Summary of the 2007-2008 Influenza Season

Flu Season Summary (September 30, 2007 — May 17, 2008)**

When did the 2007-2008 flu season start, peak and end?

From October through early December, low levels of flu activity were reported in the United States. The first report of regional flu activity came from the West South Central region of the United States (Texas) during the first week of December. (Regional flu activity is defined as increased flu-like activity or flu outbreaks in at least two — but fewer than half — of the regions in a state with recent laboratory evidence of flu in those regions.) Activity increased slowly from mid-December through the end of the year with more rapid increases during January and through the week ending February 16. Flu activity peaked in mid-February and then decreased through the end of the flu season on May 17.

How severe was the 2007-2008 flu season?

A greater proportion of deaths associated with influenza illness and slightly higher rates of influenza-related hospitalizations in children 0-4 years occurred during the 2007-2008 U.S. flu season than was measured during each of the previous three seasons. When compared with the previous three seasons, the 2007-2008 season was similar in severity to the 2004-2005 flu season in terms of the percentage of deaths due to pneumonia and flu, pediatric hospitalization rates, and the percentage of visits to outpatient clinics for flu-like illness.

What determines the severity of a flu season?

The overall health impact (e.g., infections, hospitalizations and deaths) of a flu season varies from year to year. Based on available data from U.S. influenza surveillance systems monitored and reported by CDC, the severity of a flu season can be judged according to a variety of criteria, including:

- The level of reported activity within each state;
- The proportion of influenza laboratory tests that are positive;
- The proportion of visits to physicians for influenza-like illness;
- The proportion of all deaths that are caused by pneumonia and flu;
- The number of influenza-associated deaths among children; and
- The influenza-associated hospitalization rate among children

A season's severity is determined by comparing these measures with previous seasons.

Was the peak of the 2007-2008 flu season typical in terms of timing?

Flu activity for the 2007-2008 U.S. flu season peaked in mid-February. Flu activity in the United States typically peaks between December and March, and the timing of peak activity changes from year to year. In 16 of the past 26 years, the U.S. flu season has peaked in February or later, making this year pretty typical in terms of the timing of the peak.

Where did most flu activity occur in the United States this season?

Flu viruses were identified in all states. In February, when the flu season peaked, widespread* flu activity was reported in all 50 states across all regions of the country.

*Widespread flu activity is defined as increased flu-like activity or flu outbreaks in at least half of the regions in a state with recent laboratory evidence of flu in the state.

How many people died from flu during the 2007-2008 season?

Exact numbers of how many people died from flu this season cannot be determined. Flu-associated deaths (which have laboratory confirmed influenza), are only a nationally notifiable condition among children; however not all pediatric influenza deaths may be detected and reported and there is no requirement to report adult deaths from influenza. In addition, many people who die from flu complications are not tested, or they seek medical care later in their illness when flu can no longer be detected from respiratory samples. However, CDC tracks pneumonia and influenza (P&I) deaths through the 122 Cities Mortality Reporting System. This system collects information each week on the total number of death certificates filed in each of the 122 participating cities and the number of death certificates with pneumonia or influenza listed as a cause of death. The 122 Cities Mortality Reporting system helps gauge the severity of a flu season compared with other years. However, only a proportion of all P&I deaths are influenza-related and, as noted, most flu deaths are not lab confirmed. Thus, this system does not allow for an estimation of the number of deaths, only the relative severity among different influenza seasons. For the 2007-2008 season, the proportion of deaths due to pneumonia and influenza was higher than the previous two years, but was similar to the 2004-2005 season.

What flu viruses circulated this season?

In the United States, influenza A (H1N1), A (H3N2) and B viruses co-circulated throughout the season. Influenza A viruses accounted for 71% of the specimens testing positive for flu by public health laboratories while influenza B viruses accounted for 29%.

Early in the season, influenza A (H1N1) viruses predominated, however, as the season progressed, an increasing proportion of sub-typed* influenza A viruses were influenza A (H3N2) viruses. Late in the season, when overall influenza activity was declining, influenza B viruses were more commonly reported than influenza A viruses. Overall, for the 2007-2008 U.S. flu season, influenza A (H3N2) viruses were most commonly reported.

* Subtyping is the process of identifying an influenza A virus by its genetic and antigenic (biological) properties to determine if it is an influenza A (H3N2) or influenza A (H1N1) virus. Flu A viruses are subtyped in public health laboratories, such as state department of health laboratories and CDC Influenza Division laboratories.

