Texas Influenza Summary Report, 2014-2015 Influenza Season (September 28, 2014 – October 03, 2015)

Overview

The 2014-2015 influenza season began on September 28, 2014 and went through October 03, 2015. During the season, influenza activity increased through early December and peaked in mid-December according to ILINet and NREVSS data. It steadily declined throughout the rest of the season. This somewhat mirrored what was seen at the national level. In the United States, influenza activity increased through late November and December and peaked in late December. Influenza activity during the summer months was low which is considered usual for this time of year[1].

The predominant strain, at least for the first part of the influenza season, was influenza A (H3N2). Once influenza A (H3N2) viruses started to decline in circulation, influenza B viruses became the predominant strain in circulation late in the influenza season. Very few influenza A 2009 (H1N1) viruses were reported in Texas throughout the influenza season.

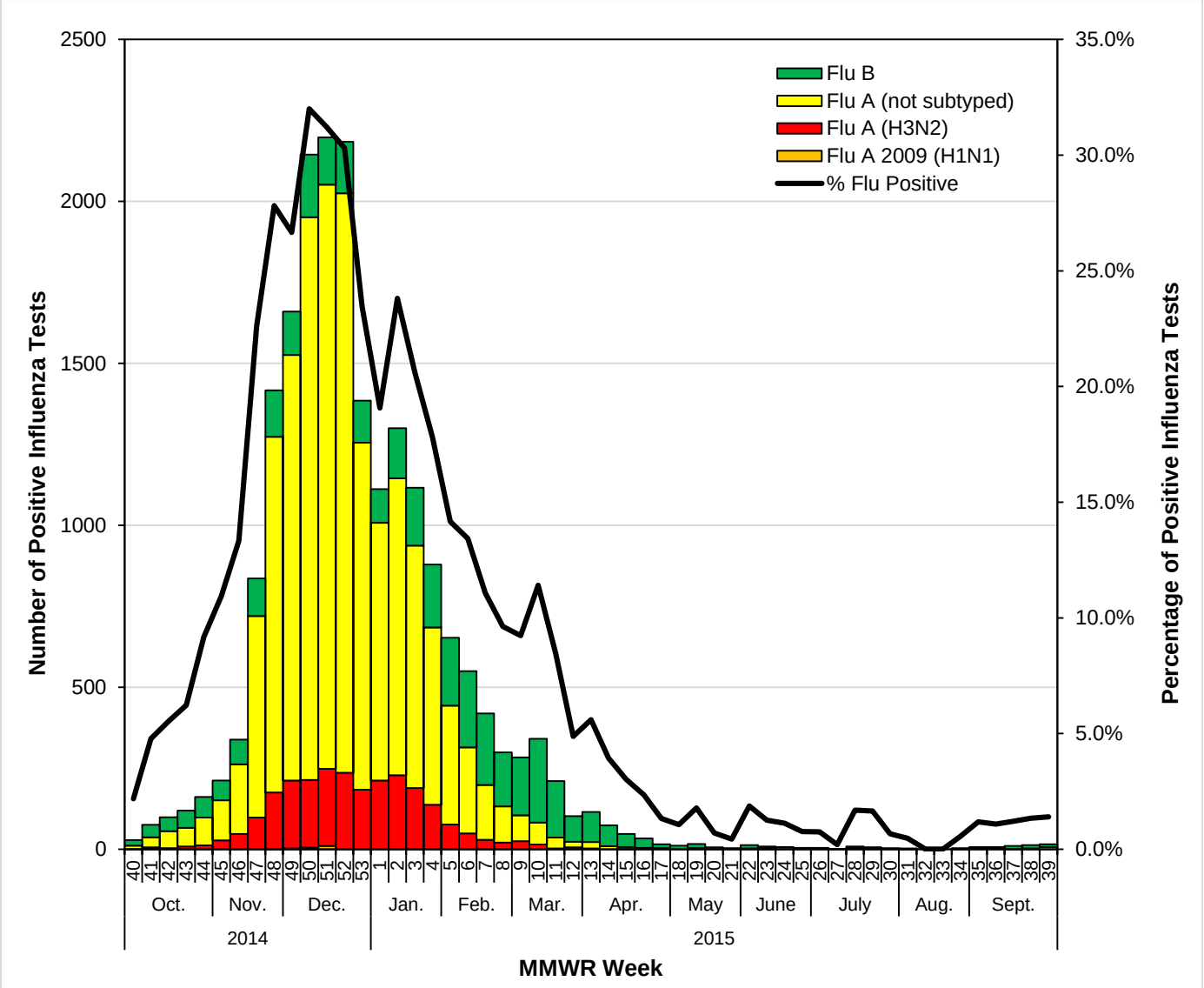
Nationally, "this influenza season, similar to previous influenza A (H3N2)–predominant seasons, was moderately severe with overall high levels of outpatient illness and influenza-associated hospitalization, especially for adults aged ≥65 years. The majority of circulating influenza A (H3N2) viruses were different from the influenza A (H3N2) component of the 2014–15 Northern Hemisphere seasonal vaccines, and the predominance of these drifted viruses resulted in reduced vaccine effectiveness"[1]. Influenza-like illness reported by Texas ILINet providers, for the most part, was higher than compared to the previous influenza season. As far as mortality for the 2014-2015 influenza season, a total of 148 influenza-associated pediatric deaths were reported in the US of which 19 were reported from Texas[2].

