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Seasonal Influenza (Flu)

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2009-2010 Influenza Season Week 50 ending December 19, 2009

All data are preliminary and may change as more reports are received.

Synopsis:

During week 50 (December 13-19, 2009), influenza activity continued to decrease in the U.S.

- 306 (6.9%) specimens tested by U.S. World Health Organization (WHO) and National Respiratory and Enteric Virus Surveillance System (NREVSS) collaborating laboratories and reported to CDC/Influenza Division were positive for influenza.
- All subtyped influenza A viruses being reported to CDC were 2009 influenza A (H1N1) viruses.
- The proportion of deaths attributed to pneumonia and influenza (P&I;) was below the epidemic threshold.
- Nine influenza-associated pediatric deaths were reported. Eight of these deaths were associated with 2009 influenza A (H1N1) virus infection and one was associated with an influenza A virus for which the subtype was undetermined.
- The proportion of outpatient visits for influenza-like illness (ILI) was 2.3% which is at the national baseline of 2.3%. Seven of the 10 regions (1, 3, 5, 6, 7, 8 and 10) reported ILI below region-specific baseline levels.
- Seven states reported geographically widespread influenza activity, 18 states reported regional influenza activity, the District of Columbia, Puerto Rico, and 13 states reported local influenza activity, the U.S. Virgin Islands and 11 states reported sporadic influenza activity, Guam and one state reported no influenza activity.

National and Regional Summary of Select Surveillance Components

HHS Surveillance Regions*	Data for current week			Data cumulative since August 30, 2009 (Week 35)*						
	Out-patient ILI†	% positive for flu‡	Number of jurisdictions reporting regional or widespread activity§	A (H1)	A (H3)	2009 A (H1N1)	A (unable to sub-type)¥	A (Subtyping not performed)	B	Pediatric Deaths
Nation	Elevated	6.9 %	25 of 54	28	49	60,113	311	18,810	206	221
Region 1	Normal	10.9 %	5 of 6	6	4	3,249	14	462	12	5
Region 2	Elevated	11.1 %	2 of 4	2	4	1,302	0	1,055	4	9
Region 3	Normal	6.0 %	3 of 6	3	7	10,501	48	1,430	14	13
Region 4	Elevated	10.8 %	5 of 8	0	4	7,002	88	4,061	57	42
Region 5	Normal	9.8 %	1 of 6	6	19	9,247	52	1,305	11	29
Region 6	Normal	3.3 %	2 of 5	0	3	3,307	45	4,657	39	63
Region 7	Normal	3.5 %	1 of 4	3	1	3,265	3	754	2	8
Region 8	Normal	7.7 %	1 of 6	6	2	9,671	0	3,671	57	13
Region 9	Elevated	11.5 %	4 of 5	0	4	8,088	47	1,101	8	30
Region 10	Normal	10.8 %	1 of 4	2	1	4,481	14	314	2	9

*Influenza season officially begins each year at week 40. This season data from week 35 will be included to show the trend of influenza activity before the official start of the 2009-10 influenza season.

**HHS regions (Region 1 CT, ME, MA, NH, RI, VT; Region 2: NJ, NY, Puerto Rico, US Virgin Islands; Region 3: DE, DC, MD, PA, VA, WV; Region 4: AL, FL, GA, KY, MS, NC, SC, TN; Region 5: IL, IN, MI, MN, OH, WI; Region 6: AR, LA, NM, OK, TX; Region 7: IA, KS, MO, NE; Region 8: CO, MT, ND, SD, UT, WY; Region 9: AZ, CA, Guam, HI, NV; and Region 10: AK, ID, OR, WA).

† Elevated means the % of visits for ILI is at or above the national or region-specific baseline

‡ National data are for current week; regional data are for the most recent three weeks

§ Includes all 50 states, the District of Columbia, Guam, Puerto Rico, and U.S. Virgin Islands

¥ Subtyping results for the majority of specimens in this category were inconclusive because of low virus titers.

