Influenza and Other Respiratory Viruses
Weekly Report

California Influenza Surveillance Program
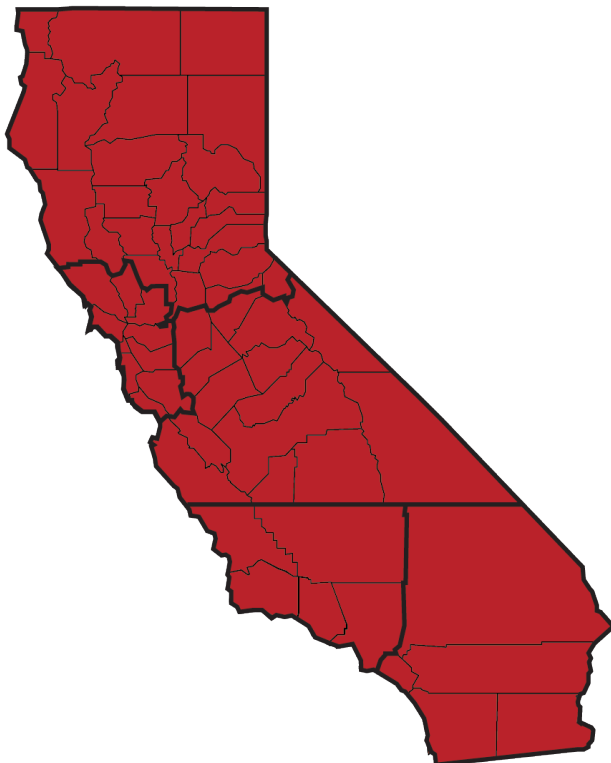
Highlights (Week 2: January 5, 2020 – January 11, 2020)

Statewide Activity

No Activity	Sporadic	Local	Regional	Widespread

■ **Regions with Elevated Activity**

▸ **Deaths:** 105* since Sept. 29, 2019

▸ **Outbreaks:** 35 since Sept. 29, 2019

▸ **Laboratory:** 28.8% flu positive

▸ **Outpatient ILI:** Above expected levels

▸ **Hospitalizations:** Above expected levels

*Influenza-coded deaths from death certificates
Click on images and links for more information

Key messages:

- Flu activity remains elevated in California.
- Flu B (Victoria) and A (H1)pdm09 viruses are co-circulating in California.
- Haven't gotten a flu shot yet? Get immunized now to protect you and your loved ones.
- Everyone >6 months of age needs a flu shot.
- Take action to stop the spread of flu: wash hands often, cover coughs and sneezes, and stay home when sick.

Note: This report includes data from many sources of influenza surveillance and it should be viewed as a preliminary "snapshot" of influenza activity for each surveillance week. Because data are preliminary, the information may be updated in later reports as additional data are received. These data should not be considered population-based or representative of all California public health jurisdictions.

A. Outpatient, Inpatient, and Death Data

1. Influenza Sentinel Providers

Sentinel providers (physicians, nurse practitioners, and physician assistants) situated throughout California report on a weekly basis the number of patients seen with influenza-like illness (ILI) and the total number of patients seen for any reason. ILI is defined as any illness with fever (≥100°F or 37.8°C) AND cough and/or sore throat (in the absence of a known cause other than influenza).