Viral Surveillance

National Respiratory and Enteric Virus Surveillance System (NREVSS)[i]

During the 2014–15 season, 22 participating laboratories in most Texas Health Service Regions (HSRs) submitted data to NREVSS on antigen detection, virus isolation (i.e. culture), and polymerase chain reaction (PCR) testing for influenza. Of the 124,737 influenza tests that were reported to NREVSS from Texas laboratories, 20,552 (16.5%) were positive for influenza virus. Of the 20,552 positive tests, 16,686 (81.2%) tests were positive for influenza A and 3,866 (18.8%) tests were positive for influenza B. The majority (85.2%) of the positive test results for influenza A reported through NREVSS were reported as influenza A (not subtyped) because most laboratories in Texas do not perform subtyping or perform mostly antigen detection tests (which do not provide a subtype result). Of the 2,465 influenza A results for which subtyping was reported, 99.1% were identified as influenza A (H3N2) and 0.9% were identified as influenza A 2009 (H1N1). The peak of influenza activity reported by Texas NREVSS laboratories occurred during the week ending December 13, 2014 (MMWR week 50), when 32.0% of tests were positive for an influenza virus (Figure 1).

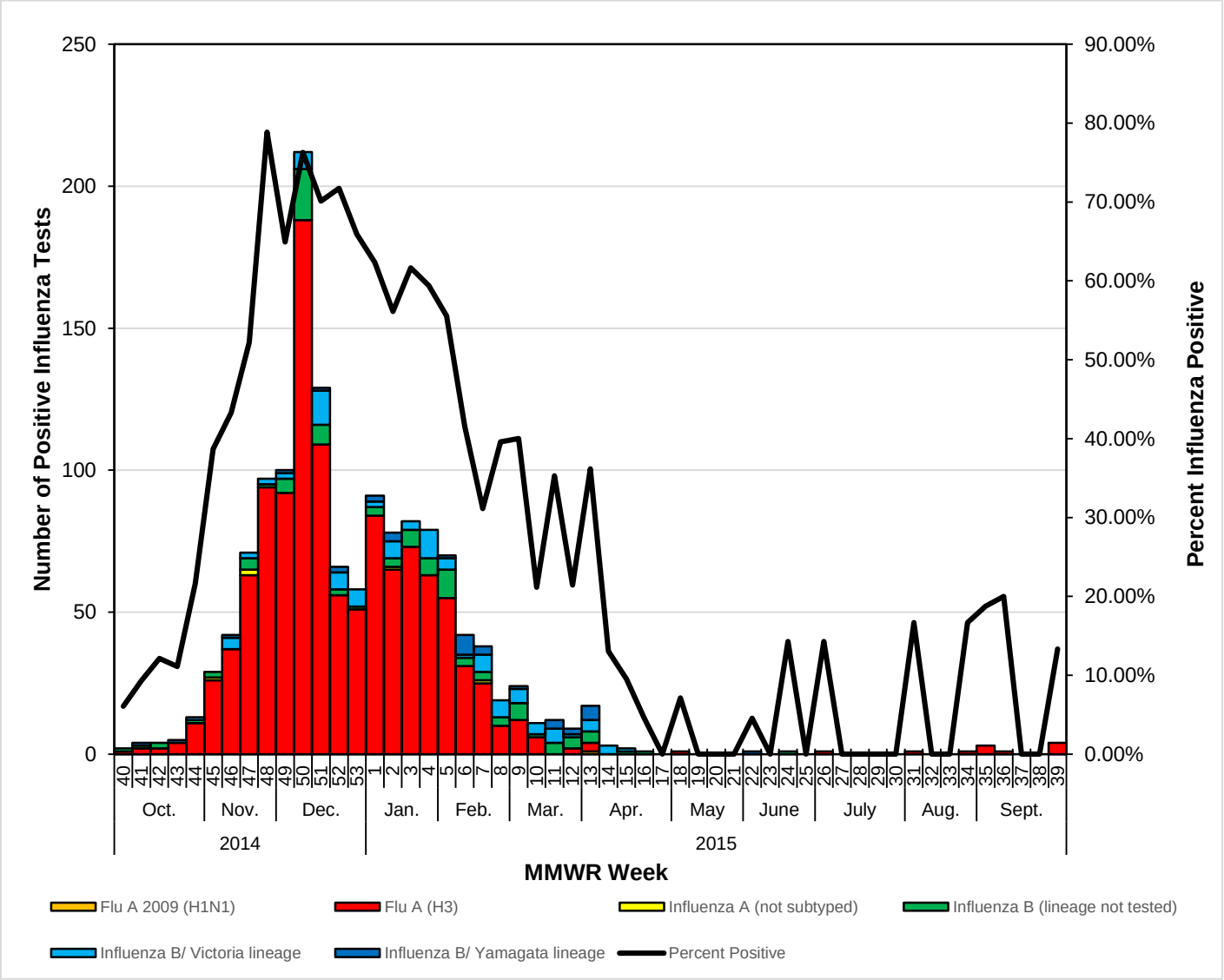
Figure 1. Influenza types and subtypes reported by National Respiratory and Enteric Virus Surveillance System (NREVSS) Laboratories, 2014-2015 Season



Texas Public Health Laboratories[ii]

The first PCR-positive influenza specimens of the season were collected from a patient in HSR 6/5S and a patient in HSR 11 during the week ending October 04, 2014 (week 40). One specimen was identified as influenza A H3 and the other specimen was identified as an influenza B by the DSHS Laboratory in Austin. Influenza viruses were detected every week from the first full week in October through the middle of April (week 40 through week 16), and then sporadically thereafter. The first positive specimen for influenza A 2009 (H1N1) was confirmed at the end of March/beginning of April (week 13). Influenza A (H3N2) was the predominant subtype of influenza A that was detected during the 2014–15 season in Texas, although both influenza A subtypes and both influenza B lineages circulated throughout the season.