U.S. Virologic Surveillance:

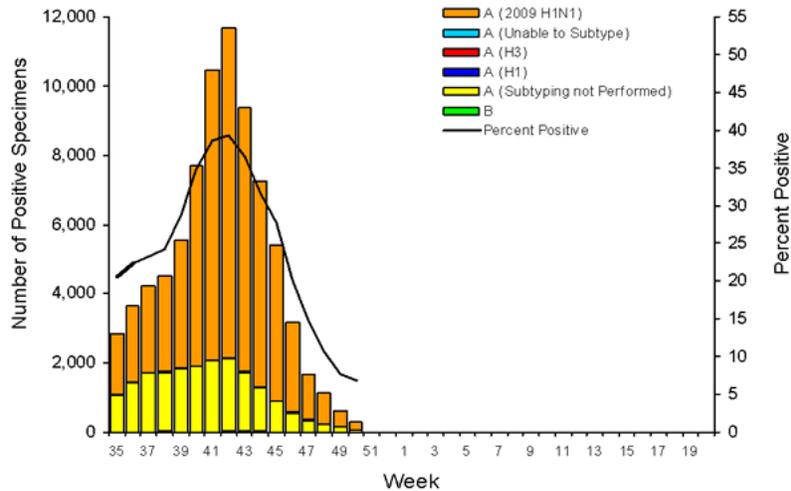
WHO and NREVSS collaborating laboratories located in all 50 states and Washington D.C., report to CDC the number of respiratory specimens tested for influenza and the number positive by influenza type and subtype. The results of tests performed during the current week are summarized in the table below.

	Week 50
No. of specimens tested	4,440
No. of positive specimens (%)	306 (6.9%)
Positive specimens by type/subtype	
Influenza A	303 (99.0%)
A (2009 H1N1)	233 (76.9%)
A (subtyping not performed)	66 (21.8%)
A (unable to subtype)*	4 (1.3%)
A (H3)	0 (0.0%)
A (H1)	0 (0.0%)
Influenza B	3 (1.0%)

*Subtyping results for all four specimens in this category were inconclusive because of low levels of viral RNA.

During week 50, influenza B viruses co-circulated at low levels with 2009 influenza A (H1N1) viruses. All subtyped influenza A viruses reported to CDC this week were 2009 influenza A (H1N1) viruses.

Influenza Positive Tests Reported to CDC by U.S. WHO/NREVSS Collaborating Laboratories, National Summary, 2009-10

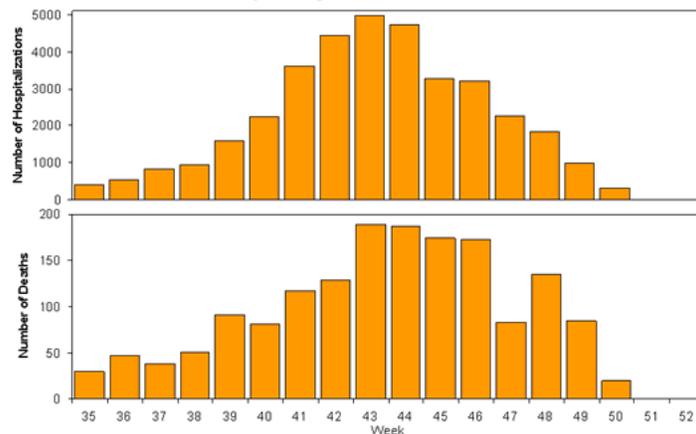


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Pneumonia and Influenza Hospitalization and Death Tracking:

This new system was implemented on August 30, 2009, and replaces the weekly report of laboratory confirmed 2009 H1N1-related hospitalizations and deaths that began in April 2009. Jurisdictions can now report to CDC counts of hospitalizations and deaths resulting from all types or subtypes of influenza, not just those from 2009 H1N1 influenza virus. To allow jurisdictions to implement the new case definition, counts were reset to zero on August 30, 2009. From August 30 – December 19, 2009, 36,163 laboratory-confirmed influenza-associated hospitalizations and 1,630 laboratory-confirmed influenza-associated deaths were reported to CDC. CDC will continue to use its traditional surveillance systems to track the progress of the 2009-10 influenza season.

Weekly Laboratory-Confirmed Influenza-Associated Hospitalizations and Deaths, National Summary, August 30 – December 19, 2009



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Antigenic Characterization:

CDC has antigenically characterized one seasonal influenza A (H1N1), six influenza A (H3N2), five influenza B, and 632 2009 influenza A (H1N1) viruses collected since September 1, 2009.

