

Texas Influenza Summary Report, 2015-2016 Influenza Season (October 4, 2015 – October 1, 2016)

Overview

The 2015-2016 influenza season began on October 4, 2015, and went through October 1, 2016. During the season, influenza activity was low through December, started to increase in January and peaked around the first part of March according to laboratory 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 remained low from October until late December and peaked in the week ending March 12, 2016 (week 10)¹. The United States, including Texas, “experienced typical low levels of seasonal influenza activity overall” during the summer months; “beginning in late August, clinical laboratories reported a slight increase in influenza positive test results and CDC received reports of a small number of localized influenza outbreaks caused by influenza A (H3N2) viruses”². In Texas, there was one influenza outbreak caused by influenza A (H3N2) that was reported in late August.

Influenza A 2009 (H1N1) virus was the predominant strain overall, but influenza A (H3N2) viruses were more commonly identified from October to December. Influenza B viruses circulated throughout the entire influenza season, but became more predominant toward the end of the influenza season.

Nationally, “influenza activity was moderate this season, with a lower percentage of outpatient visits for influenza-like illness (ILI), lower hospitalization rates, and a lower percentage of deaths attributed to pneumonia and influenza (P&I) compared with the preceding three seasons. The majority of viruses characterized this season were antigenically similar to the reference viruses representing the recommended components of the 2015–16 Northern Hemisphere influenza vaccine”¹. Influenza-like illness reported by Texas ILINet providers, for the most part, was lower when compared to the previous three influenza seasons. As far as mortality for the 2015-16 influenza season, a total of 89 influenza-associated pediatric deaths were reported in the US of which 7 were reported from Texas³.

