

2009-2010 Influenza Season Week 42 ending October 24, 2009

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

Synopsis: During week 42 (October 18-24, 2009), influenza activity increased in the U.S.

- 8,268 (42.1%) 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 above the epidemic threshold.
- Twenty-two influenza-associated pediatric deaths were reported. Nineteen of these deaths were associated with 2009 influenza A (H1N1) virus infection and three were associated with an influenza A virus for which the subtype was undetermined.
- The proportion of outpatient visits for influenza-like illness (ILI) was above the national baseline. All 10 regions reported ILI above region-specific baseline levels.
- Forty-eight states reported geographically widespread influenza activity, Guam and two states reported regional influenza activity, the District of Columbia and Puerto Rico reported local influenza activity, and the U.S. Virgin Islands did not report.

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 subtype)¶	A (Subtyping not performed)	B	Pediatric Deaths
Nation	Elevated	42.1%	51 of 54	16	33	24,971	280	14,382	88	74
Region 1	Elevated	21.5%	6 of 6	5	2	582	2	61	5	0
Region 2	Elevated	14.2%	2 of 4	1	5	177	0	205	3	0
Region 3	Elevated	51.0%	5 of 6	1	5	5,449	13	703	9	4
Region 4	Elevated	23.0%	8 of 8	0	1	2,797	56	3,130	11	20
Region 5	Elevated	45.8%	6 of 6	3	14	3,805	70	647	10	5
Region 6	Elevated	20.5%	5 of 5	0	3	1,723	3	3,132	8	28
Region 7	Elevated	50.6%	4 of 4	3	1	2,323	114	617	5	1
Region 8	Elevated	41.9%	6 of 6	2	0	3,732	1	5,282	32	7
Region 9	Elevated	28.0%	5 of 5	0	1	2,778	17	499	3	5
Region 10	Elevated	33.2%	4 of 4	1	1	1,605	4	106	2	4

*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.

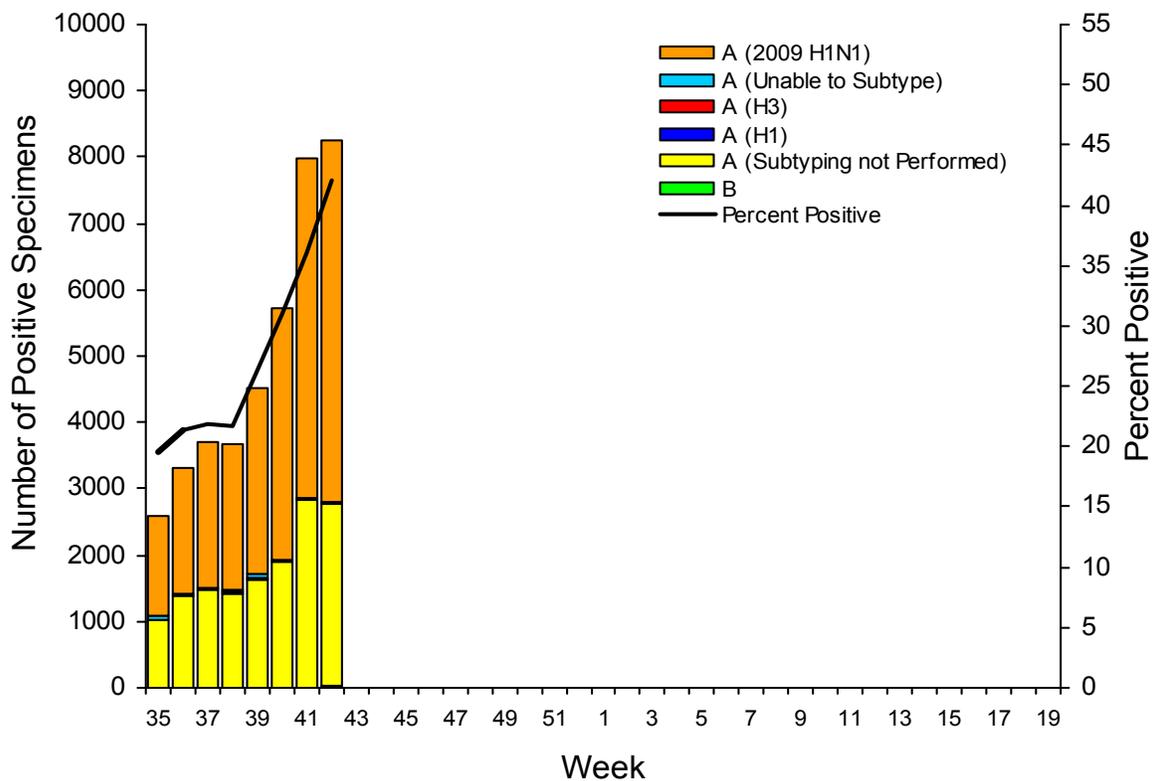
¶ The majority of influenza A viruses that cannot be sub-typed as seasonal influenza viruses are 2009 A (H1N1) influenza viruses upon further testing.