One seasonal influenza A (H1N1) virus was tested and is related to the influenza A (H1N1) component of the 2009-10 Northern Hemisphere influenza vaccine (A/Brisbane/59/2007).

The six influenza A (H3N2) viruses tested showed reduced titers with antisera produced against A/Brisbane/10/2007, the 2009-2010 Northern Hemisphere influenza A (H3N2) vaccine component, and were antigenically related to A/Perth/16/2009, the WHO recommended influenza A (H3N2) component of the 2010 Southern Hemisphere vaccine formulation.

Influenza B viruses currently circulating globally can be divided into two distinct lineages represented by the B/Yamagata/16/88 and B/Victoria/02/87 viruses. The influenza B component of the 2009-10 vaccine belongs to the B/Victoria lineage. The five influenza B viruses tested belong to the B/Victoria lineage and are related to the influenza vaccine component for the 2009-10 Northern Hemisphere influenza vaccine (B/Brisbane/60/2008).

Six hundred thirty (99.7%) of 632 2009 influenza A (H1N1) viruses tested are related to the A/California/07/2009 (H1N1) reference virus selected by WHO as the 2009 H1N1 vaccine virus and two viruses (0.3%) tested showed reduced titers with antiserum produced against A/California/07/2009.

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Annual influenza vaccination is expected to provide the best protection against those virus strains that are related to the vaccine strains, but limited to no protection may be expected when the vaccine and circulating virus strains are so different as to be from different lineages. Antigenic characterization of 2009 influenza A (H1N1) viruses indicates that these viruses are only distantly related antigenically and genetically to seasonal influenza A (H1N1) viruses, suggesting that little to no protection would be expected from vaccination with seasonal influenza vaccine. It is too early in the influenza season to determine if seasonal influenza viruses will circulate widely or how well the seasonal vaccine and circulating strains will match.

Antiviral Resistance:

Since September 1, 2009, one seasonal influenza A (H1N1), eight influenza A (H3N2), one influenza B, and 631 2009 influenza A (H1N1) virus isolates have been tested for resistance to the neuraminidase inhibitors (oseltamivir and zanamivir), and 1,753 2009 influenza A (H1N1) original clinical samples were tested for a single known mutation in the virus that confers oseltamivir resistance. In addition, one seasonal influenza A (H1N1), six influenza A (H3N2), and 620 2009 influenza A (H1N1) virus isolates have been tested for resistance to the adamantanes (amantadine and rimantadine). The results of antiviral resistance testing performed on these viruses are summarized in the table below. Additional laboratories perform antiviral testing and report their results to CDC and positive results from that testing are included in the footnote.

Antiviral Resistance Testing Results on Samples Collected Since September 1, 2009.

	Samples tested (n)	Resistant Viruses, Number (%)		Samples tested (n)	Resistant Viruses, Number (%)		Samples tested (n)	Resistant Viruses, Number (%)
		Osetamivir	Zanamivir		Osetamivir	Zanamivir		
Seasonal Influenza A (H1N1)	1	1 (100.0)	0 (0)	0	0 (0)	0 (0)	1	0 (0)
Influenza A (H3N2)	8	0 (0)	0 (0)	0	0 (0)	0 (0)	6	0 (0)
Influenza B	1	0 (0)	0 (0)	0	0 (0)	0 (0)	N/A*	0 (0)
2009 Influenza A (H1N1)	2,384	34†* (1.4)	0 (0)	631	0 (0)	0 (0)	620	0 (0)

*The adamantanes (amantadine and rimantadine) are not effective against influenza B viruses.

†Two screening tools were used to determine oseltamivir resistance: sequence analysis of viral genes or a neuraminidase inhibition assay.

*Additional laboratories perform antiviral resistance testing and report their results to CDC. Two additional oseltamivir resistant 2009 influenza A (H1N1) virus has been identified by these laboratories since September 1, 2009, bringing the total number to 36.

All of the subtyped influenza A viruses reported during week 50 were 2009 influenza A (H1N1) viruses, and the majority of 2009 H1N1 viruses tested since April 2009 have been resistant to the adamantanes (amantadine and rimantadine).

Antiviral treatment with oseltamivir or zanamivir is recommended for all patients with confirmed or suspected influenza virus infection who are hospitalized or who are at higher risk for influenza complications. Additional information on antiviral recommendations for treatment and chemoprophylaxis of influenza virus infection is available at <http://www.cdc.gov/h1n1flu/recommendations.htm>.