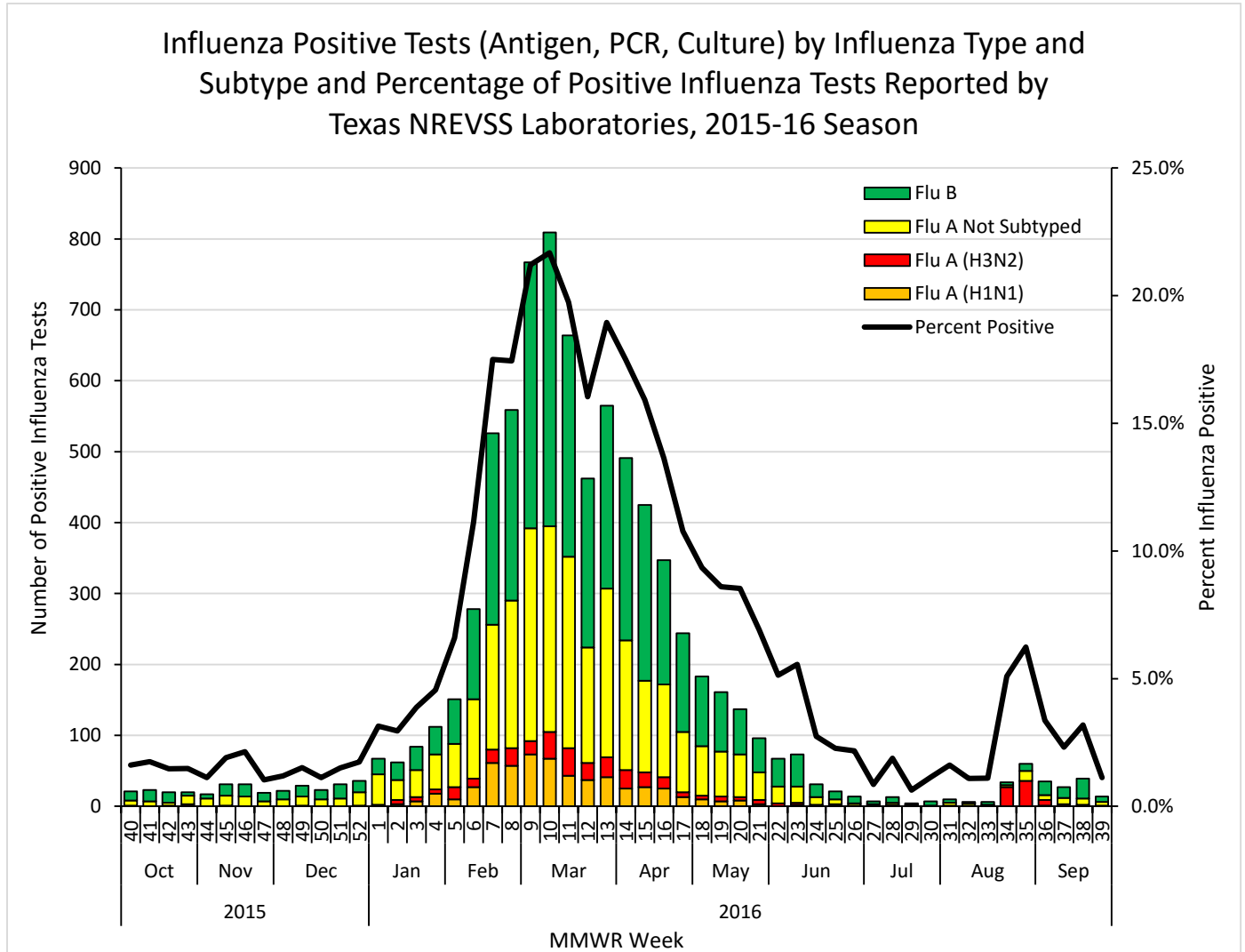
Viral Surveillance

National Respiratory and Enteric Virus Surveillance System (NREVSS)^j

During the 2015–16 season, 23 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 91,279 influenza tests that were reported to NREVSS from Texas laboratories, 7,981 (8.7%) were positive for influenza virus. Of the 7,981 positive tests, 4,009 (50.2%) tests were positive for influenza A and 3,972 (49.8%) tests were positive for influenza B. The majority (74.9%) 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 1,006 influenza A results for which subtyping was reported, 56.8% were identified as influenza A (H1N1) and 43.2% were identified as influenza A (H3N2). The peak of influenza activity

reported by Texas NREVSS laboratories occurred during the week ending March 12, 2016 (MMWR week 10), when 21.7% of tests were positive for an influenza virus (Figure 1).

Figure 1. Influenza types and subtypes reported by Texas National Respiratory and Enteric Virus Surveillance System Laboratories, 2015-16 Season