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 42
No. of specimens tested	19,642
No. of positive specimens (%)	8,268 (42.1%)
Positive specimens by type/subtype	
Influenza A	8,247 (99.7%)
A (2009 H1N1)	5,453 (66.1%)
A (subtyping not performed)	2,742 (33.2%)
A (unable to subtype)	52 (0.6%)
A (H3)	0 (0.0%)
A (H1)	0 (0.0%)
Influenza B	21 (0.3%)

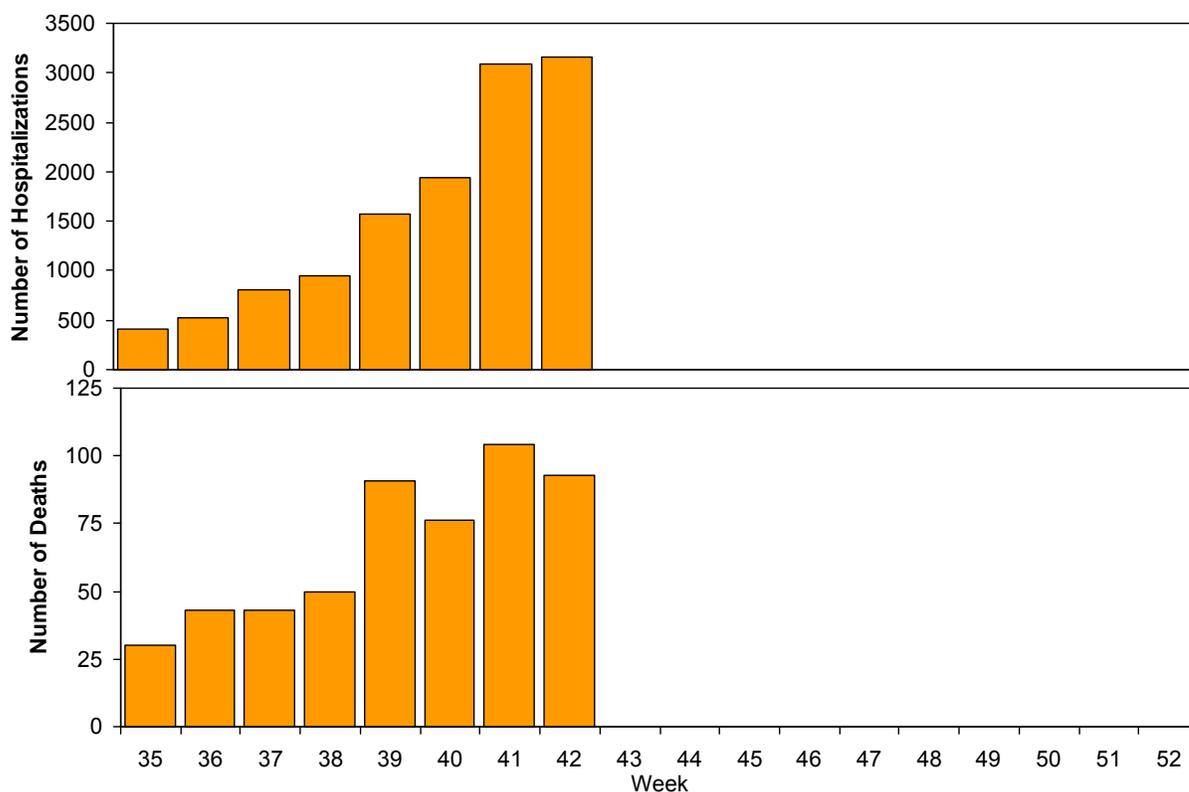
During week 42, influenza B viruses co-circulated at low levels with 2009 influenza A (H1N1) viruses. All subtyped influenza A viruses reported to CDC this week were 2009 influenza A (H1N1) viruses.

Influenza Positive Tests Reported to CDC by U.S. WHO/NREVSS Collaborating Laboratories, National Summary, August 30-October 24, 2009



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 either laboratory confirmed or pneumonia and influenza syndromic-based 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 – October 24, 2009, 12,466 laboratory-confirmed influenza associated hospitalizations, 530 laboratory-confirmed influenza associated deaths, 25,985 pneumonia and influenza syndrome-based hospitalizations, and 2,916 pneumonia and influenza syndrome-based 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 – October 24, 2009



Antigenic Characterization: CDC has antigenically characterized 1 seasonal A (H1N1) and 172 2009 influenza A (H1N1) viruses collected since September 1, 2009. Antigenic characterization of seasonal A (H3N2) and B viruses recently received by CDC is in progress.

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

171 (99.4%) of 172 2009 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 one virus (0.6%) tested showed reduced titers with antisera produced against A/California/07/2009.

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.

Antiviral Resistance: Since September 1, 2009, 166 2009 influenza A (H1N1) virus isolates have been tested for resistance to the neuraminidase inhibitors (oseltamivir and zanamivir), and 564 2009 influenza A (H1N1) original clinical samples were tested for a single known mutation in the virus that confers oseltamivir resistance. In addition, 58 influenza A (H1N1) virus isolates have been tested for resistance to the adamantanes (amantadine and rimantadine). Because of the low level of circulation of seasonal influenza A (H1N1), A (H3N2), and influenza B viruses, no samples collected since September 1, 2009 were available for antiviral resistance testing. Additional laboratories perform antiviral testing and report their results to CDC. The results of antiviral resistance testing performed on these viruses are summarized in the table below.