A total of 81 enrolled sentinel providers have reported data for Week 2. Based on available data, the percentage of visits for ILI during Week 2 was 4.4% compared to Week 1 (5.3%) and is above expected levels for this time of year (Figure 1).
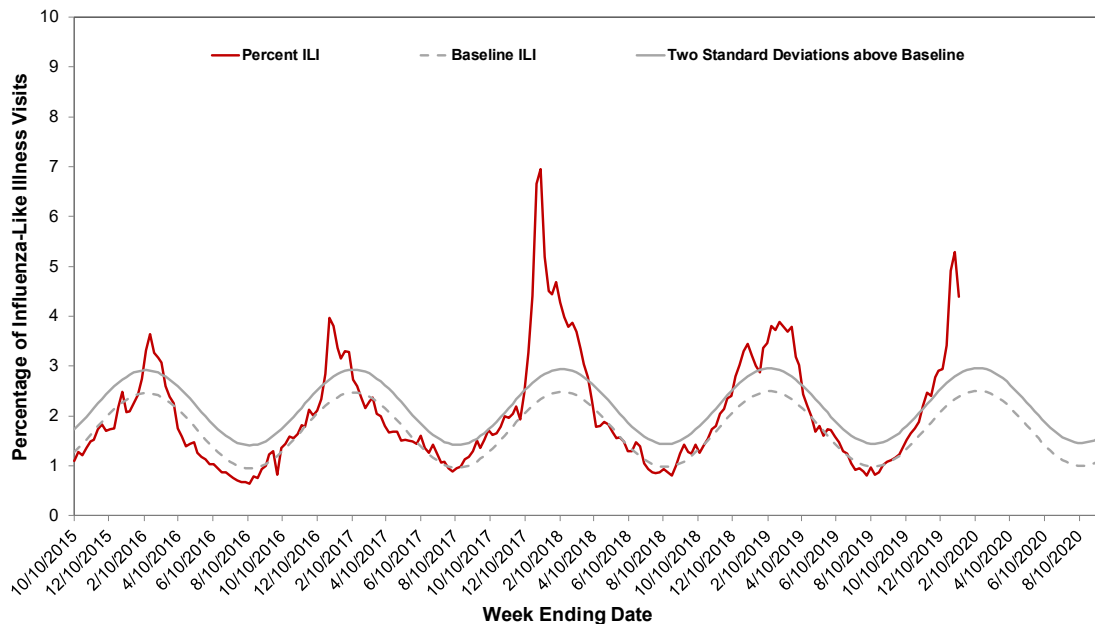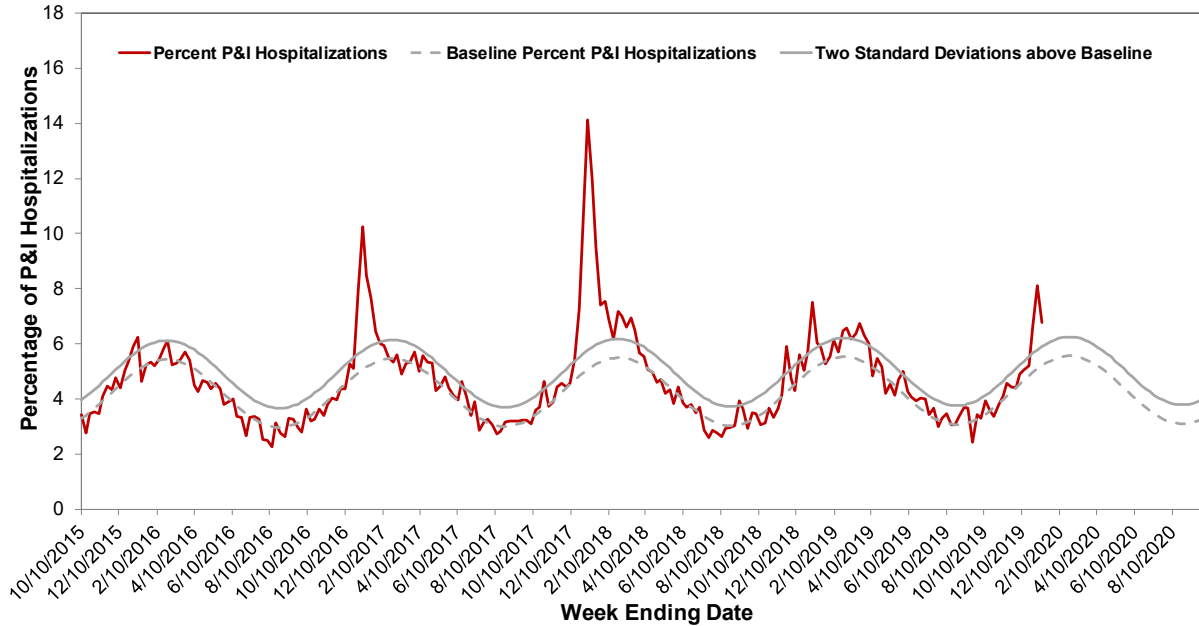

The seasonal baseline was calculated using a regression model applied to data from the previous five years. Two standard deviations above the seasonal baseline is the point at which the observed percentage of ILI is significantly higher than would be expected at that time of year.