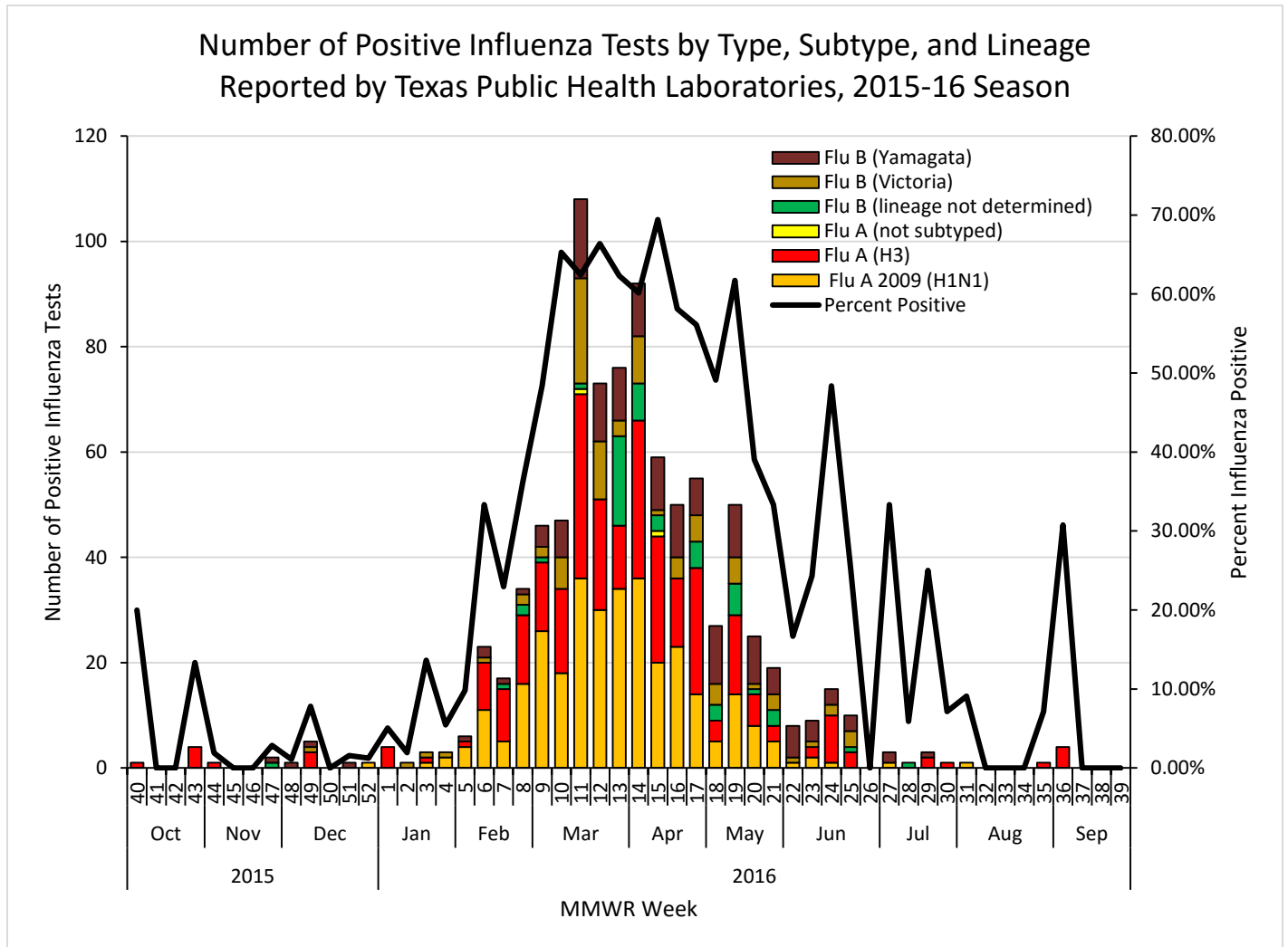


Texas Public Health Laboratoriesⁱⁱ

The first PCR positive influenza specimens of the season were collected from a person who resides in HSR 7 and a person who resides in HSR 2/3 during the week ending October 10, 2015 (week 40). Both specimens were tested at the DSHS Laboratory in Austin and were identified as influenza A (H3) during week 40. Influenza viruses were detected sporadically from the first full week in October through the second full week in December (week 40 through week 50). Influenza viruses were detected every week from the third full week in December through the end of June (week 51 through week 25), and then sporadically thereafter. The first positive specimen for influenza A 2009 (H1N1) was confirmed at the end of December/beginning of January (week 52). All four virus types,

subtypes, and lineages circulated throughout the season; however, influenza A 2009 (H1N1) was the predominant subtype of influenza A that was detected during the 2015–16 season in Texas.

Figure 2. Influenza types, subtypes, and lineages identified by Texas public health laboratories, 2015–16 season



Specimen submission began to increase beginning the week ending January 23, 2016 (week 3). The peak percentage of specimens positive for influenza, 69.4% (Figure 2), occurred during the week ending April 16, 2016 (week 15). The proportion of specimens positive for influenza virus in the 2015–16 season equaled or exceeded 10% for 20 consecutive weeks. Specimen submission peaked in the week ending March 19, 2016 (week 11) and slowly declined thereafter.

Over the course of the 2015–16 influenza season, Texas public health laboratories received 2,751 specimens for influenza surveillance that met specimen testing and handling requirements; of those, 890 (32.4%) were positive for influenza virus. Of those that were positive for influenza virus, 602 (67.6%) were identified as influenza A viruses and 288 (32.4%) were identified as influenza B viruses. Of the 600 influenza A positives that were subtyped, 315 (52.5%) were identified as influenza A (H1N1) and 285 (47.5%) were identified as influenza A (H3). Of the 235 influenza B

positives in which a lineage was determined, 147 (62.6%) were identified as influenza B/Yamagata lineage and 88 (37.4%) were identified as influenza B/Victoria lineage.

Antigenic Characterization of DSHS Austin Laboratory Influenza Positive ⁱⁱⁱ

One hundred fifteen viruses from Texas were submitted for antigenic characterization during the 2015–16 season: 35 influenza A (H1N1) viruses, 34 influenza A (H3N2) viruses, and 46 influenza B viruses.

Of the 35 influenza A (H1N1) viruses characterized, 35 (100.0%) were characterized as A/CALIFORNIA/07/2009-like (H1N1)pdm09, the 2015-16 Northern Hemisphere influenza A (H1N1) vaccine component.

Of the 34 influenza A (H3N2) viruses characterized, 19 (55.9%) were characterized as A/SWITZERLAND/9715293/2013 (H3N2)-like, the 2015–16 Northern Hemisphere influenza A (H3N2) vaccine component. Fifteen (44.1%) of the influenza A (H3N2) viruses were characterized as A/Hong Kong/4801/2014 (H3N2)-like, the influenza A (H3N2) component of the 2016-17 Northern Hemisphere vaccine.

Of the 46 influenza B viruses characterized, 28 (60.9%) were characterized as B/Phuket/3073/2013-like (part of the B/Yamagata lineage), the influenza B component of the 2015-16 Northern Hemisphere trivalent and quadrivalent influenza vaccines. Eighteen (39.1%) viruses were characterized as B/Brisbane/60/2008-like (a B/Victoria lineage virus), the influenza B component of the 2015-16 Northern Hemisphere quadrivalent influenza vaccine. Both lineages were detected during the fall and winter of 2015 through the spring of 2016.

Antiviral Resistance Testing of DSHS Austin Laboratory Influenza Positives

During the 2015–16 season, 172 influenza isolates were tested by the CDC 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, 2015-16 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)	50	0 (0%)	50	0 (0%)	50	0 (0%)
Influenza A (H3N2)	51	0 (0%)	51	0 (0%)	51	0 (0%)
Influenza B	71	0 (0%)	71	0 (0%)	71	0 (0%)

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

Figure 4. Percentage of visits for influenza-like illness reported by the US Outpatient Influenza-like Illness Surveillance Network in Texas, 2015–16 season

