

Kansas Influenza Surveillance, 2014-2015



Introduction

Influenza is not a nationally notifiable disease, nor is it a notifiable disease in Kansas. Because patient-level data is not reported to state health departments or to the Centers for Disease Control and Prevention (CDC), the burden of disease must be tracked through non-traditional methods. Influenza surveillance in Kansas consists of four components that provide data on outpatient influenza-like illness, influenza viruses, and influenza-associated deaths.

Morbidity Surveillance from the U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet)

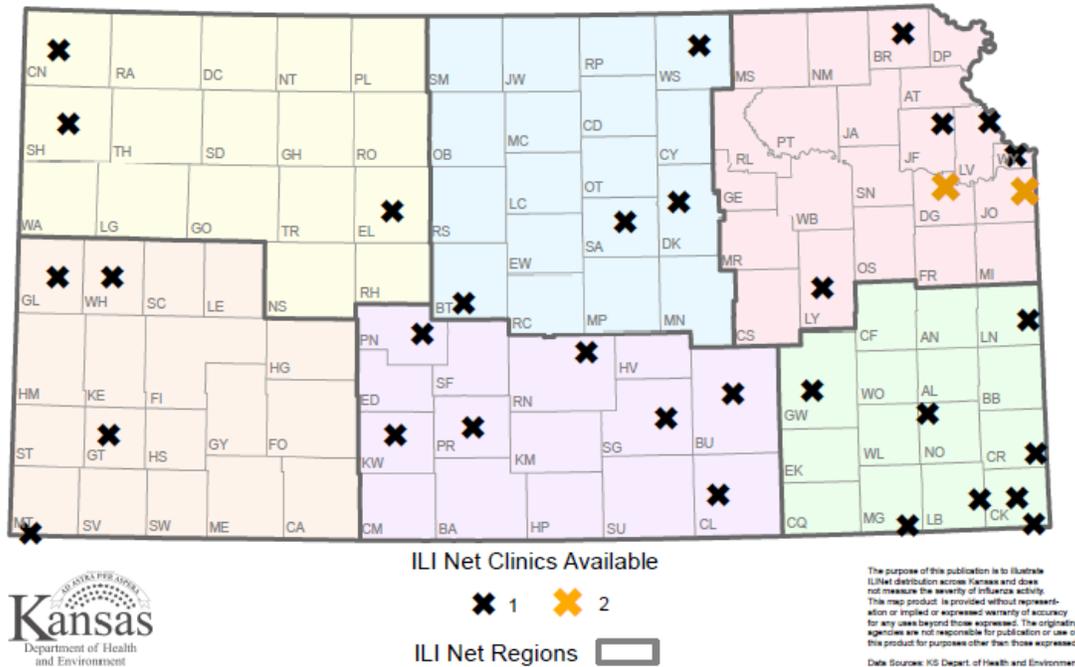
The U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet) is a collaboration between the CDC and state, local, and territorial health departments. The purpose of the surveillance is to track influenza-like illness (ILI), recognize trends in influenza transmission, determine the types of influenza circulating, and detect changes in influenza viruses. Influenza-like illness is defined by the CDC as fever ($\geq 100^{\circ}\text{F}$ or $\geq 37.8^{\circ}\text{C}$, measured either at the ILINet site or at the patient's home) with cough and/or sore throat, in the absence of a known cause other than influenza.

The Bureau of Epidemiology and Public Health Informatics (BEPHI) at the Kansas Department of Health and Environment (KDHE) recruited health care providers throughout Kansas to participate in ILINet. Each week, ILINet site personnel determined the total number of patients seen with ILI during the previous week by age group — preschool (0-4 years), school age through college (5-24 years), adults (25-49 years and 50-64 years), and older adults (>64 years). In addition, the total number of patients seen during the previous week for any illness was recorded. This data was submitted to the CDC via the internet or fax; sites are asked to report the previous week's data by 11:00 AM each Tuesday.

