) of the B/Victoria-lineage viruses tested showed reduced titers to B/Brisbane/60/2008.
- Since October 1, 2014, CDC has tested 32 influenza A (H1N1)pdm09, 1,944 influenza A (H3N2), and 237 influenza B viruses for resistance to neuraminidase inhibitors (oseltamivir, zanamivir, and peramivir). While the vast majority of the viruses that have been tested are sensitive to oseltamivir, zanamivir and

peramivir, so far this season, one influenza A (H1N1)pdm09 virus showed resistance to oseltamivir and peramivir. (Because H1N1 viruses have been so rare this season, one virus accounts for 3.1% of the H1N1 viruses analyzed for antiviral resistance this season.)

- Previously, the neuraminidase inhibitors oseltamivir and zanamivir were the only recommended influenza antiviral drugs. On December 19, 2014, the U.S. Food and Drug Administration approved Rapivab (peramivir) to treat influenza infection in adults.
- As in recent past seasons, high levels of resistance to the adamantanes (amantadine and rimantadine) continue to persist among influenza A (H1N1)pdm09 and influenza A (H3N2) viruses. Adamantanes are not effective against influenza B viruses.

- FluView is available – and past issues are archived – on the CDC website.

Note: Delays in reporting may mean that data changes over time. The most up to date data for all weeks during the 2014-2015 season can be found on the current FluView.

MMWR Update: Influenza Activity — United States, September 28, 2014–February 21, 2015

- The March 6, 2015 Morbidity and Mortality Weekly Report (MMWR) contains a summary of influenza activity in the United States from September 28, 2014 – February 21, 2015. *(For the most recent data on influenza activity, please refer to weekly FluView report.)*
- The MMWR report is available on the CDC website at: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6408a2.htm.
- Key findings from U.S. influenza activity from September 28 – February 21, 2015 include the following:
  - Influenza activity in the United States began to increase in mid-November, remained elevated through February 21, 2015, and is expected to continue for several more weeks. To date, influenza A (H3N2) viruses have predominated overall.
  - As has been observed in previous seasons during which influenza A (H3N2) viruses predominated, adults aged ≥65 years have been most severely affected.
  - The cumulative laboratory-confirmed influenza-associated hospitalization rate among adults aged ≥65 years is the highest recorded since this type of surveillance began in 2005. This age group also accounts for the majority of deaths attributed to pneumonia and influenza.

- The majority of circulating influenza A (H3N2) viruses are different from the influenza A (H3N2) component of the 2014–15 Northern Hemisphere seasonal vaccines, and the predominance of these antigenically and genetically drifted viruses has resulted in reduced vaccine effectiveness.

- During September 28, 2014–February 21, 2015, approximately 270 World Health Organization (WHO) and National Respiratory and Enteric Virus Surveillance System collaborating laboratories in the United States tested 486,004 respiratory specimens for influenza viruses, and 98,680 (20.3%) were positive.

- Since September 28, 2014, two human infections with novel influenza A viruses have been reported.

- WHO collaborating laboratories in the United States are requested to submit a subset of their influenza-positive respiratory specimens to CDC for further virus characterization.

    - CDC has antigenically and/or genetically characterized 933 influenza viruses collected since October 1, 2014, including 27 influenza A (H1N1)pdm09, 752 influenza A (H3N2), and 154 influenza B viruses.

- Since October 1, 2014, a total of 2,011 influenza viruses have been tested for resistance to influenza neuraminidase inhibitor antiviral medications, and the vast majority of circulating influenza viruses has been susceptible to these medications.

- Since September 28, 2014, the weekly percentage of outpatient visits for influenza-like illness (ILI) reported by approximately 1,800 U.S. Outpatient ILI Surveillance Network (ILINet) providers in 50 states, New York City, Chicago, the U.S. Virgin Islands, Puerto Rico, and the District of Columbia that comprise ILINet, has ranged from 1.2% to 6.0%.

- From October 1, 2014 through February 21, 2015, a total of 14,162 laboratory-confirmed influenza-associated hospitalizations were reported, with a cumulative rate thus far for all age groups of 51.7 per 100,000 population.

    - The most affected age group was adults aged ≥65 years, accounting for more than 60% of reported influenza-associated hospitalizations.

- Among all hospitalizations reported during the 2014–15 influenza season, 13,416 (94.8%) were associated with influenza A, 625 (4.4%) with influenza B, 46 (0.3%) with influenza A and B coinfection, and 67 (0.5%) had no virus type information. Among those with influenza A virus subtype information, 4,000 (99.7%) were A (H3N2) and 10 (0.2%) were A (H1N1)pdm09.