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

	Viruses tested (n)	Resistant Viruses, Number (%)	Viruses tested (n)	Resistant Viruses, Number (%)	Isolates tested (n)	Resistant Viruses, Number (%)
		Oseltamivir		Zanamivir		Adamantanes
Seasonal Influenza A (H1N1)	0	0 (0)	0	0 (0)	0	0 (0)
Influenza A (H3N2)	0	0 (0)	0	0 (0)	0	0 (0)
Influenza B	0	0 (0)	0	0 (0)	N/A*	N/A*
2009 Influenza A (H1N1)	730	3 ^{†‡} (0.5)	166	0 (0)	58	58 (100)

*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 and a neuraminidase inhibition assay.

‡ Additional laboratories perform antiviral resistance testing and report their results to CDC. Two additional oseltamivir resistant 2009 influenza A (H1N1) viruses have been identified by these laboratories since September 1, 2009, bringing the total number to 5.

All of the subtyped influenza A viruses reported during week 42 were 2009 influenza A (H1N1) viruses, and all 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>.

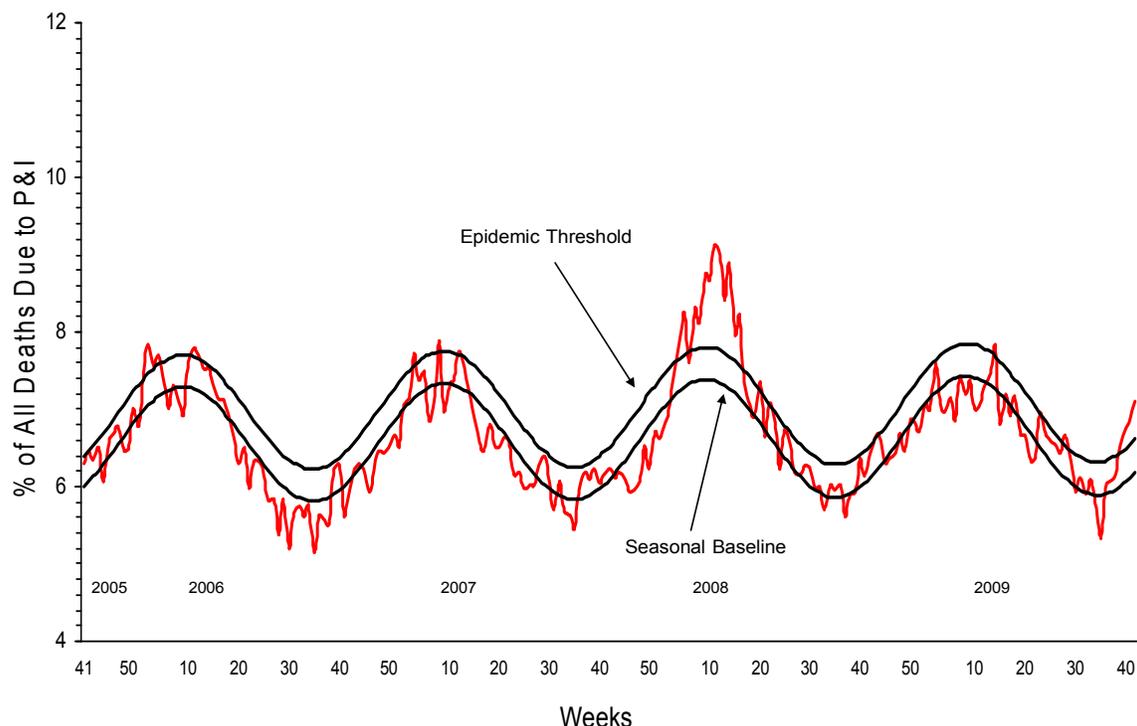
2009 influenza A (H1N1) viruses were tested for oseltamivir resistance by a neuraminidase inhibition assay and/or detection of genetic sequence mutation, depending on the type of specimen tested. Original clinical samples were examined for a single known mutation in the virus that confers oseltamivir 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. Since September 1, 2009, five cases have been identified in the United States, and a total of 14 cases of oseltamivir resistant 2009 influenza A (H1N1) viruses have been identified in the United States since April 2009 (11 viruses identified by CDC and three viruses identified by additional laboratories). All tested viruses retain their sensitivity to the neuraminidase inhibitor zanamivir. Twelve patients (including 10 of the viruses detected at CDC and two viruses identified by the additional laboratories) had documented exposure to oseltamivir through either treatment or chemoprophylaxis, one patient is under investigation to determine exposure to oseltamivir, and one patient had no documented oseltamivir exposure. Occasional development of oseltamivir resistance during treatment or prophylaxis is not unexpected. Enhanced surveillance is expected to detect additional cases of oseltamivir resistant 2009 influenza A (H1N1) viruses, and such cases will be 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 42, 7.1% of all deaths reported through the 122-Cities Mortality Reporting System were due to P&I. This percentage was above the epidemic threshold of 6.6% for week 42. Including week 42, P&I mortality has been above threshold for four consecutive weeks.