Figure 2. Influenza types, subtypes, and lineages identified by Texas public health laboratories, 2014–15 season



Specimen submission began to increase beginning the week ending November 01, 2014 (week 44). The peak percentage of specimens positive for influenza, 78.9% (Figure 2), occurred during the week ending November 29, 2014 (week 48). The proportion of specimens positive for influenza virus in the 2014–15 season equaled or exceeded 10% for 26 consecutive weeks. Specimen submission began to decline beginning in the week ending February 28, 2015 (week 08).

Over the course of the 2014–15 influenza season, Texas public health laboratories received 2,948 specimens for influenza surveillance that met specimen testing and handling requirements; of those, 1,424 (48.3%) were positive for influenza virus. Of those that were positive for influenza virus, 1,183 (83.1%) were identified as influenza A viruses and 241 (16.9%) were identified as influenza B viruses. Of the 1,178 influenza A positives that were subtyped, 1,177 (99.9%) were identified as influenza A (H3N2) and 1 (0.1%) was identified as influenza A 2009 (H1N1). Of the 137 influenza B

positives in which a lineage was determined, 102 (74.5%) were identified as influenza B Victoria lineage and 35 (25.5%) were identified as influenza B Yamagata lineage.

Antigenic Characterization of DSHS Austin Laboratory Influenza Positive [iii]
One hundred twenty-six viruses from Texas were submitted for antigenic characterization during the 2014–15 season: 78 influenza A (H3N2) viruses, 47 influenza B viruses and 1 influenza virus was not recovered.

Of the 78 influenza A (H3N2) viruses characterized, three (3.9%) were characterized as A/Texas/50/2012 (H3N2)-like, the 2014–15 Northern Hemisphere influenza A (H3N2) vaccine component. Seventy-five (96.1%) influenza A (H3N2) viruses were determined to be closely related to A/Switzerland/9715293/2013, an influenza virus that was found to be distinguishable from the 2014-2015 A/Texas/50/2012 vaccine virus. A/Switzerland-like (H3N2) viruses were first detected in the United States in small numbers in March of 2014 and began to increase through the spring and summer. An A/Switzerland/9715293/2013 (H3N2)-like virus was chosen as the influenza A (H3N2) component of the 2015-2016 Northern Hemisphere vaccine.

Of the 47 influenza B viruses characterized, 19 (40.4%) were characterized as B/Massachusetts/02/2012-like (part of the B/Yamagata lineage), the influenza B component of the 2014-2015 Northern Hemisphere trivalent and quadrivalent influenza vaccines. One (2.1%) B/Yamagata-lineage virus that was tested showed reduced titers to B/Massachusetts/2/2012. There is an expectation that a proportion of all isolates tested will exhibit somewhat reduced titers compared with the homologous titer for the reference strain. One (2.1%) was characterized as B/Phuket/3073/2013-like (part of the B/Yamagata lineage), the influenza B component of the 2015-2016 Northern Hemisphere trivalent and quadrivalent influenza vaccines. Twenty-six (55.3%) viruses were characterized as B/Brisbane/60/2008-like (a B/Victoria lineage virus), the influenza B component of the 2014-2015 Northern Hemisphere quadrivalent influenza vaccine. Both lineages were detected during the fall and winter of 2014 through the spring of 2015.

Antiviral Resistance Testing of DSHS Austin Laboratory Influenza Positives
During the 2014–15 season, 132 influenza isolates were tested by the CDC lab or a CDC-contracted lab for resistance to commonly prescribed influenza antiviral medications (Table 1). All of the tested viruses from Texas were sensitive to oseltamivir, zanamivir and peramivir.

Table 1: Antiviral Resistance Results from Texas Influenza Viruses, 2014-2015 Season

	Oseltamivir		Zanamivir		Peramivir^	
	Virus samples tested (n)	**Resistant viruses, number (%)**	**Virus samples tested (n)**	**Resistant viruses, number (%)**	**Virus samples tested (n)**	**Resistant viruses, number (%)**
Influenza A (H1N1)	0	0 (0%)	0	0 (0%)	0	0 (0%)
Influenza A (H3N2)	111	0 (0%)	111	0 (0%)	111	0 (0%)
Influenza B	21	0 (0%)	21	0 (0%)	21	0 (0%)

^ Peramivir is an intravenous antiviral medication that was FDA-approved for use on December 19, 2014

Morbidity Surveillance

US Outpatient Influenza-like Illness Surveillance Network (ILINet)[iv]

One hundred thirty-six providers in Texas submitted data to ILINet for at least one week during the 2014–15 season (i.e., 2014 MMWR week 40 to 2015 week 39) (Figure 3). During the official influenza reporting season (i.e., 2014 week 40 to 2015 week 20), an average of 112 providers submitted data on an average of 28,052 patient visits each week.

The Texas ILI baseline for the 2014–15 season was 5.42%[v]. According to data from Texas ILINet participants, the percentage of visits due to ILI first exceeded the Texas baseline during the week ending November 22, 2014 (week 47), with 6.57% of visits due to ILI (Figure 4). Influenza-like illness peaked during the week ending December 20, 2014 (week 51). During that week, ILINet providers reported that influenza-like illness accounted for 14.17% of all patient visits. The percentage of visits due to ILI fell below the state baseline in the week ending April 11, 2015 (week 14) and remained below the state baseline for the remainder of the 2014–15 season, except during the week ending October 03, 2015 (week 39).