How well did circulating viruses match the vaccine strains during the 2007-2008 season?

The majority (66%) of influenza A (H1N1) viruses were found to be similar to the vaccine strain. However, 77% of influenza A (H3N2) and 98% of B viruses sent to CDC for further testing were not optimally matched to the 2007-2008 influenza vaccine strains.

Why were two of the three strains in this season's flu vaccine less than optimally matched to circulating viruses?

Flu viruses are always changing. They can change from the time the vaccine is recommended and the beginning of the flu season, or they can even change during a flu season. Each year, experts study thousands of flu virus samples from around the world to figure out which viruses are making people sick and how these viruses are changing. With this information, they forecast which three viruses are most likely to make the most people sick during the *next* flu season. Each year, the seasonal influenza vaccine contains three influenza virus strains – one influenza A (H3N2) virus, one influenza A (H1N1) virus, and one influenza B virus. The selection of which viruses to include in the vaccine must be made in February of the prior year in order for vaccine to be produced in time for distribution the following season. For this reason, there is always the possibility of a less than optimal match between viruses in the vaccine and circulating viruses. For more information about the vaccine strain selection process, visit Selecting the Viruses in the Influenza (Flu) Vaccine.

In terms of the influenza A (H3N2) virus strain selection for the 2007-2008 vaccine, in February of 2007, there were few influenza A (H3N2) virus samples available to guide the selection of the H3N2 vaccine component. While the H3N2 A/Brisbane-like virus that became the predominant virus in the U.S. this season first emerged in Australia in 2007, there was no clear indication that this virus would become the predominant virus causing illness. In addition, there were very few influenza A (H3N2) samples and nothing suitable as a strain for vaccine production. For this reason, the World Health Organization and the Vaccines and Related Biologicals Advisory Committee in the U.S. Food and Drug Administration recommended that the influenza A (H3N2) component of the 2007-2008 influenza vaccine would remain the same as the

previous season because influenza A (H3N2) viruses similar to the vaccine strain were still circulating and no other candidate reference strains were available. CDC continued to monitor this situation closely and frequently updated information on circulating strains and public health and public education guidance based on this information throughout the season.

In terms of the selection of the B/Yamagata lineage for inclusion in the 2007-2008 vaccine, in February 2007, both B/Yamagata and B/Victoria viruses were co-circulating, however the B/Victoria lineage was predominant at the time. B/Victoria and B/Yamagata viruses are antigenically and genetically far apart. With two co-circulating B lineages, it's more difficult to forecast which B lineage will predominate for the next season. At the time the vaccine virus selection decision was made, is was not yet clear that B/Yamagata viruses would become the predominant B viruses circulating in the United States this season.

Can the vaccine provide protection even if the vaccine is not a "good" match?

Yes, antibodies made in response to vaccination with one strain of influenza viruses can provide protection against different, but related strains. A less than ideal match may result in reduced vaccine effectiveness against the variant viruses, but it can still provide enough protection to prevent or lessen illness severity and prevent flu-related complications. In addition, it's important to remember that the influenza vaccine contains three virus strains so that even when there is a less than ideal match or lower effectiveness against one strain, the vaccine may protect against the other two viruses. For these reasons, even during seasons when there is a less than ideal match, CDC continues to recommend influenza vaccination. This is particularly important for people at high risk for serious flu complications and their close contacts.

How often are the vaccine and circulating virus strains well matched?

In recent years the match between the vaccine viruses and those identified during the flu season has usually been good. In 16 of the last 20 U.S. influenza seasons, including the 2007-2008 season, the viruses in the influenza vaccine have been well matched to the predominant circulating viruses. Since 1988, there has only been one season (1997-1998) when there was very low cross-reaction between the viruses in the vaccine and the predominate circulating virus and three seasons (1992-1993, 2003-2004, and 2007-2008) when there was low cross-reaction.

What did we see during the 2007-2008 season in terms of antiviral resistance monitoring or surveillance in the United States?

During the 2007-2008 flu season, a small increase in the number of flu viruses resistant to the neuraminidase inhibitor oseltamivir was observed. Among specimens collected since October 1, 2007, 111 (10.9%) of the 1,020 influenza A (H1N1) viruses tested were found to be resistant to oseltamivir, an increase from four (0.7%) of 588 influenza A (H1N1) viruses tested during the 2006-2007 season. No resistance to oseltamivir was identified among the 444 influenza A (H3N2) or the 305 influenza B viruses tested.