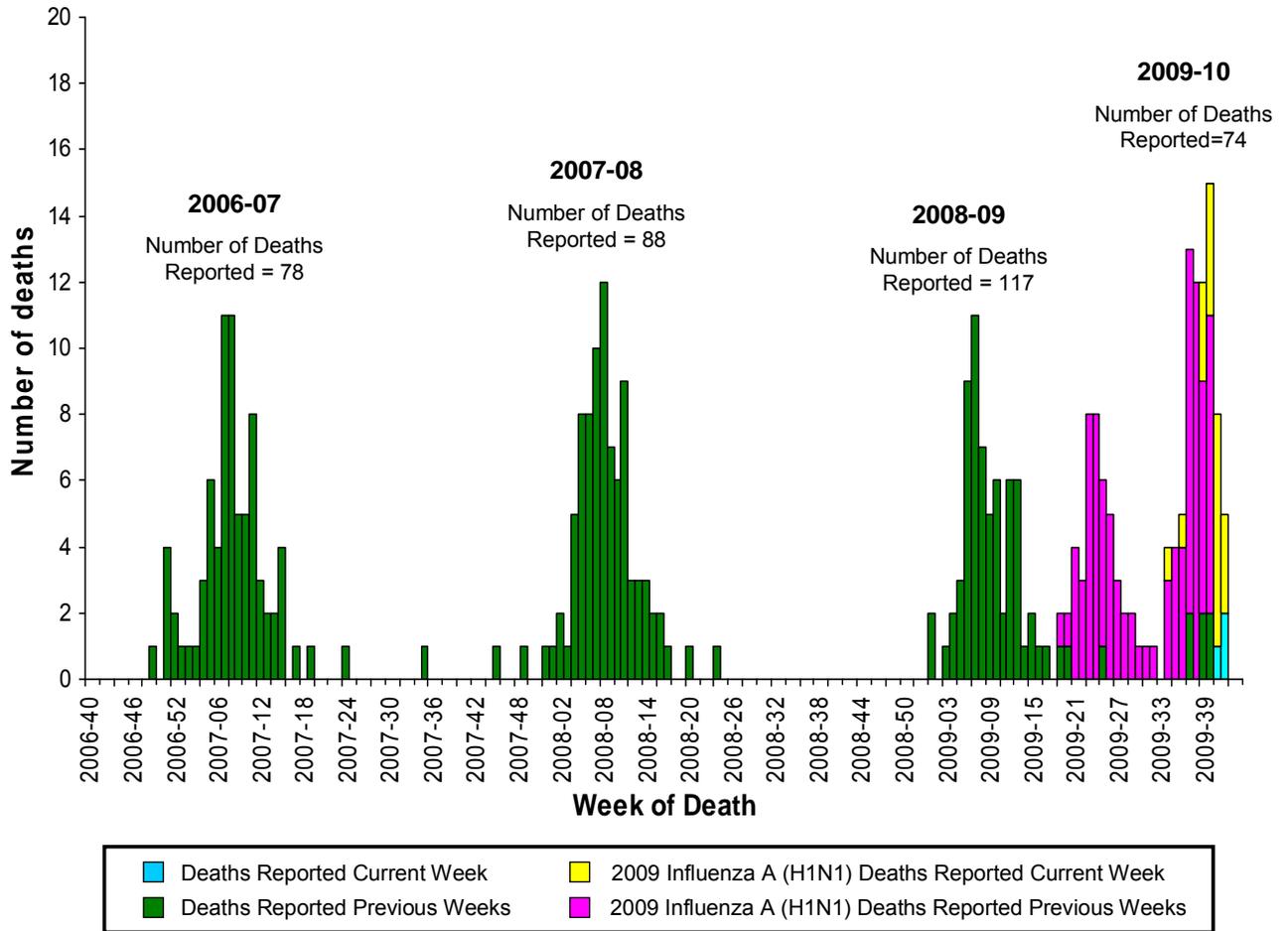
Pneumonia and Influenza Mortality for 122 U.S. Cities Week ending 10/24/2009



Influenza-Associated Pediatric Mortality: Twenty-two influenza-associated pediatric deaths were reported to CDC during week 42 (Arizona [3], Florida, Georgia, Guam, Montana, Ohio, South Dakota, Tennessee [2], Texas [9], Washington, and Wisconsin). Nineteen of these deaths were associated with 2009 influenza A (H1N1) virus infection and three were associated with an influenza A virus for which the subtype is undetermined. These deaths occurred between August 23 and October 24, 2009. One death reported during week 42 occurred during the 2008-09 season. Since August 30, 2009, CDC has received 74 reports of influenza-associated pediatric deaths that occurred during the current influenza season (nine deaths in children less than 2 years old, nine deaths in children 2-4 years old, 27 deaths in children 5-11 years old, and 29 deaths in individuals 12-17 years old). Sixty-five of the 74 deaths were due to 2009 influenza A (H1N1) virus infections, and the remaining nine were associated with influenza A virus for which the subtype is undetermined. A total of 114 deaths in children associated with 2009 H1N1 virus have been reported to CDC.