When the surveillance period began during the week ending October 4, 2014, 37 health care providers were enrolled in ILINet. Three sites dropped out during the week ending January 10, 2014 after failing to submit any data. As a result, the 2014-2015 surveillance

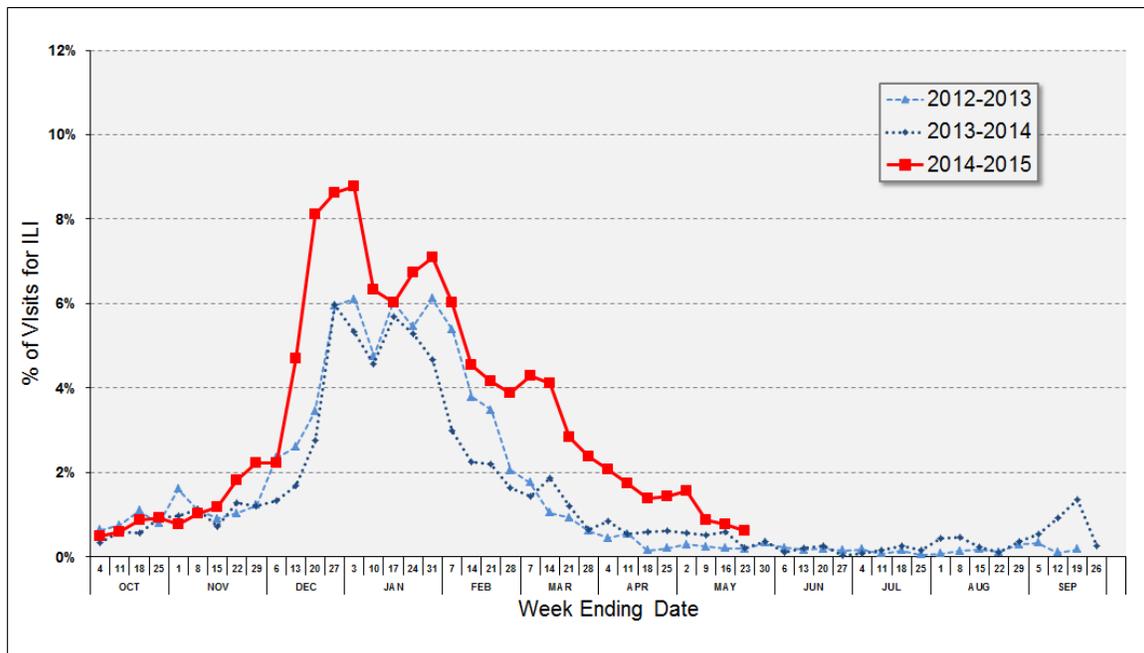
data was collected from 35 sites throughout the state: 20 family practice clinics, nine hospital emergency departments, four university student health centers, and two pediatric clinics (Figure 1).

Figure 1. Sites enrolled in the U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet), Kansas, September 28, 2014 – May 23, 2015 (n=35)



During the influenza surveillance period, starting September 28, 2014 (week 40) and ending May 23, 2015 (week 20), sites observed a total of 218,686 patients—7,306 (3.3%) sought care for ILI. The rate of ILI rose steadily from November 2014 through December 2014. The ILI rate peaked at 8.8% during the week ending January 3, 2015. The rate of ILI dropped below 2% during the week ending April 11, 2015 and remained low through the end of the surveillance period (Figure 2).