CDC laboratory surveillance has indicated continued high resistance among influenza virus isolates to the adamantanes (amantadine and rimantadine) in the United States. Among specimens collected since October 1, 2007, 99.8% of influenza A (H3N2) viruses tested were resistant to the adamantanes. Adamantane resistance among influenza A (H1N1) viruses has been detected at a lower level with 10.8% of influenza A (H1N1) viruses resistant to adamantanes.

Did CDC recommend any changes to the guidance on the use of antivirals for the 2007-2008 influenza season?

No, CDC did not recommending any changes to the guidance on the use of influenza antivirals. CDC and the Advisory Committee on Immunization Practices (ACIP) recommended that oseltamivir (brand name Tamiflu®) or zanamivir (brand name Relenza®) be used for the treatment and prevention of flu in the United States during the 2007-2008 season. Although amantadine and rimantadine (two other influenza antiviral drugs) also are FDA-approved for treatment or prevention of influenza, these two drugs were NOT recommended for use in the United States during the 2007-2008 flu season because many recent flu viruses are resistant to these drugs. This guidance can be found in Prevention & Control of Influenza – Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 2007 Jul 13;56(RR06):1-54.

What was this season like in terms of bacterial co-infections, including *Staphylococcus aureus* with flu?

Staphylococcus aureus, with flu:

Bacterial infections can occur as co-infections with influenza or occur following influenza infection. In 2006-2007, CDC noted an increase in flu and *Staphylococcus aureus (S. aureus)* co-infections among children who had died or were hospitalized with influenza infection. Some of those infections were with methicillin-resistant *S. aureus* (MRSA). CDC is working with state and local public health authorities to monitor and investigate flu-*S. aureus* co-infections, including pneumonias and other types of *S. aureus* infections. On January 30, 2008 CDC issued a Health Advisory on Influenza-Associated Pediatric Mortality and Staphylococcus aureus co-infection. For more information about flu and staph infections visit Seasonal Flu and Staph Infection.

Flu Deaths in Children

Flu-associated deaths in children (defined as persons aged 18 years and younger) first became a nationally notifiable condition during the 2004-2005 flu season and are reported through the National Notifiable Diseases Surveillance System (NNDSS). The number of flu-associated deaths among children reported during the 2007-2008 flu season can be found at Flu Activity & Surveillance.

How many children have died from flu-associated complications during previous flu seasons?

- During the 2003-2004 season, 153 flu-associated deaths in children were reported to CDC. (This data was collected by CDC.)
- During the 2004-2005 season, 47 deaths in children were reported to CDC. (This is the first year that influenza mortality in children became a nationally reportable condition.)
- During the 2005-2006 season, 46 deaths in children were reported to CDC.
- During the 2006-2007 season, 76 deaths in children were reported to CDC.
- As of June 14, 2008, 83 deaths in children occurring during the 2007-2008 season have been reported to CDC.

(Note: The counts above are of flu-associated deaths among children according to the flu season the deaths occur, not when they are reported to CDC.)

What can be done to protect children from flu-associated illness and death?

Vaccination remains the best method for preventing flu and its potentially severe complications in children. There are two types of vaccines that protect against the flu. The “flu shot” is an inactivated vaccine (containing killed virus) approved for use among people 6 months of age or older, including healthy people and those with chronic medical conditions (such as asthma, diabetes, or heart disease). The nasal-spray flu vaccine (sometimes referred to as LAIV for Live Attenuated Influenza Vaccine or FluMist®) contains attenuated (weakened) live viruses, and is administered by nasal sprayer. It is approved for use only among healthy* people 2-49 years of age who are not pregnant. Children under 6 months old can become very sick from the flu, but they are too young to get a flu vaccine. The best way to protect young children is to make sure that their household members and their caregivers are vaccinated.

Children 6 months to 9 years of age getting a flu shot **for the first time** will need two doses of vaccine the first year they are vaccinated, with the first dose ideally being given in September. The second dose should be given 28 or more days after the first dose. The first dose “primes” the immune system; the second dose provides immune protection. Keep this in mind if your child needs the two doses—begin the process early. It usually takes about two weeks after the second dose for protection to begin.

Vaccination should begin in September or as soon as vaccine is available. Though it varies, the flu season can last as late as May and sporadic cases of flu occur year round. For more information, see Children, the Flu, and the Flu Vaccine.

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* “Healthy” indicates persons who do not have an underlying medical condition that predisposes them to influenza complications.

**The most up-to-date influenza surveillance summaries can be found at Flu Activity & Surveillance.

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