Overall, ILI activity in Texas exceeded the Texas baseline for 20 consecutive weeks and one week at the end of the season. The peak percentage of visits due to ILI reported in Texas ILINet for the 2014–15 season was the highest peak reported since 2001. This peak was higher than the previously reported highest ILI percentage which occurred during the 2013-2014 influenza season (14.17% versus 13.75%). The peak occurred in week 51, one week before the ILI peak in the previous influenza season (week 52).

Figure 3. Number of active Texas participants per county in the US Outpatient Influenza-like Illness Surveillance Network, 2014-15 influenza season[vi]

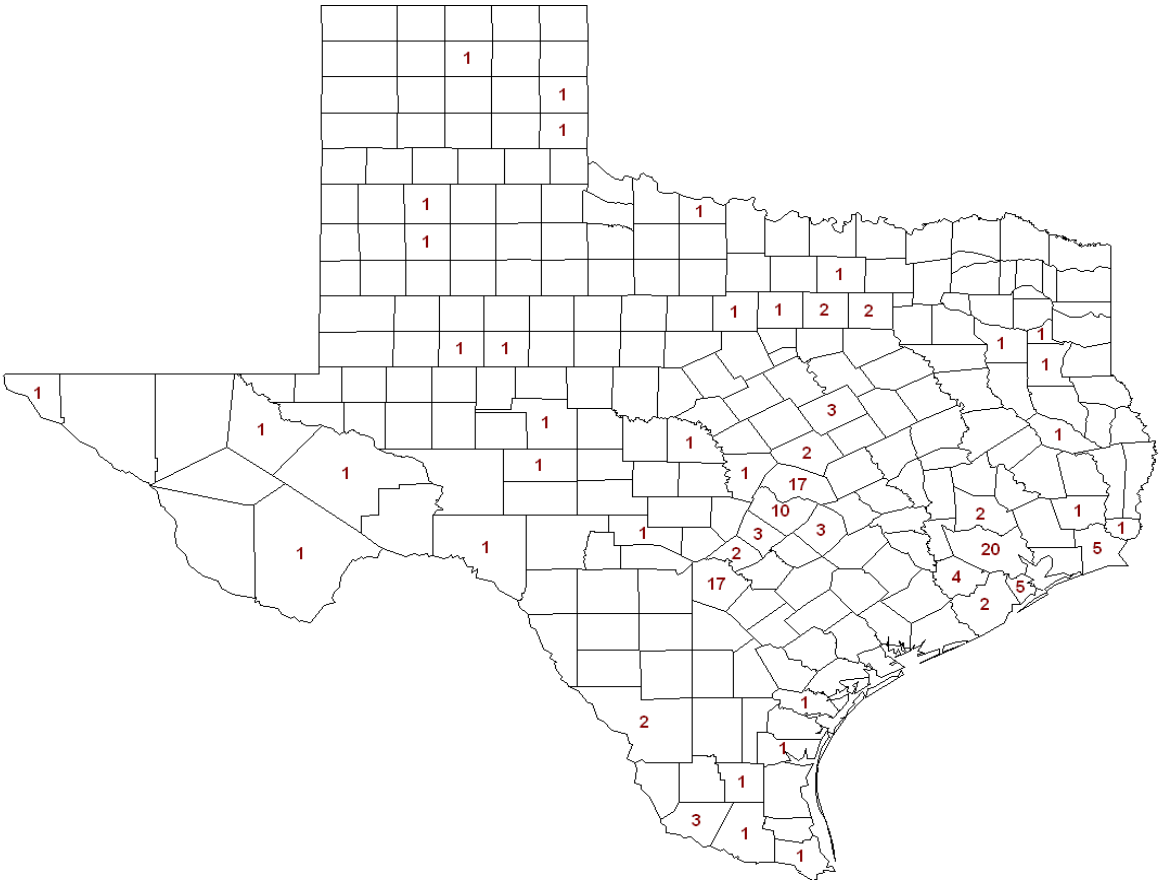
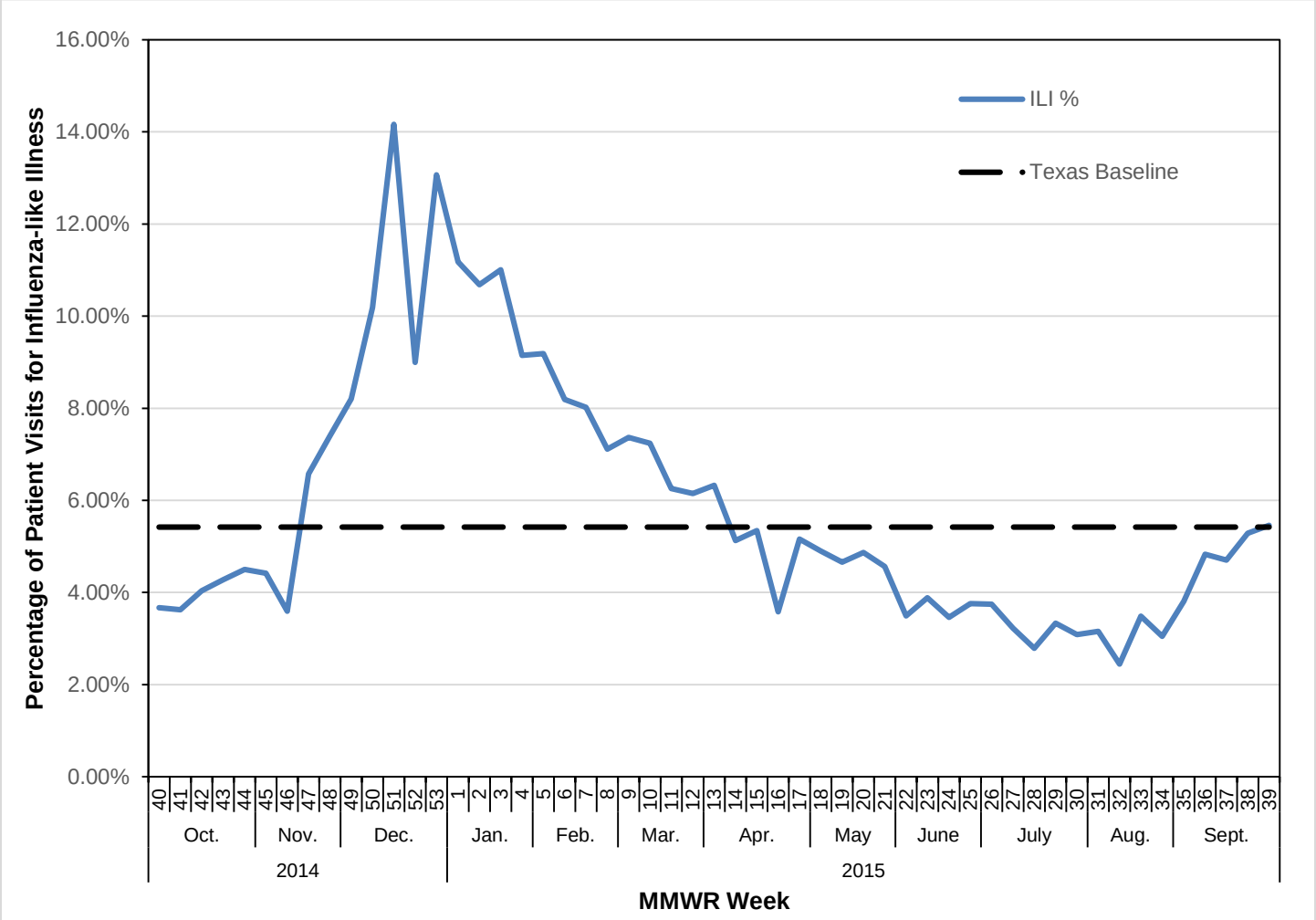