Figure 2. Percentage of visits for influenza-like illness (ILI) reported by ILINet sites, Kansas, October 2014 – May 2015 and previous two surveillance periods*



**ILINet sites may vary in number and type (student health, family practice, etc.) each season. Data from the previous two surveillance years are plotted according to week number corresponding to the 2014-2015 week ending date; for example, week 40 ended October 5, 2014, week 40 of 2013 ended October 6, 2012, and week 40 of 2012 ended October 7, 2011.*

Laboratory Surveillance

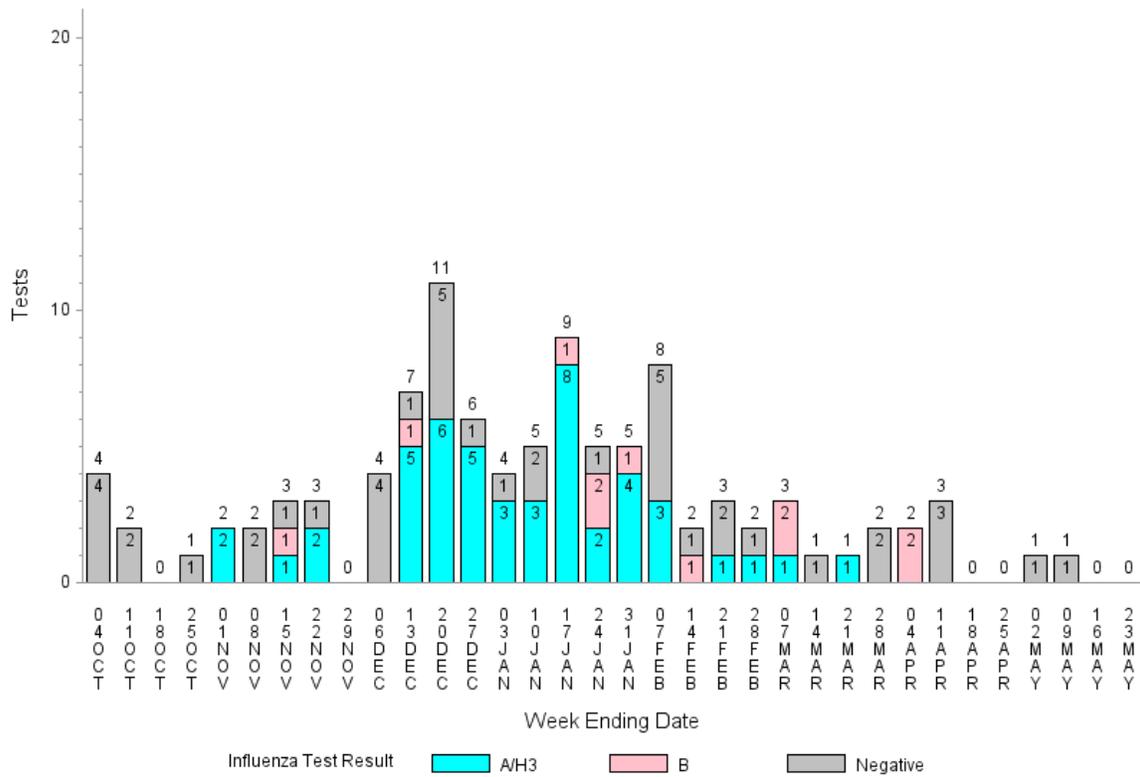
The Kansas Health and Environmental Laboratories (KHEL) provided confirmatory testing for ILINet site patients with ILI, as well as for hospitalized patients throughout the state. Real-Time Polymerase Chain Reaction (RT-PCR) tests were used to analyze nasal and nasopharyngeal swabs for the presence of influenza virus. Laboratory data was sent weekly to CDC by KHEL. In addition, KHEL forwarded a subset of its specimens to CDC for subtyping, antigenic characterization, and antiviral resistance testing.

From September 30, 2014, when the first respiratory specimen for influenza testing was received, until May 23, 2015, when the 2014-2015 surveillance period ended, KHEL tested 102 specimens for influenza. ILINet sites submitted 46 (91%) specimens; the remainder was submitted by hospitals or tested for outbreak investigations. Influenza was detected in 59 (58%) of the specimens. Both influenza type A and B viruses were detected. One influenza A subtype, A/H3, and influenza B were seen. The influenza A/H3 subtype was most frequently detected, representing of 81% of all positive specimens (Table 1, Figure 3).