2. Kaiser Permanente Hospitalization Data

Inpatients at Kaiser Permanente facilities with an admission diagnosis including the keywords "flu," "influenza," "pneumonia," or variants of the keywords are defined as pneumonia and influenza (P&I)-related admissions. The number of P&I admissions is divided by the total number of hospital admissions occurring in the same time period to estimate the percentage of P&I admissions. Admissions for pregnancy, labor and delivery, birth, and outpatient procedures are excluded from the denominator.

The percentage of admissions for pneumonia and influenza (P&I) in Kaiser Permanente facilities in northern California during Week 2 was 6.8% compared to Week 1 (8.1%) and is above expected levels for this time of the year (Figure 2).

**Figure 2. Percentage of P&I Admissions in Kaiser Permanente Northern California Hospitals, 2015–2020**

The seasonal baseline was calculated using a regression model applied to data from the previous five years. Two standard deviations above the seasonal baseline and is the point at which the observed percentage of pneumonia and influenza hospitalizations in Kaiser Permanente hospitals in Northern California is significantly higher than would be expected at that time of the year.

The majority of admissions for pneumonia and influenza did not result in intensive care unit (ICU) admission or death; however, 383 ICU admissions and 186 deaths have occurred among persons with P&I admission diagnoses (Figure 3a). The majority of P&I admissions occurred among persons ≥65 years of age across all severity categories, especially among deaths (Figure 3b). Please note that pneumonia and influenza admissions serve as a proxy for influenza activity, but do not necessarily represent laboratory-confirmed influenza infections.

Figure 3. Number (a) and age group distribution (b) of non-ICU, ICU, and deaths associated with P&I Admissions in Kaiser Permanente Northern California hospitals, 2019–2020 season to date

(a)
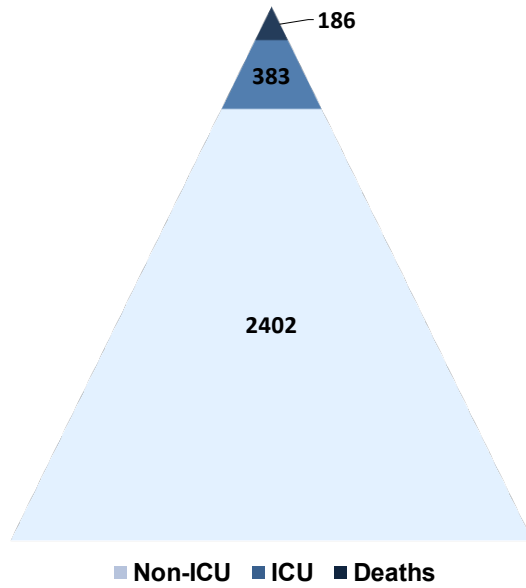
(b)
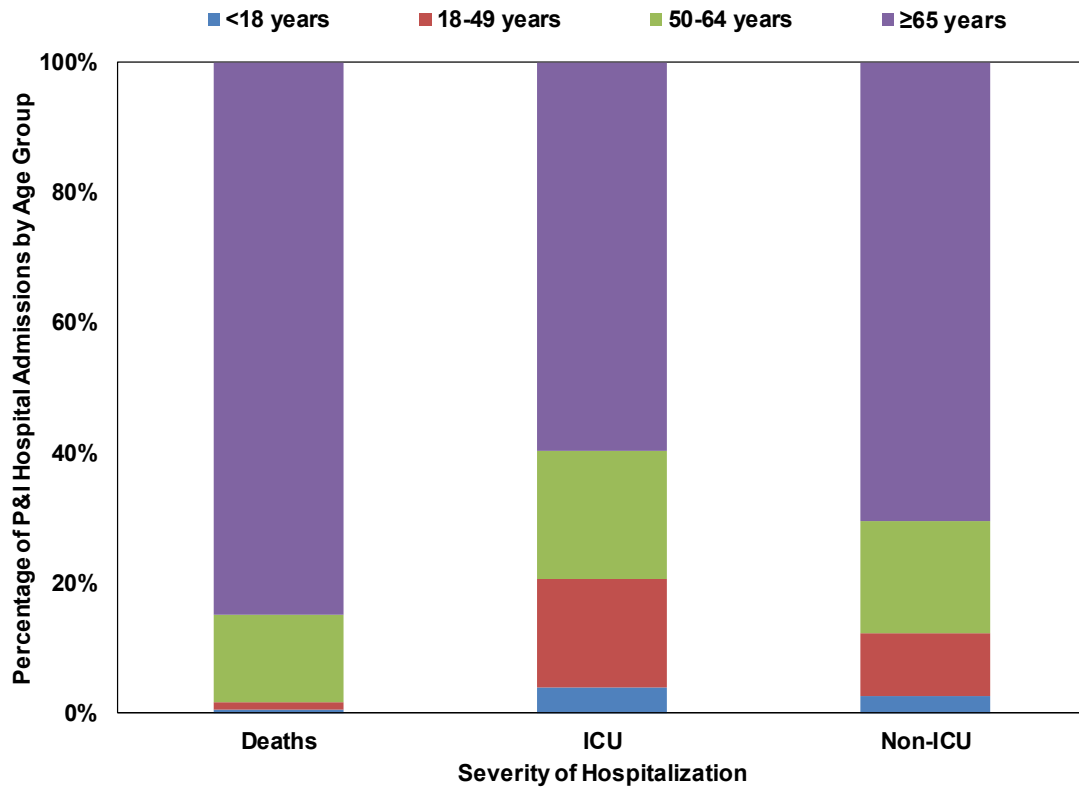
3. Influenza-Associated Hospitalizations, California Emerging Infections Program