- Since September 28, 2014, the weekly percentage of deaths attributed to P&I ranged from 5.0% to 9.3%, and as of February 21, 2015 (week 7), had exceeded the epidemic threshold for 8 consecutive weeks (weeks ending January 3– February 21, 2015 [weeks 53–7]).

- As of February 21, 2015, a total of 92 laboratory-confirmed influenza-associated pediatric deaths that occurred during the 2014–15 season were reported to CDC from New York City and 31 states.

WHO Consultation Meeting Recommendations

- Influenza viruses are always changing and so the composition of the seasonal influenza vaccine is reviewed each year. The review takes place to help ensure that circulating viruses and vaccine viruses are closely matched.
- In February each year, international experts gather at the World Health Organization (WHO) to review global flu laboratory and surveillance data and available vaccine candidate viruses, and then select the vaccine strains for the upcoming Northern Hemisphere flu vaccines.
- WHO makes vaccine strain recommendations twice a year; once for the Northern Hemisphere, and once for the Southern Hemisphere.
- In the United States, the Food and Drug Administration's Vaccines and Related Biological Products Advisory Committee (VRBPAC) reviews WHO's recommendation and makes the official recommendation for flu vaccines to be used in the United States during the upcoming influenza season.
- WHO met February 23-25, 2015, to consider the vaccine strain selection for the next Northern Hemisphere flu season, and announced their recommended flu vaccine composition on February 26.
- WHO recommends that influenza vaccines for use in the 2015-2016 northern hemisphere influenza season contain the following:
  - an A/California/7/2009 (H1N1)pdm09-like virus, which is the same as 2014-2015
  - an A/Switzerland/9715293/2013 (H3N2)-like virus, which is different from 2014-2015
  - a B/Phuket/3073/2013-like virus, which is different from 2014-2015
- WHO also recommends that quadrivalent vaccines containing two influenza B viruses contain the above three viruses and a B/Brisbane/60/2008-like virus.
- The WHO-recommended vaccine viruses for the 2015-2016 Northern Hemisphere influenza season are the same as those for the 2015 Southern Hemisphere influenza season. That recommendation was made in September 2014.

- More information about the WHO recommendation is available at http://www.who.int/influenza/vaccines/virus/recommendations/2015_16_north/en/.
- On March 4, 2015, VRBPAC endorsed the WHO-recommended Northern Hemisphere vaccine composition for use in the United States during the upcoming 2015-2016 U.S. flu season.
- More information about selecting vaccine viruses for the seasonal flu vaccine is available on the CDC website at http://www.cdc.gov/flu/about/season/vaccine-selection.htm.

Influenza Vaccine Effectiveness: Updated Estimates

- Since 2004-2005, CDC has been conducting vaccine effectiveness (VE) studies each season to measure how well the vaccine is protecting vaccinated people from having to go to the doctor because of flu.
- Study results from the U.S. Influenza Vaccine Effectiveness (Flu VE) Network have varied from 10% to 60% between 2004-2005 and 2013-2014. (See Seasonal Influenza Vaccine Effectiveness, 2005-2015 for adjusted vaccine effectiveness estimates for influenza seasons from 2005-2015.)
- Early estimates for the current season were published in the January 16, 2015 edition of the Morbidity and Mortality Weekly Report. The MMWR report is available on the CDC web site at http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6401a4.htm?s_cid=mm6401a4_w.
- At that time, influenza vaccination was estimated to have reduced a vaccinated person's risk of having to go to the doctor for flu illness by about 23% across all ages.
- On February 26, 2015, updated interim estimates from the U.S. Flu VE Network were presented to the Advisory Committee on Immunization Practices (ACIP).
- These updated estimates include an additional four weeks of data from this season.
- The updated vaccine effectiveness against H3N2 was 18% (95% CI: 6% to 29%).
- The vaccine effectiveness estimate against influenza B viruses was 45% (95% CI: 14% to 65%).
- The findings for VE against H3N2 this season are about one-third of what has been reported previously for VE when vaccine viruses and circulating viruses are well-matched. This is likely a reflection of the fact that more than two-thirds of circulating H3N2 viruses this season have been antigenically or genetically different from the H3N2 vaccine virus.

- The reduced protection offered by flu vaccine this season underscores the need for additional prevention and treatment efforts, including the appropriate use of influenza antiviral medications for treatment.
- These updated estimates are available in a CDC Flu Spotlight at http://www.cdc.gov/flu/news/updated-vaccine-effectiveness-2014-15.htm.