Figure 4. Percentage of visits for influenza-like illness reported by the US Outpatient Influenza-like Illness Surveillance Network in Texas, 2014–15 season



Respiratory Virus Surveillance Project (RVSP)/ Influenza Incidence Surveillance Project (IISP)[vii]
From September 28, 2014 through October 03, 2015, seven Texas providers reported a total of 64,748 patient visits for any reason and 3,526 patient visits for influenza-like illness (ILI), or 5.45% of visits for ILI. Over this time period, the percentage of visits for ILI was highest in people in the age category 5 to 24 years of age (1.9%) and lowest for adults aged 50 to 64 years (0.5%). The percentage of visits for ILI peaked at 12.5% in the week ending December 27, 2014 (week 52) (Figure 5).

A total of 434 ILI specimens were submitted for testing from September 28, 2014 through October 03, 2015 and 420 (96.8%) of those were acceptable for testing. Overall, 222 (52.9%) ILI specimens tested for the RVSP project were positive for at least one respiratory virus and 30.2% of all specimens tested were positive for an influenza virus (includes single and mixed infections). Results are displayed in Table 2.

Providers began submitting specimens for RVSP in October 2014. Rhinoviruses, influenza viruses, a parainfluenza virus 2, and an adenovirus were detected in October 2014 (Figure 6). Influenza

viruses, rhinoviruses, and respiratory syncytial viruses were the predominant viruses detected from November 2014 through March 2015 (week 45–week 12); adenoviruses, human metapneumoviruses, and parainfluenza viruses 2 and 3 were detected sporadically during this timeframe. From April 2015 through May 2015 (week 13–week 21), very few specimens were submitted for respiratory virus testing; of those that were submitted, the predominant virus detected was rhinovirus. No patient specimens were submitted after the week ending May 30, 2015 (week 21) through the week ending September 26, 2015 (week 38), even though participating providers were still seeing patients with ILI during these weeks (weekly median ILI patients seen by all providers combined: 37 ILI patients; range: 9–65 ILI patients per week). During the week ending October 03, 2015 (week 39), four specimens were submitted for respiratory virus testing and all four specimens were positive for influenza.

Figure 5. Percentage of visits for influenza-like illness reported by providers in the Respiratory Virus Surveillance Project (RVSP), Texas, 2014–15 season