Table 1: Laboratory-confirmed influenza viruses tested at Kansas Health and Environmental Laboratories by subtype, Kansas, September 30, 2014 – May 23, 2015 (n=102)

Influenza subtype	Number	Percent of Total
A/H3	48	81%
B	11	19%

Figure 3: Influenza specimens tested at Kansas Health and Environmental Laboratories by week ending date, September 30, 2014 – May 23, 2015 (n=102)



KHEL sent 30 positive influenza specimens to CDC for antigenic characterization. Antigenic characterization testing performed on influenza isolates submitted by all states to the CDC showed that 100% of the A/H1 isolates, 19% of the A/H3, 98% of both B lineages matched their corresponding components in the 2014-2015 seasonal influenza vaccine.

Respiratory Viral Panel Testing

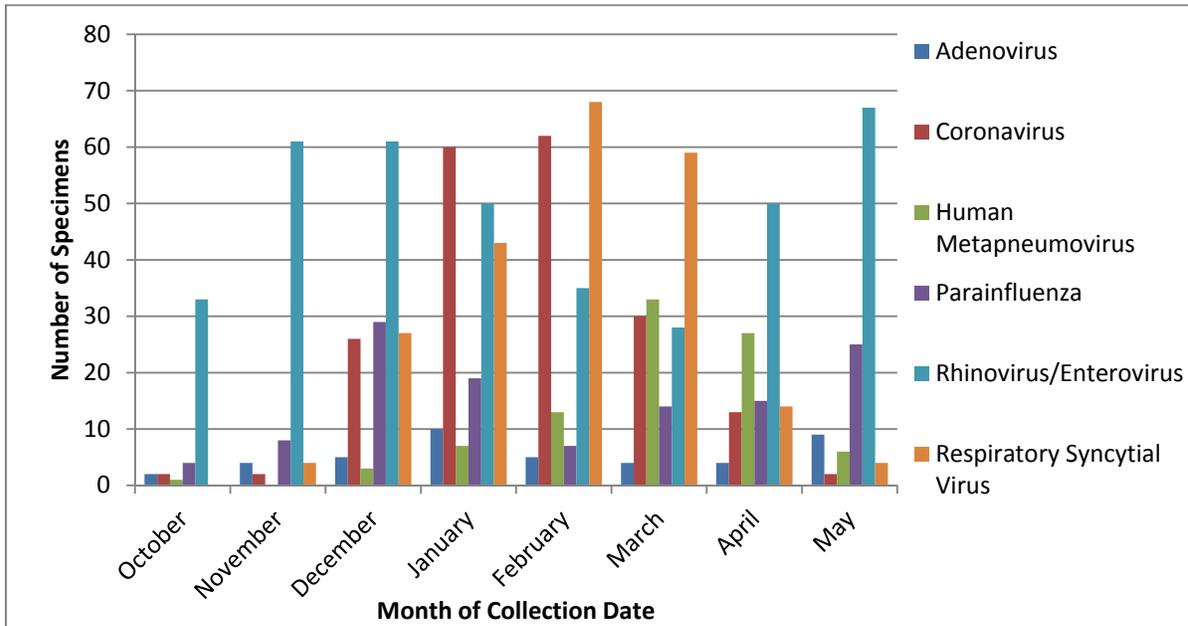
A subset of specimens which test negative for influenza by RT-PCR at the Kansas Health and Environmental Laboratories (KHEL) were tested using the Luminex PCR instrument. The Luminex assay probed for the following 12 viral targets per specimen: influenza A, influenza A subtype H1, influenza A subtype H3, influenza B, respiratory syncytial virus subtype A, respiratory syncytial virus subtype B, parainfluenza 1, parainfluenza 2, parainfluenza 3, human metapneumovirus, rhinovirus, and adenovirus. The goal of Luminex testing was to better understand which respiratory viruses were circulating in Kansas during influenza season.