Among the 74 deaths in children, 47 children had specimens collected for bacterial culture from normally sterile sites and 16 (34.0%) of the 47 were positive; *Staphylococcus aureus* was identified in seven (43.8%) of the 16 children. One *S. aureus* isolate was sensitive to methicillin, five were methicillin resistant, and one did not have sensitivity testing performed. Eleven (68.8%) of the 16 children with bacterial coinfections were five years of age or older, and five (31.3%) of the 16 children were 12 years of age or older.

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

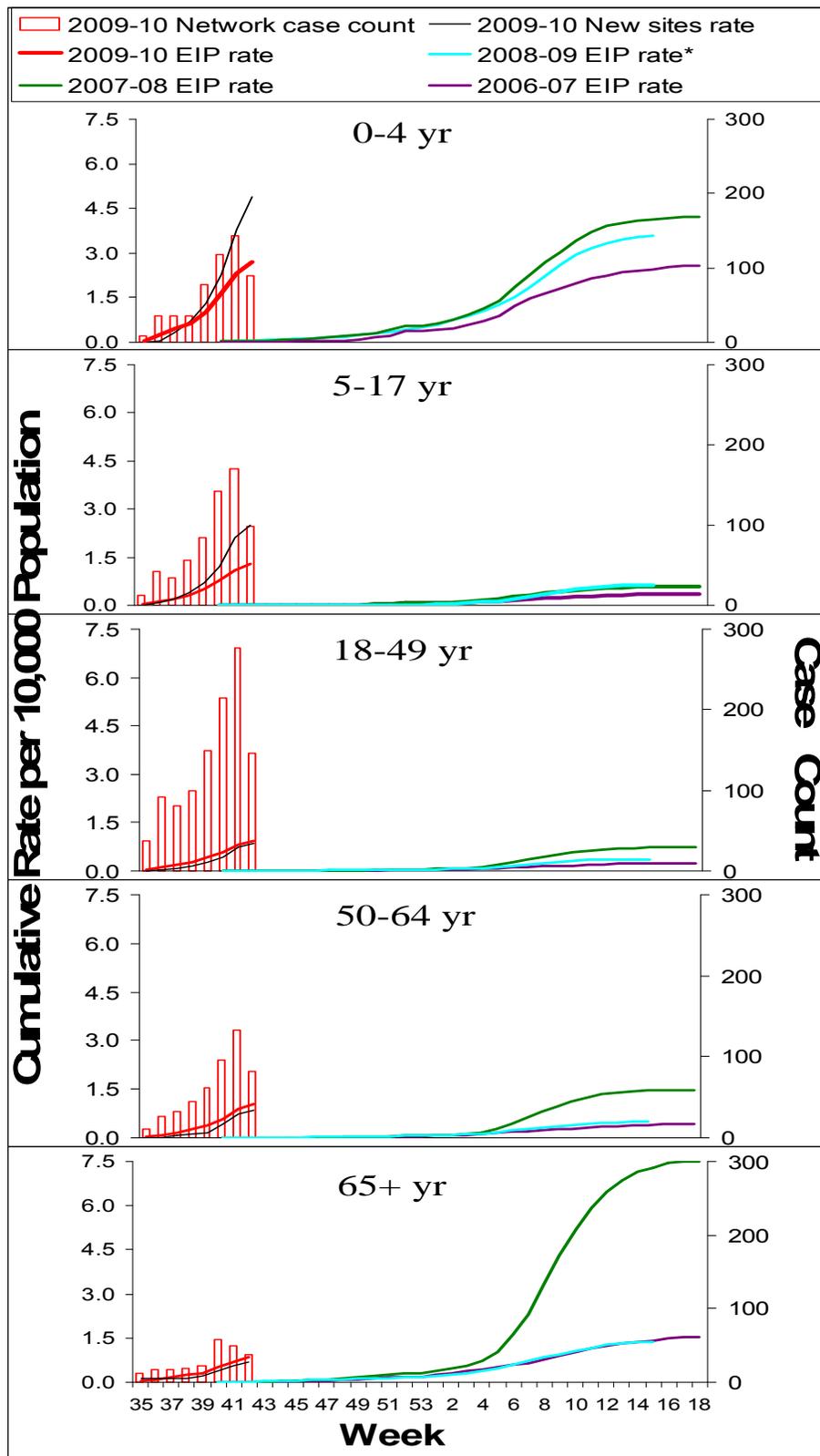


Influenza-Associated Hospitalizations: Laboratory-confirmed influenza-associated hospitalizations are monitored using a population-based surveillance network that includes the 10 Emerging Infections Program (EIP) sites (CA, CO, CT, GA, MD, MN, NM, NY, OR and TN) and 6 new sites (IA, ID, MI, ND, OK and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

During September 1, 2009 – October 24, 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 2.7 (4.9) and 1.3 (2.5) per 10,000, respectively. Rates [EIP (new sites)] for adults aged 18-49 years, 50-64 years, and ≥ 65 years were 0.9 (0.8), 1.0 (0.9) and 0.8 (0.7) per 10,000, respectively.