The California Emerging Infections Program (CEIP), Influenza Surveillance Network (FluSurv-NET) conducts population-based surveillance for laboratory-confirmed influenza-associated hospitalizations among patients of all ages in Alameda, Contra Costa, and San Francisco counties.

The incidence of influenza-associated hospitalizations per 100,000 population was higher in week 52 (3.0) compared to Week 51 (2.0) (Figure 4). Data for the most recent two weeks are not presented because results are still being collected and are likely to change.

Figure 4. Incidence of Influenza Hospitalizations in CEIP Counties, 2017–2020
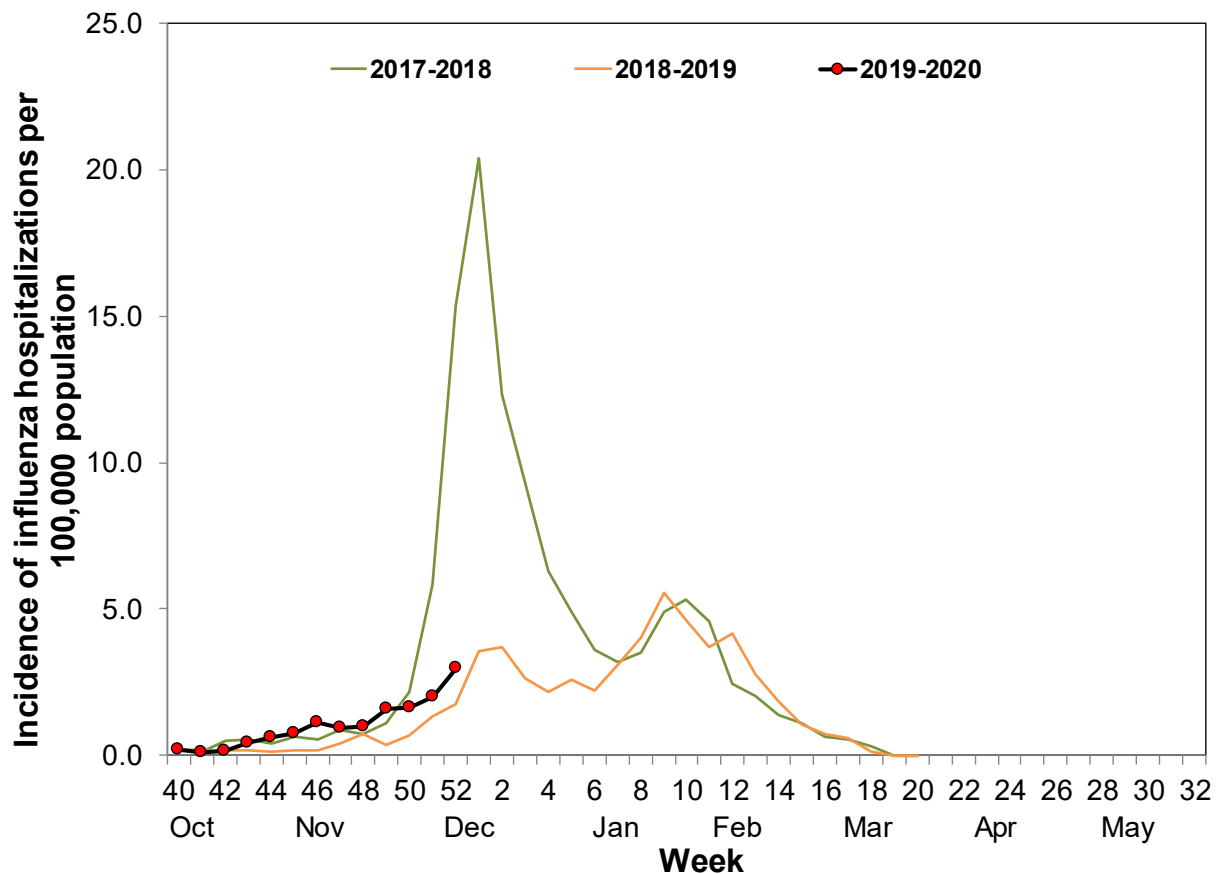