For the 2014-15 season, Via Christi Laboratories in Sedgwick County shared its RVP data with KDHE. Via Christi Laboratories' RVP can detect Parainfluenza 4 and four different coronaviruses in addition to the 12 targets in the RVP panel used by KHEL; RVP results were sent to KDHE monthly and represented the majority of respiratory virus surveillance in the south central region of Kansas. The resources available at KHEL focused on the remaining five regions of the state.

A total of 48 specimens were tested on the KHEL Luminex assay, 30 of which were negative for all viral targets. Rhinovirus/enterovirus was the most common virus found (n=9). The other viruses identified using Luminex included adenovirus (n=2), human metapneumovirus (n=2) and parainfluenza 3 (n=1). The KHEL RVP specimens showed no time-specific disease trends over this surveillance period.

Via Christi saw many respiratory virus trends during the flu season (Figure 5). The most common virus found was rhinovirus/enterovirus, which declined throughout the season. They also reported high numbers of respiratory syncytial virus and coronaviruses during peak flu season. Other viruses detected were adenovirus, human metapneumovirus, and parainfluenza.

Figure 5: Positive Respiratory Viral Panel Results, Via Christi Laboratories, October 2014 – May 2015

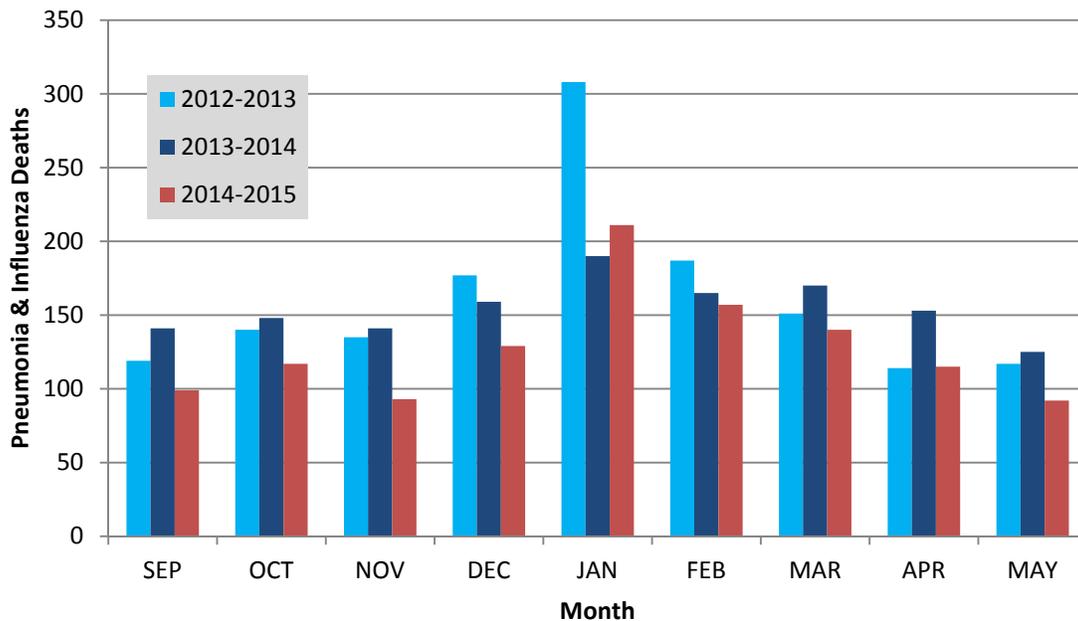


Pneumonia and Influenza (P&I) Mortality

BEPHI monitored influenza-related mortality. Death certificate data was collected to determine the number of deaths caused by pneumonia or influenza (P&I). Mortality was divided among three categories: pneumonia or influenza recorded as a contributing factor of death, influenza recorded as the direct cause of death, and pneumonia recorded as the direct cause of death.