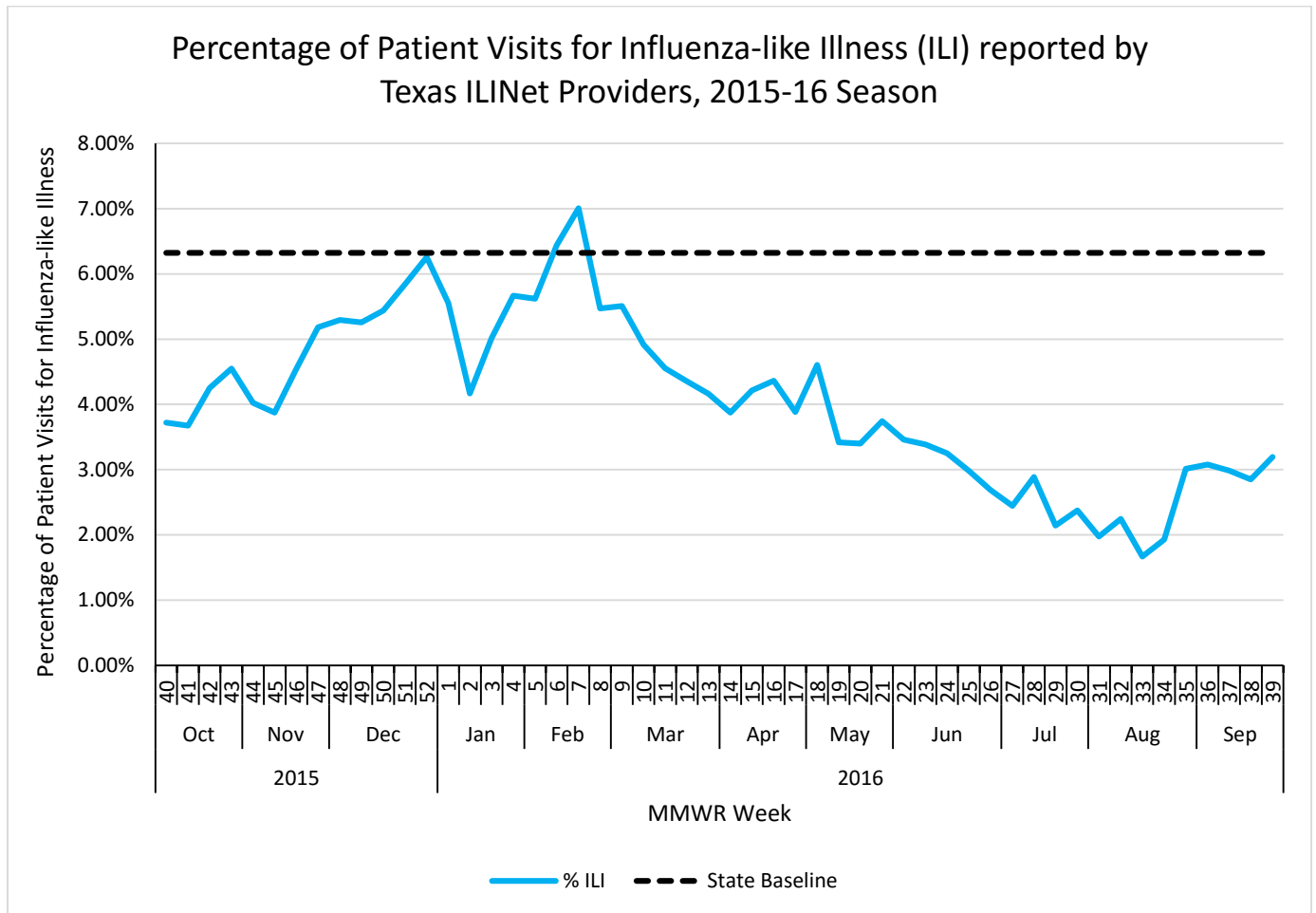
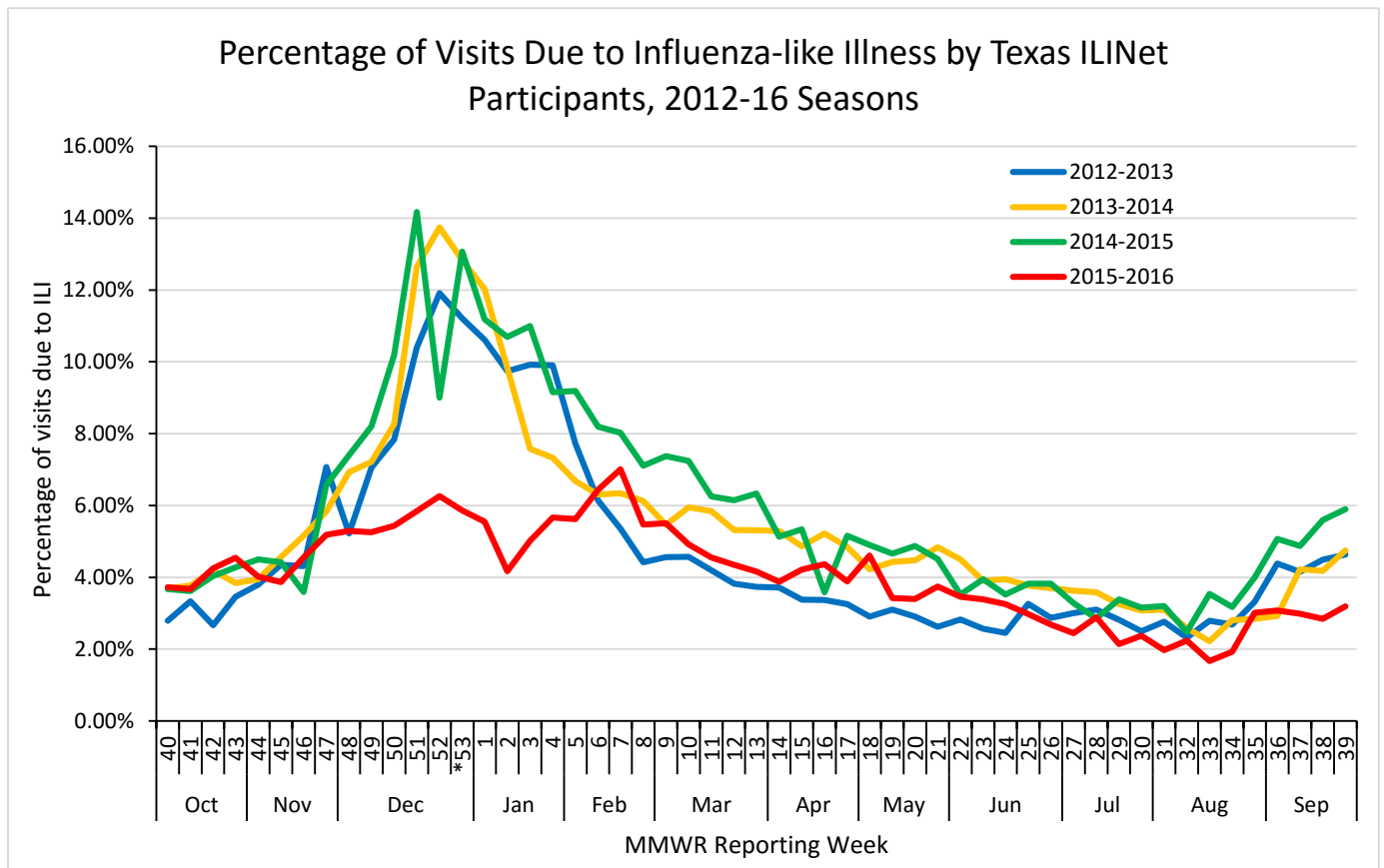