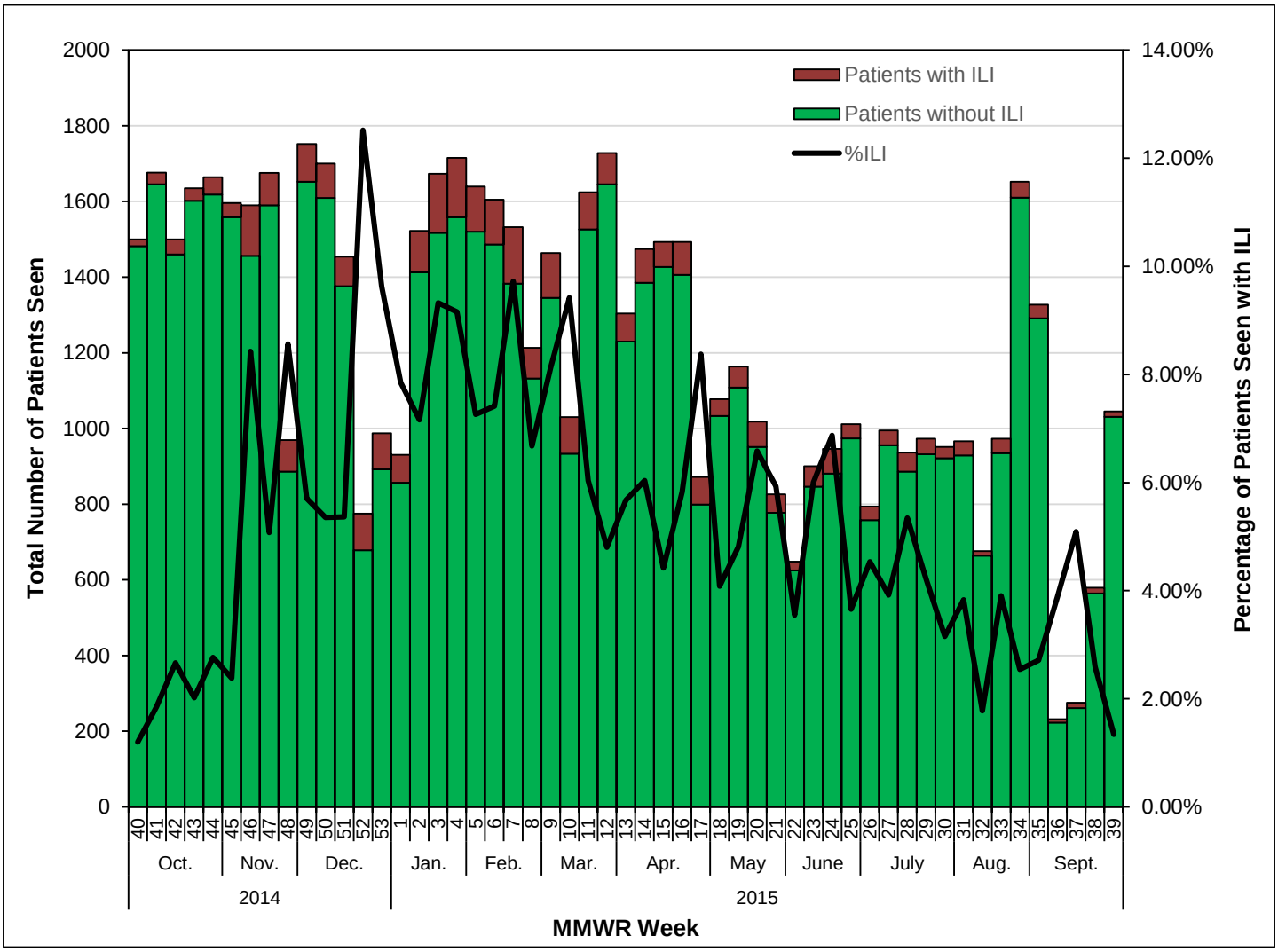
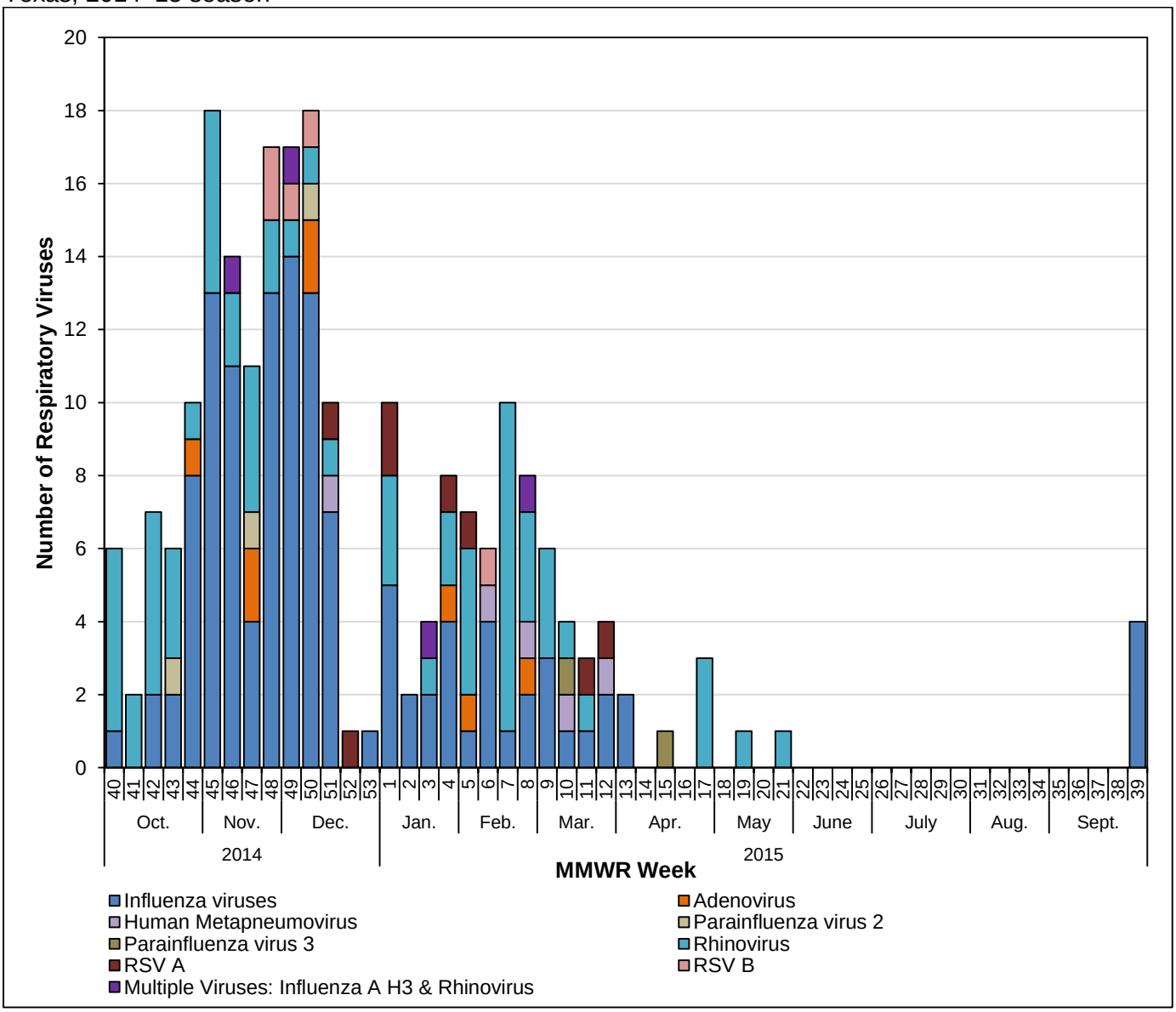