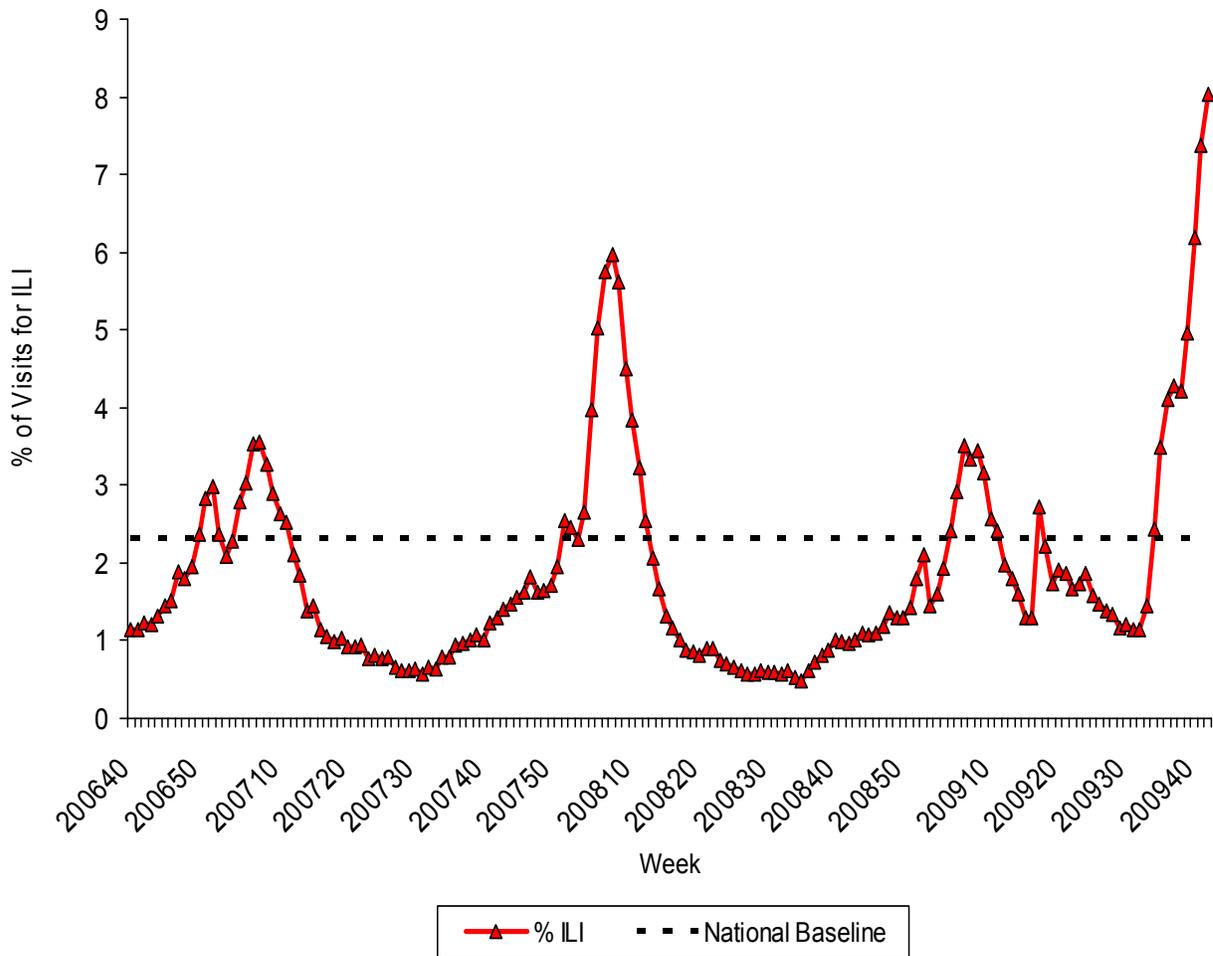
EIP Influenza Laboratory-Confirmed Cumulative Hospitalization Rates, 2009-10 and Previous Three Seasons*