Figure 5. Percentage of visits due to influenza-like illness reported by Texas ILINet Participants, 2012-16 Seasons



*There was a week 53 in the 2014-2015 influenza season, but there was not a week 53 for the 2015-2016 influenza season or the other previous seasons; therefore the week 53 data point for those seasons is an average of week 52 and 1.

Respiratory Virus Surveillance Project (RVSP)/ Influenza Incidence Surveillance Project (IISP)^{vii}
 From October 4, 2015 through August 27, 2016, five Texas providers reported a total of 45,006 patient visits for any reason and 1,704 patient visits for influenza-like illness (ILI), or 3.8% of visits for ILI during this time period. Over this time period, the percentage of visits for ILI was highest in people in the age category 5 to 24 years of age (2.6%) and lowest for adults 65 years of age or older (0.2%). The percentage of visits for ILI peaked at 8.4% in the week ending March 26, 2016 (week 12) (Figure 6).

A total of 260 ILI specimens were submitted for testing from October 4, 2015 through May 23, 2016 and 252 (96.9%) of those were acceptable for testing. Overall, 107 (42.5%) ILI specimens tested for the RVSP project were positive for at least one respiratory virus and 19.8% of all specimens tested were positive for an influenza virus. Results are displayed in Table 2.

Providers began submitting specimens for RVSP at the beginning of October. Rhinoviruses were the predominant viruses detected from October 2015 through January 2016; respiratory syncytial viruses, influenza viruses, adenoviruses, human metapneumoviruses, and parainfluenza 1 viruses were detected sporadically during this timeframe (Figure 7). Influenza viruses and rhinoviruses were the predominant viruses detected from February 2016 through the first part of May 2016.

After the first part of May 2016, only a couple more specimens were submitted for respiratory virus testing. These specimens were negative for respiratory viruses. No patient specimens were submitted after the week ending May 28, 2016 (week 21), even though participating providers were still seeing patients with ILI during these weeks (weekly median ILI patients seen by all providers combined: 9 ILI patients; range: 5 to 29 ILI patients per week).

Figure 6. Percentage of visits for influenza-like illness reported by providers in the Respiratory Virus Surveillance Project (RVSP), Texas, 2015–16 season