Traditionally, P&I mortality data includes deaths that occurred from September through May. During the 2014-2015 period, the largest number of P&I deaths (n=211) were recorded in the month of January (Figure 6).

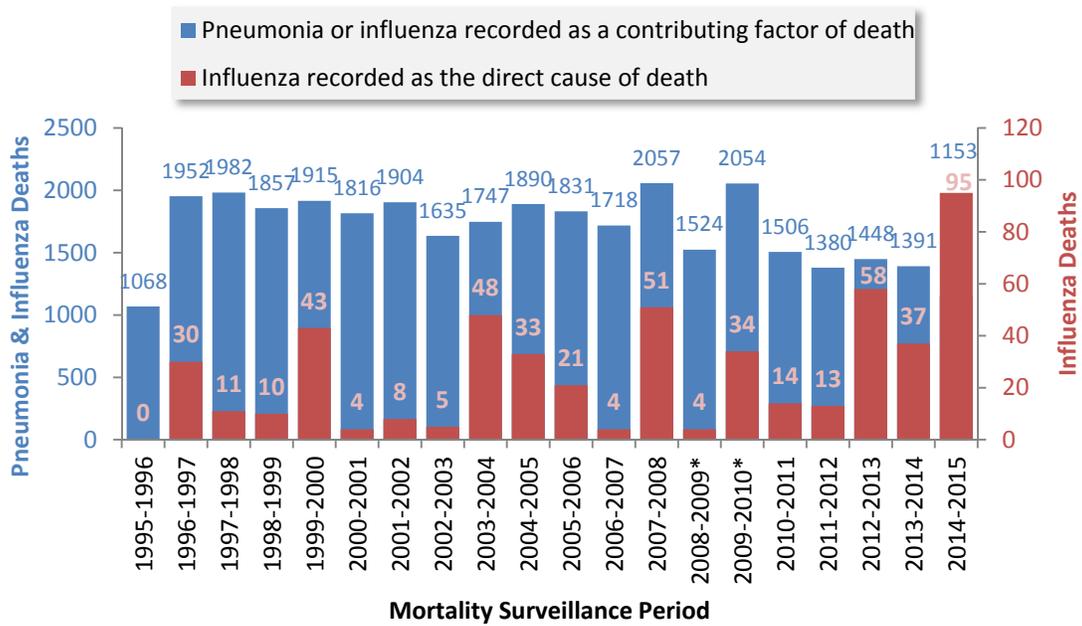
Figure 6: Deaths attributed to pneumonia or influenza by month, Kansas, September 2012-May 2015*



* 2014-2015 data is provisional and subject to change.