2009 influenza A (H1N1) viruses were tested for oseltamivir resistance by a neuraminidase inhibition assay and/or detection of genetic sequence mutation, depending on the type of specimen tested. Original clinical samples were examined for a single known mutation in the virus that confers oseltamivir resistance in currently circulating seasonal influenza A (H1N1) viruses, while influenza virus isolates were tested using a neuraminidase inhibition assay that determines the presence or absence of neuraminidase inhibitor resistance, followed by the neuraminidase gene sequence analysis of resistant viruses.

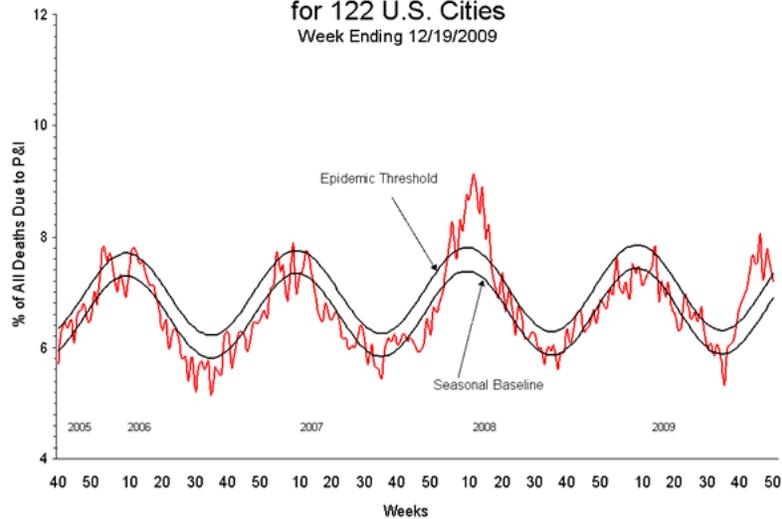
The majority of 2009 influenza A (H1N1) viruses are susceptible to the neuraminidase inhibitor antiviral medication oseltamivir; however, rare sporadic cases of oseltamivir resistant 2009 influenza A (H1N1) viruses have been detected worldwide. A total of 46 cases of oseltamivir resistant 2009 influenza A (H1N1) viruses have been identified in the United States since April 2009, including 2 newly identified cases since last week. In specimens collected since September 1, 2009, 36 cases have been identified in the United States. The proportion of oseltamivir-resistant 2009 H1N1 viruses does not represent the prevalence of oseltamivir-resistant 2009 H1N1 in the U.S. Most cases were tested because drug resistance was suspected. All tested viruses retain their sensitivity to the neuraminidase inhibitor zanamivir. Of the 46 total cases identified, 33 patients had documented exposure to oseltamivir through either treatment or chemoprophylaxis, 11 patients are under investigation to determine exposure to oseltamivir, and two patients had no documented oseltamivir exposure. Occasional development of oseltamivir resistance during treatment or prophylaxis is not unexpected. Enhanced surveillance, an increased availability of testing performed at CDC, and an increasing number of public health and other clinical laboratories performing antiviral resistance testing increase the number of cases of oseltamivir resistant 2009 influenza A (H1N1) viruses detected. All cases are investigated to assess the spread of resistant strains in the community.

To prevent the spread of antiviral resistant virus strains, CDC reminds clinicians and the public of the need to continue hand and cough hygiene measures for the duration of any symptoms of influenza, even while taking antiviral medications (<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5832a3.htm>).

Pneumonia and Influenza (P&I) Mortality Surveillance

During week 50, 7.2% of all deaths reported through the 122-Cities Mortality Reporting System were due to P&I. This percentage was below the epidemic threshold of 7.3% for week 50.

**Pneumonia and Influenza Mortality
for 122 U.S. Cities
Week Ending 12/19/2009**



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Influenza-Associated Pediatric Mortality

Nine influenza-associated pediatric deaths were reported to CDC during week 50 (Iowa [3], New Jersey, New York [2], Ohio, South Carolina, and West Virginia). Eight of these deaths were associated with 2009 influenza A (H1N1) virus infection and one was associated with an influenza A virus for which the subtype is undetermined. The deaths reported during week 50 occurred between October 11 and December 12, 2009.