Background on Vaccine Effectiveness

- CDC conducts studies to measure the benefits of seasonal flu vaccination each flu season to help determine how well flu vaccines are working. These studies are called "vaccine effectiveness" studies or "VE" studies, for short.
- How well the flu vaccine works can vary by season, virus type/subtype, the vaccine, and age and other host factors of the people being vaccinated.
- Although antigenic match influences vaccine effectiveness, randomized studies of influenza vaccines have reported variable vaccine efficacy during seasons when antigenically drifted viruses predominated.
- VE is difficult to measure and study results can vary widely based on the study design, the outcome being measured and the population being studied.
- CDC has worked with researchers at universities and health systems since 2003-2004 to estimate VE in non-randomized, observational studies.
- The U.S. Flu VE Network consists of five study sites across the United States that measure the flu vaccine's effectiveness at preventing outpatient medical visits due to laboratory-confirmed influenza.
- CDC's observational studies at U.S. Flu VE Network sites measure outpatient visits for laboratory-confirmed influenza infection using a highly accurate lab test called rRT-PCR to verify the outcome.
- This is an observational study that compares the odds of vaccination among outpatients with acute respiratory illness and laboratory-confirmed influenza infection to the odds of vaccination among outpatients with ARI who test negative for influenza infection.
- The study uses a test-negative control design, which minimizes potential bias introduced by access to medical care and health care-seeking behavior.

Influenza-Associated Pediatric Deaths

- Six influenza-associated pediatric deaths were reported to CDC this week. One of these deaths occurred during the 2013-2014 season.

- A total of 97 influenza-associated deaths have been reported during the 2014-2015 season.
- Because of confidentiality issues, CDC does not discuss or give details on individual pediatric death cases.
- Additional information regarding pediatric deaths is available through FluView Interactive.
- A pediatric death is a death in a person who is a U.S. resident and younger than 18 years old resulting from a clinically compatible illness with influenza that is confirmed by an appropriate laboratory test.
- During the 2013-2014 influenza season, a total of 109 influenza-associated pediatric deaths were reported to CDC.
- A review of the available pediatric death reports from the 2013-2014 season indicates that:
    - Of the 106 deaths in which the child's medical history was known, 54% occurred in children who had underlying medical conditions that placed them at high risk of developing serious flu-associated complications. However, 46% had no recognized underlying health problems.
    - About 80% of pediatric deaths occurred in unvaccinated children.
    - These proportions are largely consistent with what has been seen in the past.
- Since 2004, when flu-associated pediatric deaths became a nationally notifiable condition, the number of deaths reported to CDC each season has ranged from 37 (2011-2012 season) to 171 (2012-2013 season).
- During the 2009 H1N1 pandemic — April 15, 2009 to October 2, 2010 — 358 pediatric deaths were reported to CDC.
- These deaths are a somber reminder of the danger flu poses to children.
- Typically, most flu-related pediatric deaths occur in children who have not been vaccinated against flu.
- Among children 6 months and older, 80% to 85% of flu-related pediatric deaths occur in children who have not been vaccinated.
- The single best way to protect children against seasonal flu and its potential severe consequences is to have them receive a seasonal flu vaccine each year.
- Among children, vaccination is especially important for those younger than 5 years of age and those of any age with an underlying medical condition like asthma; a neurologic, neuromuscular or neurodevelopmental disorder; or immune suppression. These children are at higher risk of serious complications if they get the flu.

- Yearly vaccination also is especially important for people who come in contact with high risk children in order to protect the child (or children) from the flu.
- Even previously healthy children can become seriously ill if they get the flu. Data on laboratory-confirmed influenza hospitalizations collected through FluSurv-Net during the 2013-2014 flu season indicated that 50.3% of children hospitalized with the flu had no identified underlying medical conditions.
- Flu-associated deaths in children younger than 18 years old should be reported through the Influenza-Associated Pediatric Mortality Surveillance System. The number of flu-associated deaths among children reported during the 2014-2015 flu season is updated each week and can be found at http://www.cdc.gov/flu/weekly/.
- Additional information about the pediatric deaths, including basic demographics, underlying conditions and week and place of death, for the 2014-2015 season as well as past influenza seasons, is available through the Influenza Associated Pediatric Mortality application of FluView Interactive at http://gis.cdc.gov/GRASP/Fluview/PedFluDeath.html.