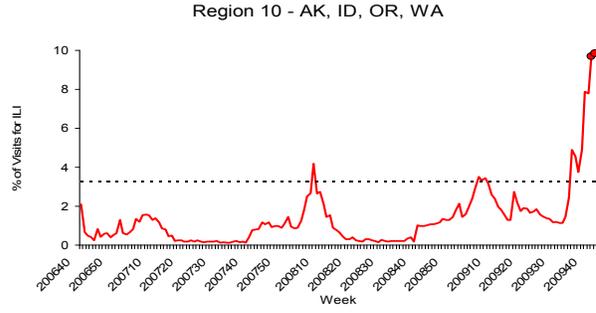
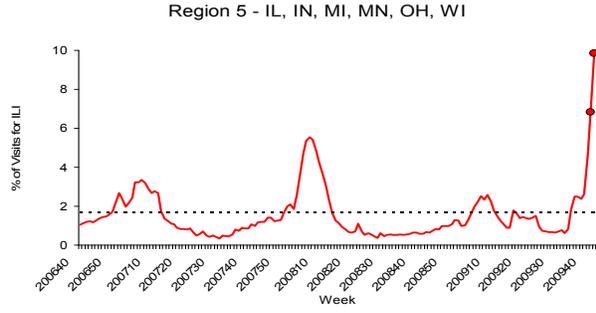
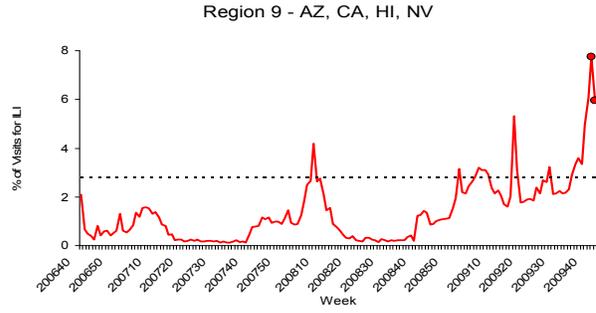
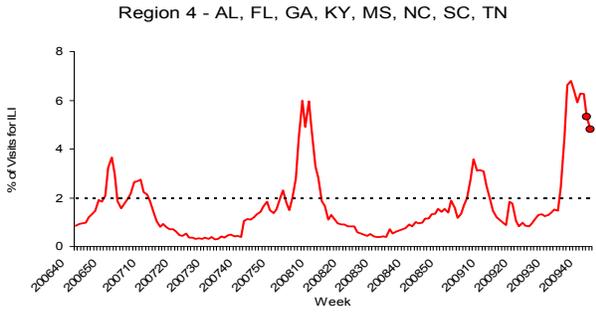
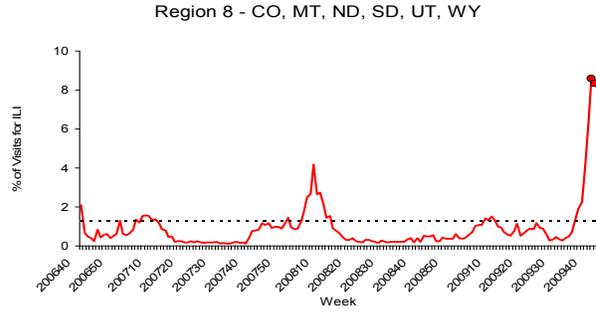
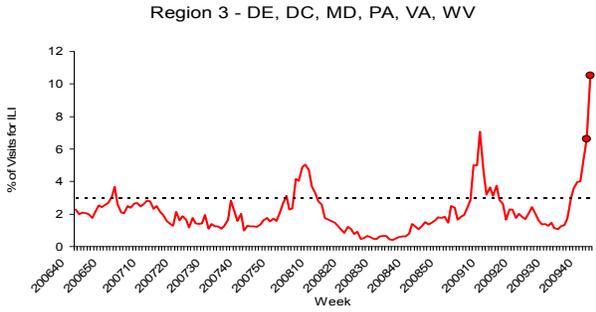
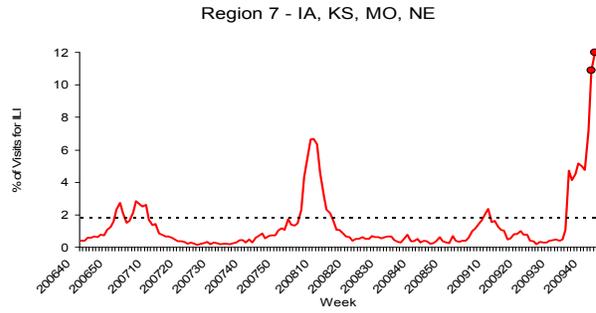
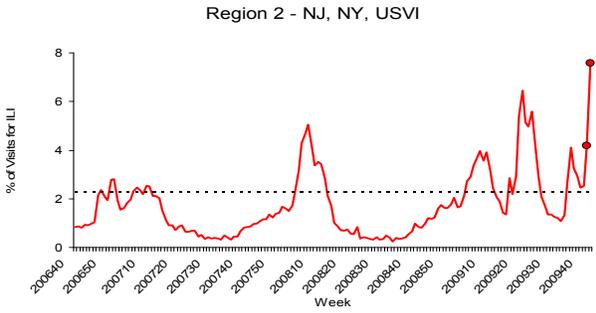
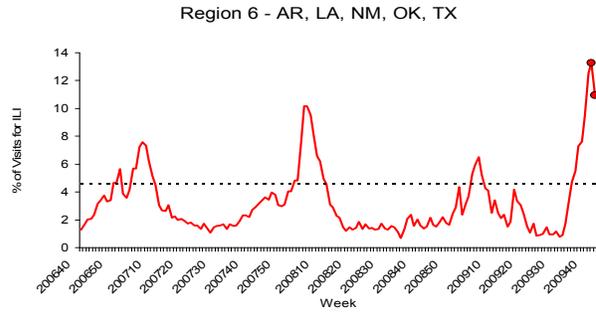
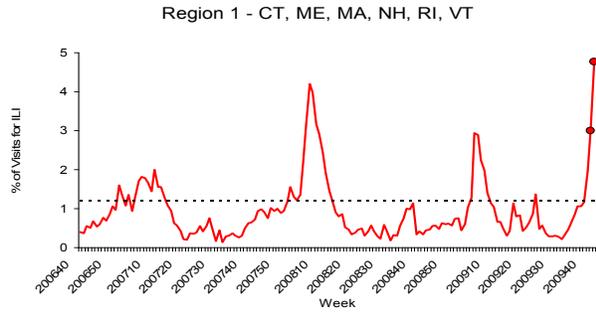
*2006-07 & 2007-08 (Oct 1–Apr 30); 2008-09 (Oct 1–Apr 14, limited due to emergence of 2009 H1N1).