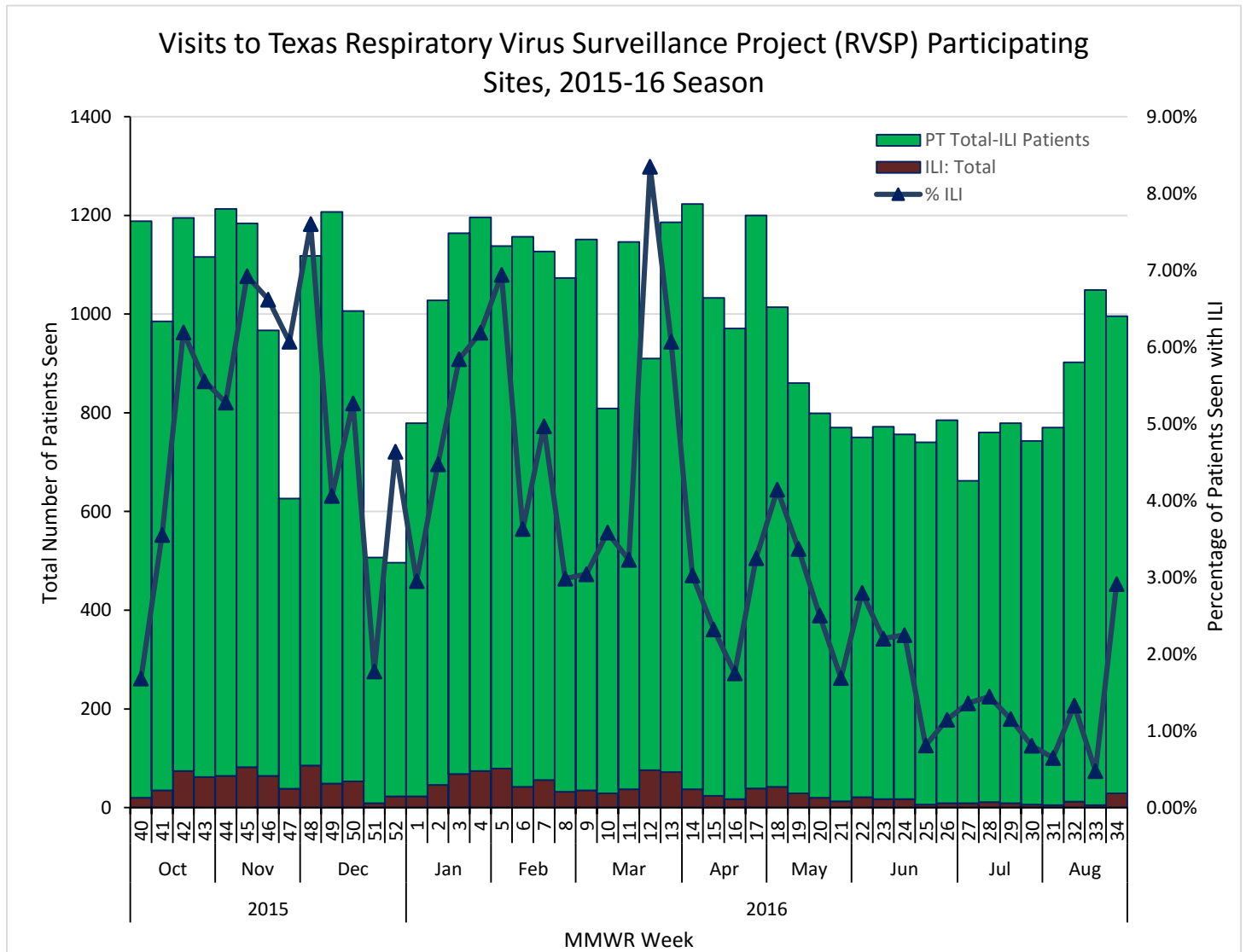
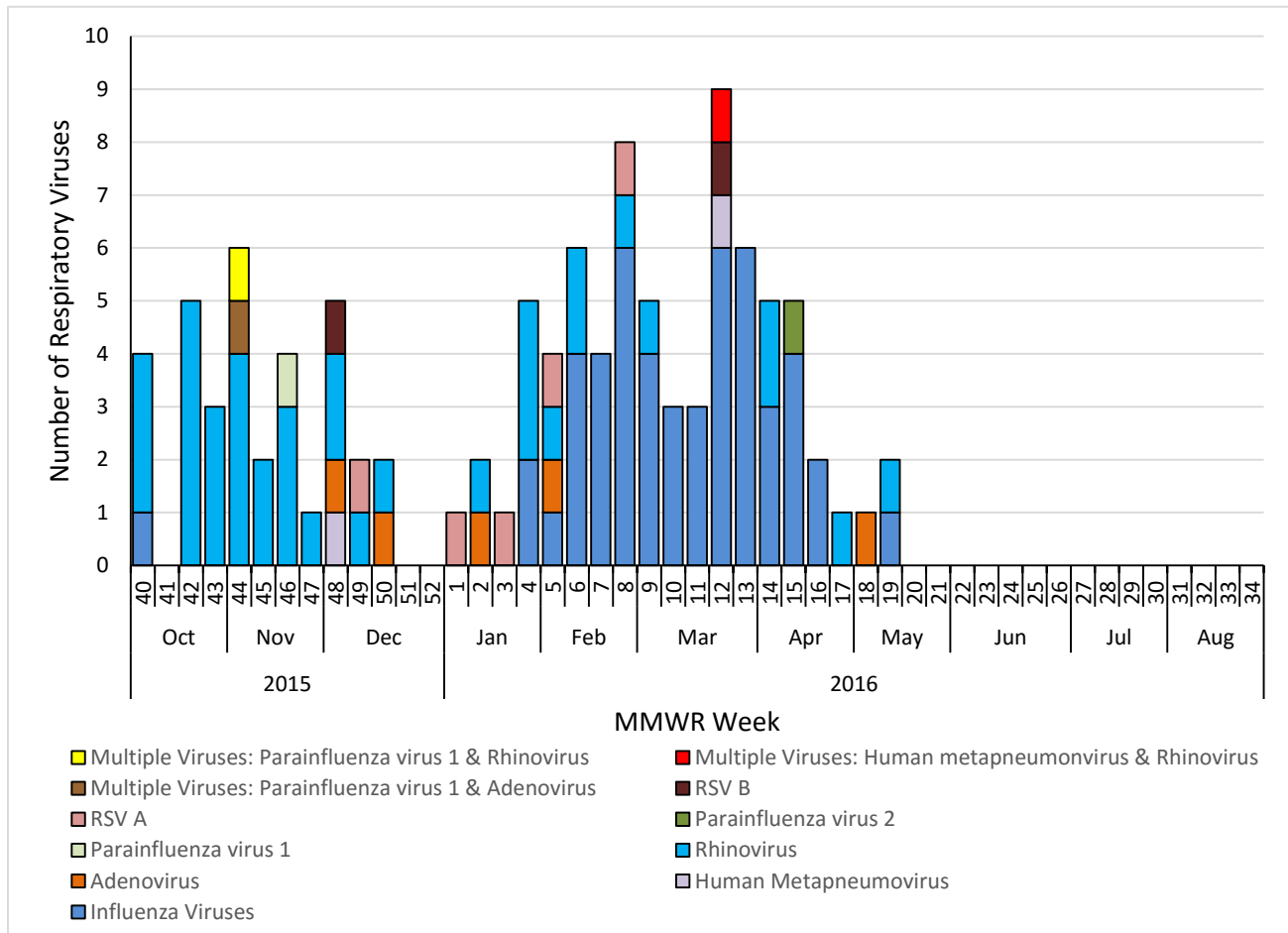