4. Influenza Mortality Surveillance from Death Certificates

Deaths occurring in California among residents who had influenza noted in any cause of death field on the death certificate (text or coded) are defined as influenza-coded deaths. The percentage of influenza-coded deaths is calculated by dividing the number of influenza-coded deaths by the total number of all cause deaths during the same period. Influenza-coded deaths are not necessarily laboratory-confirmed and are an underestimate of all influenza-associated deaths.

During Week 2, 35 new influenza-coded deaths were identified. To date during the 2019–2020 influenza season, 105 influenza-coded deaths have been identified (Figure 5). The percentage of deaths coded as influenza during Week 2 was 0.5% compared to 0.6% during Week 1 (Figure 6).

Figure 5. Number of Influenza-coded Deaths Identified from Death Certificates by Week of Death, 2019–2020 Season
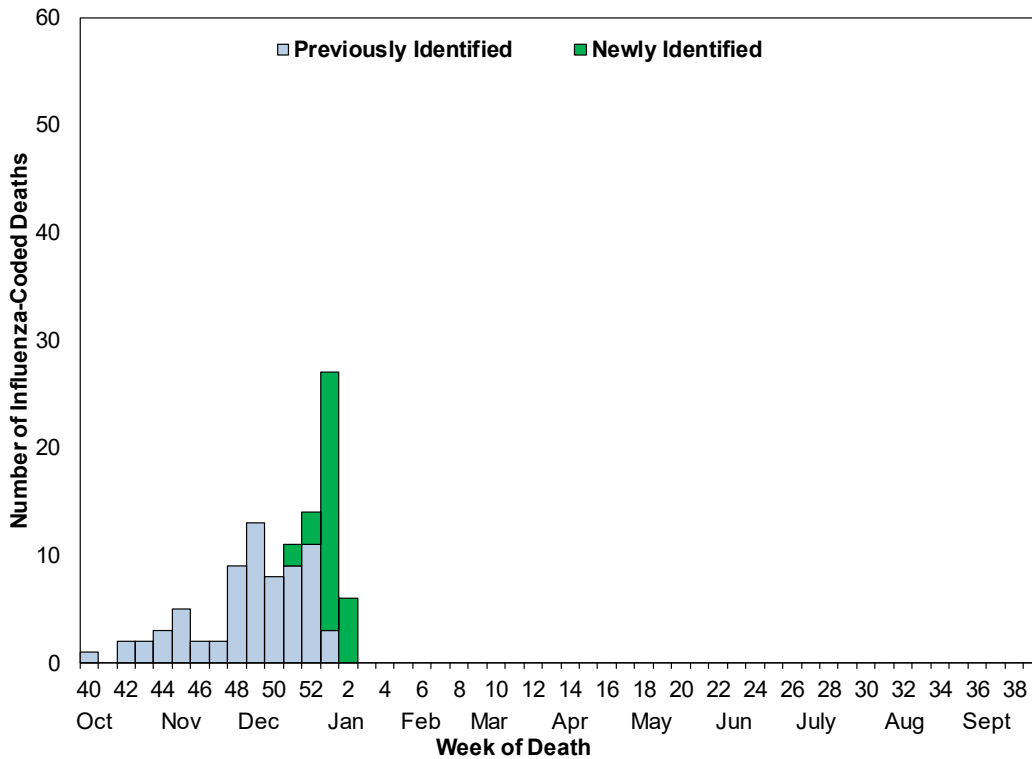

Note: Coding of deaths can be delayed by several weeks. Influenza-coded deaths will be included once enough information is available to identify them.