Table 2. Number and percentage of respiratory viruses detected through the Respiratory Virus Surveillance Project (RVSP), Texas, 2014–15 season

Viruses detected	Number of specimens positive	Percentage of total specimens positive
Positive for one or more respiratory viruses	**222**	**52.9%**
Influenza virus (all types/subtypes)	123	55.4%
Influenza A (H1N1)	0	*0.0%*
Influenza A (H3N2)	103	*83.7%*
Influenza B	20	*16.3%*
Adenovirus	8	3.6%
Human metapneumovirus (HMPV)	5	2.3%
Parainfluenza virus 1	0	0.0%
Parainfluenza virus 2	3	1.4%
Parainfluenza virus 3	2	0.9%
Respiratory syncytial viruses (RSV)	13	5.9%
RSV A	8	*61.5%*
RSV B	5	*38.5%*
Rhinovirus	64	28.8%
Multiple viruses detected	4	1.8%
Influenza A (H3N2) and rhinovirus	4	*100.0%*
Negative or inconclusive	**198**	**47.1%**
Total tested	**420**	**100.0%**

Figure 6. Respiratory viruses detected through Respiratory Virus Surveillance Project (RVSP), Texas, 2014–15 season



School Closures and Institutional Outbreaks

Six ILI or influenza-associated outbreaks were reported in schools during the 2014–15 season. Outbreaks were reported from HSRs 2/3, 8, and 9/10. The reported school outbreaks occurred from October through January and were attributed to ILI (2 schools), influenza with unknown type (2 schools), and influenza A [not subtyped] (2 schools).

Forty-eight institutional outbreaks of ILI or influenza and one ILI-associated community outbreak was reported during the 2014–15 season. Outbreaks were reported from HSRs 1, 2/3, 4/5N, 6/5S, 7, 8, and 11. Forty-five long-term care facility (LTCF) outbreaks were reported from November 2014 through September 2015. Forty-three of the LTCF outbreaks were caused by influenza (8 influenza [not typed], 25 influenza A [not subtyped], 3 influenza A [H3], 4 influenza B, and 3 influenza A [not subtyped] and B) and two were caused by pneumonia and influenza-like illness

(ILI). One correctional facility outbreak was reported in February 2015. The outbreak was caused by influenza A [not subtyped]. An outbreak of influenza A [not subtyped] was reported in a healthcare provider's clinic in December 2014. Finally, a child day care facility outbreak that was reported in November 2014 and a community outbreak that was reported in September 2015 were attributed to ILI.

Mortality Surveillance

Influenza-Associated Pediatric Mortality[viii]

Nineteen influenza-associated pediatric fatalities were reported to DSHS for the 2014–2015 influenza season. The 2014-2015 influenza season had the third highest number of reported influenza-associated pediatric deaths in a single non-pandemic influenza season since reporting for this condition began in Texas in 2007. The season fell behind the 2012-2013 and 2013-2014 influenza seasons where both seasons had 20 reported influenza-associated pediatric deaths.

The reported deaths occurred during the week ending November 22, 2014 (week 47) through the week ending August 15, 2015 (week 32). These deaths were reported in residents of all Texas HSRs except HSR 1 and HSR 8. Ten (52.6%) patients had confirmed influenza A infections and nine (47.4%) patients had influenza B infections. Subtyping of the influenza A virus was performed for three of the influenza A infections; all of them were identified as influenza A (H3N2).

The median age at death was 5 years with patients ranging in age from 1 month to 17 years. Of the nineteen reported cases, two cases were younger than 6 months of age, seven cases were 6 months to 4 years of age, three cases were 5 to 10 years of age, and seven cases were 11 to 17 years of age. Of the 15 cases who were eligible for vaccination and for whom influenza vaccination status was known, five (33.3%) were fully vaccinated for the current season. Ten (52.6%) cases had significant underlying medical conditions.

Texas Influenza Surveillance System

Background

Influenza and influenza-like illnesses (ILI) were last reportable by law in any county in Texas in 1993[3]. During that year, over 275,000 cases of influenza and influenza-like illness were reported to the Texas Department of State Health Services (DSHS) (legacy agency Texas Department of Health). The only influenza categories reportable by law in Texas for the 2014–15 season included influenza-associated pediatric fatalities, outbreaks associated with influenza, and novel influenza A infections in humans. Because there is no current reporting requirement for the majority of influenza illnesses, it is not known how many influenza-related illnesses, hospitalizations, and deaths occur each year in Texas residents. A small number of influenza cases are reported voluntarily through sentinel surveillance networks composed of laboratories, hospitals, physicians, nurses, schools, and universities located throughout the state. Additional resources include web-based influenza and ILI reporting systems, as well as local and regional health departments that gather data from surveillance participants in their jurisdictions. Data from all sources are reported to the DSHS Central Office in Austin, compiled, and presented weekly in the Texas Influenza Surveillance Report.