Table 2. Number and percentage of respiratory viruses detected through the Respiratory Virus Surveillance Project (RVSP), Texas, 2015–16 season

Viruses detected	Number of specimens positive	Percentage of total specimens positive
Positive for one or more respiratory viruses	107	42.5%
Influenza virus (all types/subtypes)	50	46.7%
<i>Influenza A (H1N1)</i>	15	30.0%
<i>Influenza A (H3N2)</i>	13	26.0%
<i>Influenza B</i>	22	44.0%
Adenovirus	5	4.7%
Human metapneumovirus (HMPV)	2	1.9%
Parainfluenza virus 1	1	0.9%
Parainfluenza virus 2	1	0.9%
Parainfluenza virus 3	0	0.0%
Respiratory syncytial viruses (RSV)	7	6.5%
<i>RSV A</i>	5	71.4%
<i>RSV B</i>	2	28.6%
Rhinovirus	38	35.5%
Multiple viruses detected	3	2.8%
<i>Parainfluenza virus 1 and adenovirus</i>	1	33.3%
<i>Parainfluenza virus 1 and rhinovirus</i>	1	33.3%
<i>Rhinovirus and HMPV</i>	1	33.3%
Negative or inconclusive	145	57.5%
Total tested	252	100.0%

Figure 7. Respiratory viruses detected through Respiratory Virus Surveillance Project (RVSP), Texas, 2015–16 season



School Closures and Institutional Outbreaks

Sixteen ILI or influenza-associated outbreaks were reported in schools during the 2015–16 season. One of the schools closed due to high absentee rates attributed to ILI/influenza. Outbreaks were reported from HSRs 1, 6/5S, 8 and 11. The majority of the reported school outbreaks occurred from January through May with the exception of one that occurred at the end of September. The reported school outbreaks were attributed to ILI (3 schools), influenza with unknown type (2 schools), influenza A (4 schools), influenza B (2 schools) and influenza A & B (5 schools).

Nine institutional outbreaks of ILI or influenza and one influenza-associated outbreak at a summer camp in Missouri that involved Texas residents was reported during the 2015–16 season. Outbreaks were reported from HSRs 2/3, 6/5S, 7 & 8 and from the Missouri Department of Health and Senior Services. Five long-term care facility (LTCF) outbreaks were reported from February through June 2016. Four of the LTCF outbreaks were caused by influenza (1 influenza [not typed] and 3 influenza B) and one was caused by influenza-like illness (ILI). One correctional facility outbreak was reported in May 2016. The outbreak was caused by ILI. One childcare facility outbreak was reported in April 2016. The outbreak was caused by influenza A [not subtyped] and influenza B. One outbreak of influenza (influenza A (H1N1) and influenza B) was reported in a

healthcare provider’s clinic in April 2016. One outbreak of influenza (influenza A (H3)) was reported at a large Texas university in August 2016. Finally, an outbreak of influenza (influenza A (H3)) was reported at a summer camp in Missouri that involved Texas residents in July 2016.

Mortality Surveillance

Influenza-Associated Pediatric Mortality^{viii}

Seven influenza-associated pediatric fatalities were reported to DSHS for the 2015–16 influenza season. The 2015-16 influenza season had the second lowest number of reported influenza-associated pediatric deaths in a single influenza season since reporting for this condition began in Texas in 2007. Only the 2011-12 season had fewer reported influenza-associated pediatric deaths when only 4 influenza-associated pediatric deaths were reported.