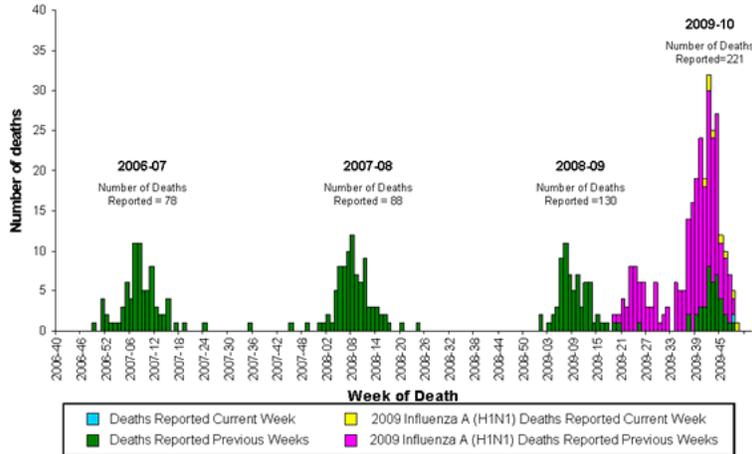
Since August 30, 2009, CDC has received 221 reports of influenza-associated pediatric deaths that occurred during the current influenza season (40 deaths in children less than 2 years old, 25 deaths in children 2-4 years old, 81 deaths in children 5-11 years old, and 75 deaths in children 12-17 years old). One hundred eighty-one (82%) of the 221 deaths were due to 2009 influenza A (H1N1) virus infections, 39 were associated with influenza A virus for which the subtype is undetermined, and one was associated with an influenza B virus infection. A total of 241 deaths in children associated with 2009 influenza A (H1N1) virus infection have been reported to CDC.

Among the 221 deaths in children, 104 children had specimens collected for bacterial culture from normally sterile sites and 33 (31.7%) of the 104 were positive; *Streptococcus pneumoniae* was identified in 10 (30.3%) of the 33 children and *Staphylococcus aureus* was identified in eight (24.2%) of the 33 children. One *S. aureus* isolate was sensitive to methicillin, six were methicillin resistant, and one did not have sensitivity testing performed. Twenty-two (66.7%) of the 33 children with bacterial coinfections were five years of age or older, and 10 (30.3%) of the 33 children were 12 years of age or older.

Laboratory-Confirmed Influenza-Associated Pediatric Deaths by Date and Type/Subtype of Influenza.

Date	2009 H1N1 Influenza	Influenza A-Subtype Unknown	Seasonal Influenza	Total
Number of Deaths REPORTED for Current Week – Week 50 (Week ending December 19, 2009)	8	1	0	9
Number of Deaths OCCURRED since August 30, 2009	181	39	1	221
Number of Deaths OCCURRED since April 26, 2009	241	42	2	285

Number of Influenza-Associated Pediatric Deaths by Week of Death: 2006-07 season to present



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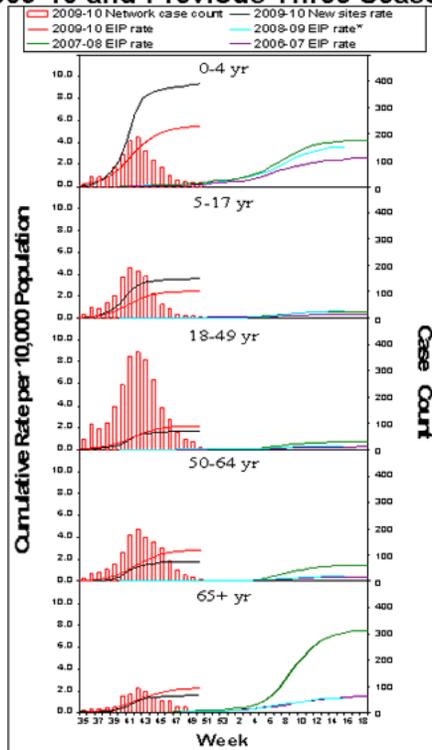
Influenza-Associated Hospitalizations

Laboratory-confirmed influenza-associated hospitalizations are monitored using a population-based surveillance network that includes the 10 Emerging Infections Program (EIP) sites (CA, CO, CT, GA, MD, MN, NM, NY, OR and TN) and 6 new sites (IA, ID, MI, ND, OK and SD).