Outpatient Illness Surveillance: Nationwide during week 42, 8.0% 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 above 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 - October 24, 2009



On a regional level, the percentage of outpatient visits for ILI ranged from 4.7% to 12.0% during week 42, and increased in six of the 10 surveillance regions compared to the previous week. All 10 regions reported a proportion of outpatient visits for ILI above their region-specific baseline levels.

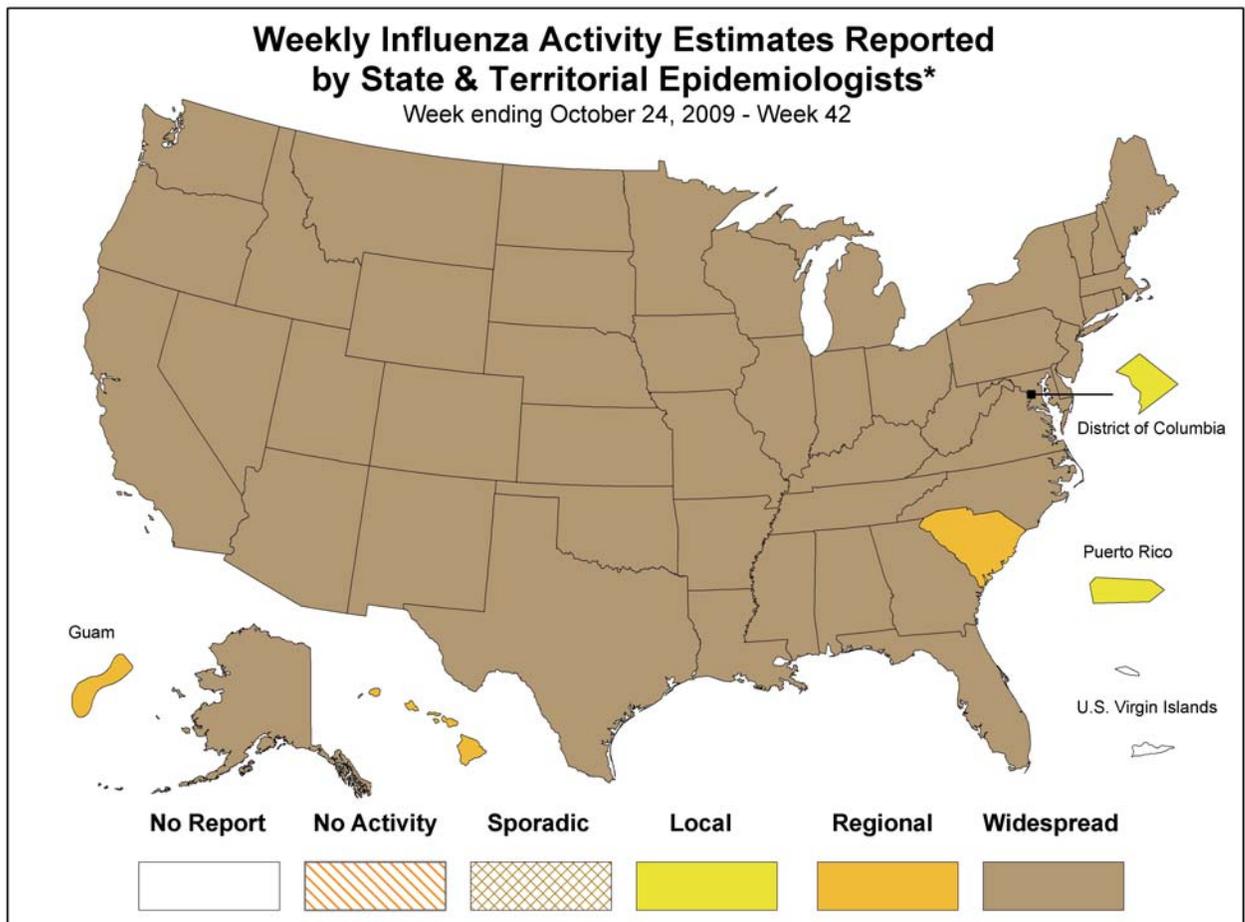


NOTE: Scales differ between regions

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 42, the following influenza activity was reported:

- Widespread influenza activity was reported by 48 states (Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming).
- Regional influenza activity was reported by Guam and two states (Hawaii and South Carolina).
- Local influenza activity was reported by the District of Columbia and Puerto Rico.
- The U.S. Virgin Islands did not report.



* This map indicates geographic spread & does not measure the severity of influenza activity

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

Report prepared: October 30, 2009.