Figure 6. Percentage of Influenza-coded Deaths Occurring in California among California Residents, 2015–2020
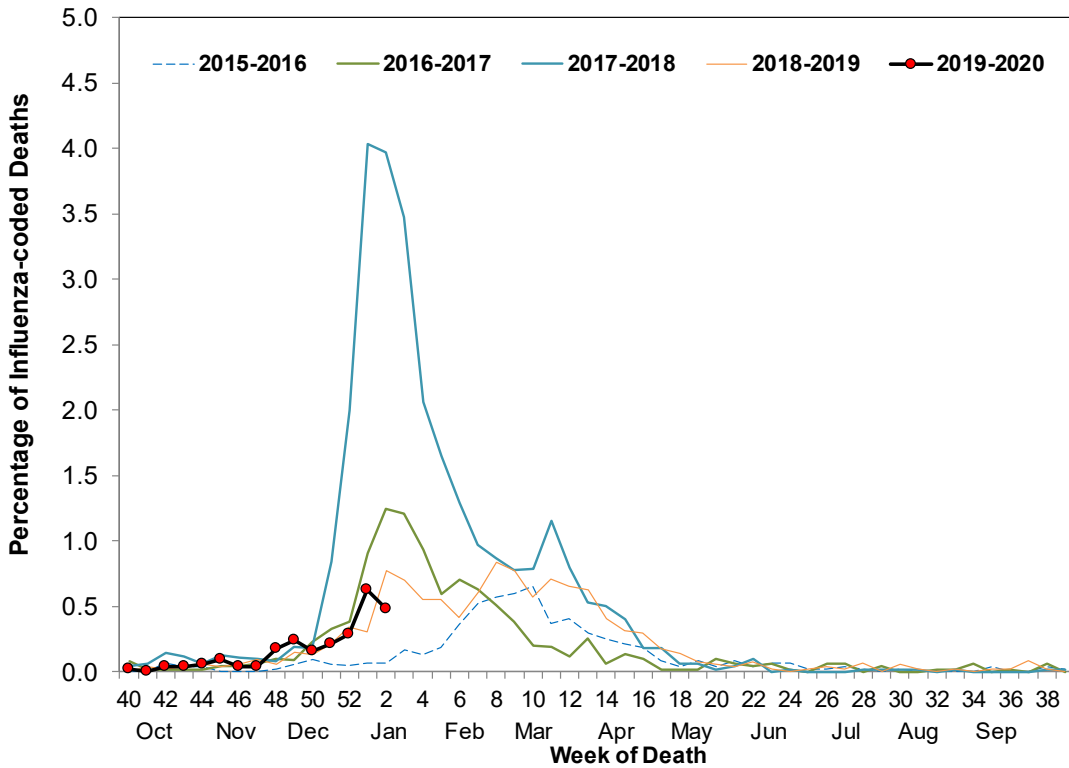
To date, more deaths have occurred among persons ≥65 years of age (61.0%) than among persons <65 years of age during the 2019–2020 influenza season; however, the percentage of deaths occurring among persons <65 years of age (39.0%) is consistent with other seasons during which influenza viruses other than influenza A (H3N2) have circulated in greater numbers, such as the 2015–2016 and 2018–2019 seasons (Figure 7).