The reported deaths occurred during the week ending December 5, 2015 (week 48) through the week ending April 30, 2016 (week 17). These deaths were reported in residents of three Texas HSRs (HSR 2/3- 2 deaths, HSR 6/5S- 3 deaths, and HSR 8- 2 deaths). Four (57.1%) patients had confirmed influenza A infections, 2 (28.6%) patients had influenza B infections, and 1 patient had influenza [unknown type] (14.3%). Subtyping of the influenza A virus was performed for three of the influenza A infections; two were identified as influenza A (H3) and one was identified as influenza A (H1N1).

The median age at death was 4 years with patients ranging in age from 2 months to 15 years. Of the seven reported cases, one case was younger than 6 months of age, three cases were 6 months to 4 years of age, two cases were 5 to 10 years of age, and one case was 11 to 17 years of age. Of the five cases who were eligible for vaccination and for whom influenza vaccination status was known, two (40.0%) were fully vaccinated for the current season. Four (57.1%) cases had significant underlying medical conditions.

Pneumonia and Influenza (P&I) Mortality^{ix}

Eight thousand four hundred fifteen P&I deaths were reported in Texas during the 2015-16 influenza season. The 65 years or older age category had the highest number of P&I deaths with 6,443 (76.6%) followed by the 50-64 years of age category with 1,418 P&I deaths (16.9%). The number of P&I deaths for the other age categories (0-4, 5-17, and 18-49) were low (see table 3 below). When looking at P&I deaths by HSR, HSR 4/5N had the highest mortality rate with 42.50 per 100,000 followed by HSR 1 with 40.24 per 100,000 (see table 4).

Table 3: Texas P&I Deaths Occurring Oct. 04, 2015-Oct. 05, 2016 by Age

Age Category (years)	Number of P&I Deaths ⁺	Mortality Rate (per 100,000)
0 - 4	42	2.06
5 - 17	21	0.39
18 - 49	491	3.93
50 - 64	1418	28.52
65 +	6443	191.46
Overall	8415	29.80

*NOTE: Data are provisional and subject to change, errors, and duplicates

Table 4: Texas P&I Deaths Occurring Oct. 04, 2015-Oct. 05, 2016 by Health Service Region (HSR)

HSR	Number of P&I Deaths	Mortality Rate (per 100,000)
1	362	40.24
2/3	2348	28.76
4/5N	675	42.50
6/5S	1899	25.83
7	979	28.70
8	870	29.76
9/10	481	31.44
11	801	33.79
Overall	8415	29.80

*NOTE: Data are provisional and subject to change, errors, and duplicates

Texas Influenza Surveillance System

Background

Influenza and influenza-like illnesses (ILI) were last reportable by law in any county in Texas in 1993⁴. 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 2015–16 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) which concluded at the end of August 2016 of the 2015-16 season, 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 and pneumonia and influenza (P&I) deaths among Texas residents of all ages.

References

1. Davlin SL, Blanton L, Kniss K, et al. Influenza Activity — United States, 2015–16 Season and Composition of the 2016–17 Influenza Vaccine. *MMWR Morb Mortal Wkly Rep* 2016;65:567–575.
2. Budd A, Blanton L, Kniss K, et al. Update: Influenza Activity — United States and Worldwide, May 22–September 10, 2016. *MMWR Morb Mortal Wkly Rep* 2016;65:1008–1014.
3. Centers for Disease Control and Prevention. Fluview: 2016-2017 Influenza Season Week 50 ending December 17, 2016. Retrieved December 23, 2016 from <https://www.cdc.gov/flu/weekly/>.
4. Texas Department of Health. Epidemiology in Texas 1993 Annual Report. Available at: <http://www.dshs.texas.gov/idcu/Data/annual/1990s/>.
5. Centers for Disease Control and Prevention. U.S. Outpatient Influenza-like Illness Surveillance Network: 2015–2016 Workfolder. 55.20E, Rev. 03/2015.
6. Council of State and Territorial Epidemiologists. Influenza Incidence Surveillance Project – Application. April 1, 2011.
7. Centers for Disease Control and Prevention. Influenza-Associated Pediatric Mortality, 2004 case definition. Available at: <https://wwwn.cdc.gov/nndss/conditions/influenza-associated-pediatric-mortality/case-definition/2004/>. Accessed on December 22, 2016.

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 ($\geq 100^{\circ}\text{F}$ [37.8°C], oral or equivalent) *and* cough and/or sore throat without a known cause other than influenza"⁵. 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"⁶. 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 reported⁷."

^{ix} Pneumonia and influenza (P&I) death data are obtained from death certificates of Texas residents whose underlying or contributing cause(s) of death is reported as pneumonia or influenza. P&I deaths are identified based on ICD-10 multiple cause of death codes. The death data comes from the DSHS Center for Health Statistics. P&I Mortality Surveillance began during the 2015-16 influenza season.