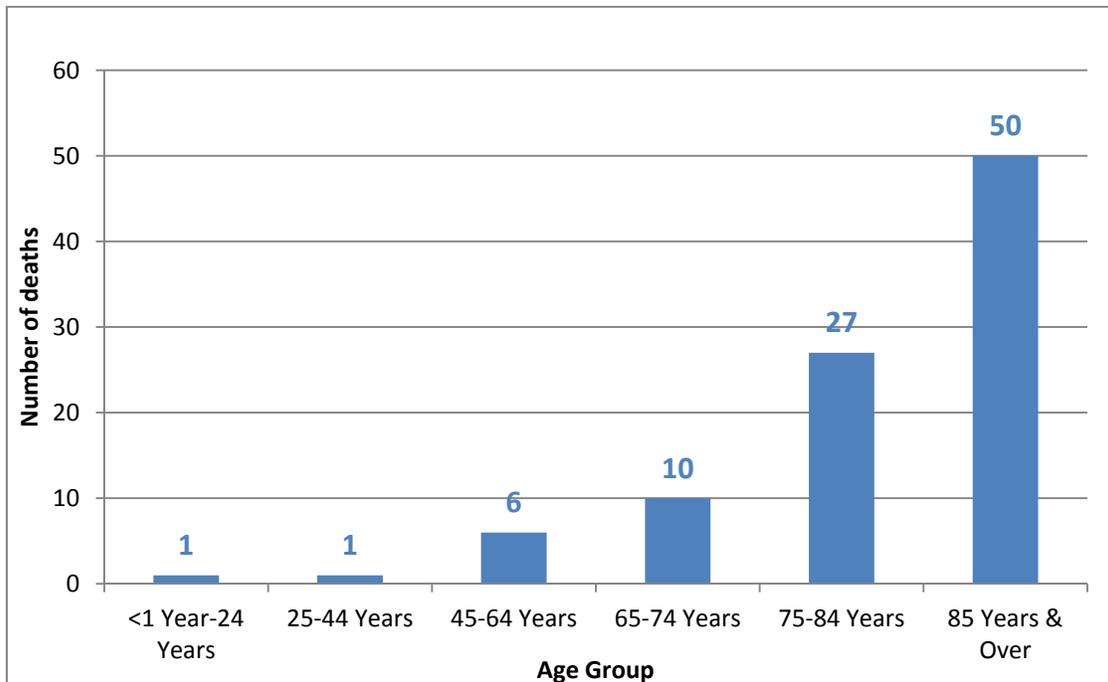
A total of 1,153 pneumonia and influenza deaths occurred during the 2014-2015 surveillance period. The observed mortality was below the 20-year median of 1,781 (Figure 7). During the 2014-2015 surveillance period, 95 deaths (8%) were directly attributed to influenza—this number was well above the 20-year median (18 deaths) observed since the 1995-1996 surveillance period, and above the 20-year mean (26 deaths). The majority of these deaths occurred in individuals aged 85 years or older with 50 deaths (53%) (Figure 8).

Figure 7: Pneumonia and influenza mortality by surveillance period, Kansas, 1995-2015 *



*Each influenza season begins September 1 and ends May 31 of the following year, with the exception of 2008-2009 (September 1, 2008 through April 30, 2009) and 2009-2010 (May 1, 2009 through May 31, 2010). This time shift is due to the emergence of pandemic H1N1 in May 2009. The 2014-2015 data is provisional and subject to change.

Figure 8: Influenza recorded as direct cause of death by age group, Kansas, September 2014 – May 2015



Influenza-Associated Pediatric Mortality

Since 2004, CDC has requested information on influenza-associated pediatric deaths; the condition was added to the list of reportable diseases in Kansas in 2006. For surveillance purposes, pediatric deaths were considered influenza-related if there was no period of complete recovery between the clinically compatible illness and death, and if the diagnosis was confirmed to be influenza by an appropriate laboratory or rapid diagnostic test.

During the 2014-2015 surveillance period, two confirmed influenza-associated pediatric deaths were reported in Kansas.

Summary

Typically, ILI in Kansas has peaked in December, January, or February. The ILI rate peaked in Kansas at 8.8% during the week ending January 2, 2015. The peak rate was higher than what was observed during the previous two surveillance periods; ILI peaked at 6.0% during 2013-14, and 6.1% during 2011-12. Two influenza viruses were detected in Kansas: A/H3, and B. The predominant strain in Kansas and the U.S. was A/H3.

Influenza vaccination during the 2014-15 season offered reduced protections against the predominant circulating A/H3 virus, compared with previous seasons when most circulating and vaccine strain viruses were well-matched. This may have contributed to the higher peak of ILI seen in Kansas during 2014-15.

During the 2014-15 influenza season, 95 deaths were directly attributed to influenza. This was the highest number of influenza deaths in the last 20 years in Kansas. This reflected the national trend—the CDC determined that P&I mortality during 2014-15 was comparable to previous severe flu seasons. Of the Kansas deaths, 53% were among those 85 years and older.