Components

The national influenza reporting period begins in early October [Morbidity and Mortality Weekly Report (MMWR) week 40] and continues through late May (MMWR week 20). Influenza surveillance in Texas continues year-round, although in reduced capacity during the summer months. The goals of influenza surveillance are to determine when and where influenza viruses are circulating, if the circulating viruses match the vaccine strains, what changes are occurring in the

viruses, what impact influenza is having on hospitalizations and deaths, and the severity of influenza activity. The three main Texas influenza surveillance components are viral, morbidity, and mortality surveillance. Viral influenza surveillance at the state level consists of influenza test results reported by Texas laboratories in the National Respiratory and Enteric Virus Surveillance System (NREVSS) and specimens sent to public health laboratories for influenza surveillance testing. Morbidity surveillance consists of reports of novel influenza A virus infections in humans; reports of ILI from Texas participants in the US Outpatient Influenza-like Illness Surveillance Network (ILINet), the Respiratory Virus Surveillance Project (RVSP), and local and regional health department surveillance; and reports of influenza or ILI outbreaks. Mortality surveillance includes influenza-associated deaths in children younger than 18 years of age.

References

1. Appiah GD, Blanton L, D'Mello T, et al. Influenza Activity — United States, 2014–15 Season and Composition of the 2015–16 Influenza Vaccine. MMWR 2015; 64 (21): 583-590.
2. Centers for Disease Control and Prevention. Fluview: 2015-2016 Influenza Season Week 48 ending December 05, 2015. Retrieved December 11 from http://www.cdc.gov/flu/weekly/.
3. Texas Department of Health. Epidemiology in Texas 1993 Annual Report. Available at: https://www.dshs.state.tx.us/idcu/data/documents/1993TexasAnnualReport.pdf
4. Centers for Disease Control and Prevention. U.S. Outpatient Influenza-like Illness Surveillance Network: 2014–15 Workfolder. 55.20E, Rev. 02/2014.
5. Council of State and Territorial Epidemiologists. Influenza Incidence Surveillance Project – Application. April 1, 2011.
6. Centers for Disease Control and Prevention. Influenza-Associated Pediatric Mortality, 2004 case definition. Available at: http://wwwn.cdc.gov/nndss/conditions/influenza-associated-pediatric-mortality/case-definition/2004/. Accessed on December 09, 2015.

[i] NREVSS is an online laboratory results reporting system for several respiratory and enteric viruses that is maintained by the CDC. NREVSS reporters in Texas are primarily hospital laboratories, although two public health laboratories (Tarrant County Public Health [Laboratory Response Network] Lab and the DSHS Austin Laboratory) also participate. See http://www.cdc.gov/surveillance/nrevss/ for more information.

[ii] Influenza surveillance specimens are submitted for PCR testing to the DSHS Austin laboratory, the Houston Department of Health and Human Services Laboratory, and the Texas Laboratory Response Network (LRN) laboratories throughout the season by physicians, hospitals, clinics, and health departments across Texas. The Texas LRN laboratories have been participating in influenza surveillance since the 2008–2009 influenza season; the participating LRN laboratories are located in Corpus Christi, Dallas, El Paso, Fort Worth, Harlingen, Houston, Lubbock, San Antonio, and Tyler.

[iii] Like other state virology laboratories in the country, DSHS submits early, mid, and late-season as well as unusual influenza viruses to the CDC for strain characterization. Specimens and influenza viruses are also submitted at regular intervals according to CDC's instructions.

[iv] Texas participants in ILINet report weekly on the number of patient visits for ILI by age group and the total number of patients seen for any reason. For ILINet reporting, ILI is defined as "fever (≥100°F [37.8°C], oral or equivalent) *and* cough and/or sore throat without a known cause other than influenza"[4]. ILINet data are used to calculate a weekly percentage of visits due to ILI.

[v] The baseline is the mean percentage of patient visits for ILI during non-influenza weeks for the previous three seasons plus two standard deviations. A "non-influenza week" is defined as a week that accounted for less than 2% of the season's total number of specimens that tested positive for influenza.

[vi] In order to be considered an active participant in ILINet, a provider must report at least one week during the season. Therefore, active providers did not necessarily report every week of the influenza reporting season.

[vii] RVSP is an IISP-like project. IISP is a collaborative project among CDC, the Council of State and Territorial Epidemiologists (CSTE), and state and local health departments to "[monitor] the age-specific incidence of medically-attended ILI and influenza-associated ILI in real time throughout the influenza season"[5] . Providers submit weekly data on the number of patients with ILI by age group and the total patients seen by age group. Specimens collected from the first 10 ILI patients seen each week by each participating provider are tested for the presence of influenza and other respiratory viruses (adenovirus, rhinovirus, respiratory syncytial virus, human metapneumovirus, and parainfluenza virus). Texas participated in IISP for the first time during the 2011–12 season.

[viii] "An influenza-associated death is defined for surveillance purposes as a death resulting from a clinically compatible illness that was confirmed to be influenza by an appropriate laboratory or rapid diagnostic test. There should be no period of complete recovery between the illness and death. Influenza-associated deaths in all persons aged <18 years should be reported[6].