During September 1, 2009 – December 19, 2009, the following preliminary laboratory-confirmed overall influenza associated hospitalization rates were reported by EIP and the new sites (*rates include influenza A, influenza B, and 2009 influenza A (H1N1)*):

Rates [EIP (new sites)] for children aged 0-4 years and 5-17 years were 5.5 (9.4) and 2.4 (3.6) per 10,000, respectively. Rates [EIP (new sites)] for adults aged 18-49 years, 50-64 years, and ≥ 65 years were 2.2 (1.7), 2.8 (1.8) and 2.2 (1.6) per 10,000, respectively.

EIP Influenza Laboratory-Confirmed Cumulative Hospitalization Rates, 2009-10 and Previous Three Seasons*



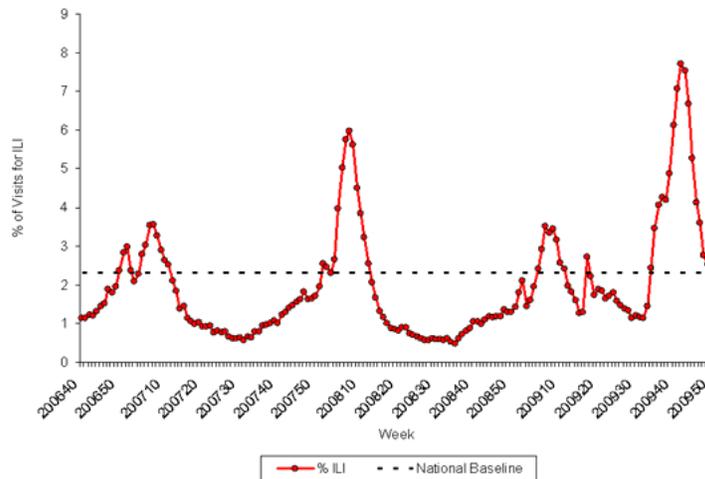
*The 2008-09 EIP rate ended as of April 14, 2009 due to the onset of the 2009 H1N1 season.

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Outpatient Illness Surveillance:

Nationwide during week 50, 2.3% of patient visits reported through the U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet) were due to influenza-like illness (ILI). This percentage is at the national baseline of 2.3%.

Percentage of Visits for Influenza-like Illness (ILI) Reported by the U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet), Weekly National Summary, October 1, 2006 – December 19, 2009



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On a regional level, the percentage of outpatient visits for ILI ranged from 0.7% to 3.7% during week 50. Three of the 10 regions reported a proportion of outpatient visits for ILI above their region-specific baseline levels. Regions 1, 3, 5, 6, 8, 7, and 10 reported ILI below their region-specific baselines.

Geographic Spread of Influenza as Assessed by State and Territorial Epidemiologists:

The influenza activity reported by state and territorial epidemiologists indicates geographic spread of both seasonal influenza and 2009 influenza A (H1N1) viruses and does not measure the severity of influenza activity.

- During week 50, the following influenza activity was reported:
 - Widespread influenza activity was reported by seven states (Alabama, California, Delaware, Maine, Nevada, New Jersey, and Virginia).
 - Regional influenza activity was reported by 18 states (Alaska, Arizona, Connecticut, Florida, Georgia, Hawaii, Indiana, Kentucky, Louisiana, Missouri, New Hampshire, New Mexico, New York, Rhode Island, Tennessee, Utah, Vermont, and West Virginia).
 - Local influenza activity was reported by the District of Columbia, Puerto Rico, and 13 states (Illinois, Maryland, Massachusetts, Michigan, Mississippi, Montana, North Carolina, Oklahoma, Oregon, Pennsylvania, South Carolina, Texas, and Washington).
 - Sporadic influenza activity was reported by the U.S. Virgin Islands, and 11 states (Arkansas, Colorado, Idaho, Iowa, Kansas, Minnesota, North Dakota, Ohio, South Dakota, Wisconsin, and Wyoming).
 - Guam and one state (Nebraska) reported no influenza activity

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A description of surveillance methods is available at: <http://www.cdc.gov/flu/weekly/fluactivity.htm>

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