Figure 7. Age Distribution of Influenza-coded Deaths Occurring in California among California Residents, 2015–2016 Season through 2019–2020 Seasons
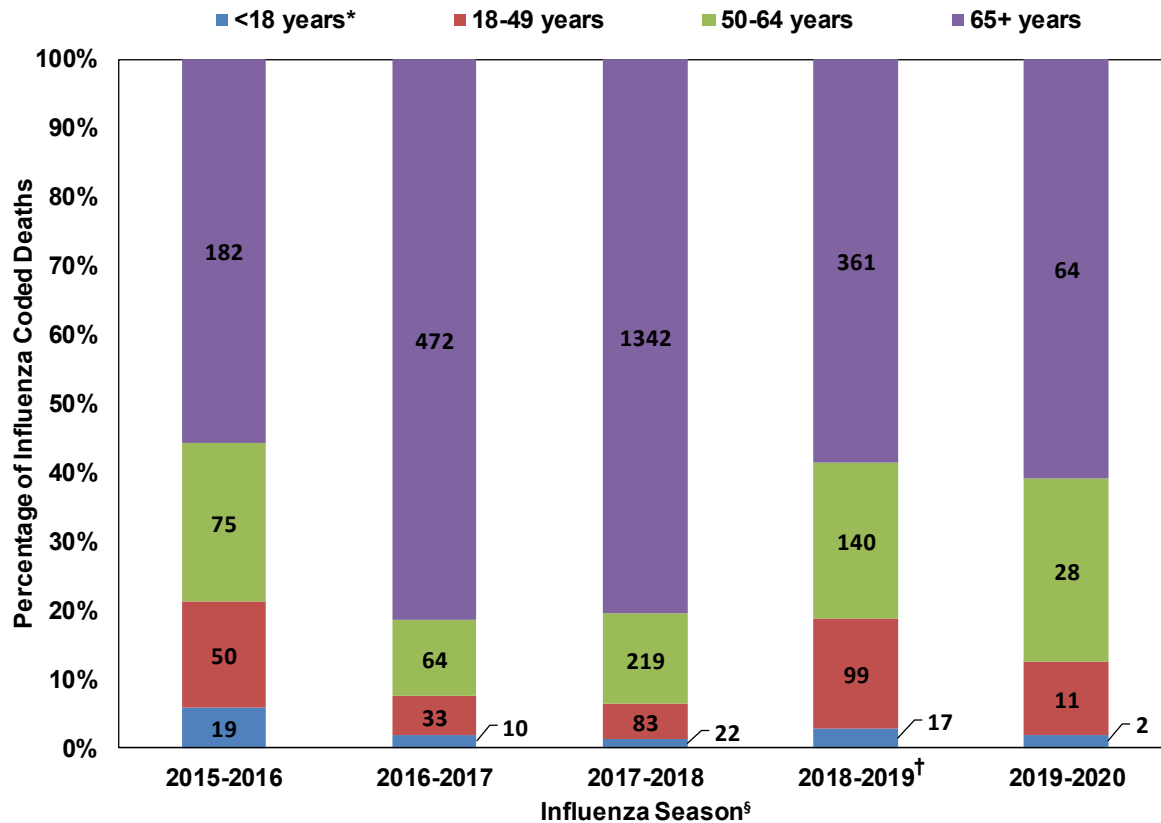
* Methods used to identify pediatric influenza-coded deaths on death certificates differ from those used to identify the influenza-associated pediatric deaths presented below.

[†] One death during the 2018–2019 influenza season has unknown age and is not included in the figure.

§ 2015–2016 influenza season: October 4, 2015–October 1, 2016; mixed influenza A and influenza B season

2016–2017 influenza season: October 2, 2016–September 30, 2017; influenza A (H3N2) predominant season

2017–2018 influenza season: October 1, 2017–September 29, 2018; influenza A (H3N2) predominant season

2018–2019 influenza season: September 30, 2018–September 28, 2019; mixed influenza A (H1N1)pdm09 and influenza A (H3N2) season

2019–2020 influenza season: September 29, 2019–September 26, 2020; influenza B (Victoria) viruses predominating, influenza A (H1N1)pdm09 viruses are also circulating

5. Laboratory-Confirmed Severe Influenza-associated Pediatric Deaths

Influenza-associated deaths in children <18 years of age are nationally notifiable. The weekly influenza report includes confirmed deaths formally reported to CDPH through January 11, 2020 (Week 2).

No laboratory-confirmed influenza-associated fatalities in children <18 years of age were reported to CDPH during Week 2. To date, CDPH has received five reports of laboratory-confirmed influenza-associated deaths among children <18 years of age during the 2019–2020 influenza season.

B. Laboratory Update – Influenza

1. Respiratory Laboratory Network (RLN) and Clinical Sentinel Laboratory Surveillance Results

Laboratory surveillance for influenza and other respiratory viruses involves the use of data from clinical sentinel laboratories (hospital, academic, and private laboratories) and public health laboratories in the Respiratory Laboratory Network located throughout California. These laboratories report the number of laboratory-confirmed influenza and other respiratory virus detections and isolations on a weekly basis.

The overall percentage of influenza detections in clinical sentinel laboratories in Week 2 (28.8%) was higher than Week 1 (26.8%) (Figure 8). Additional details, including influenza typing and subtyping information from public health laboratories can be found in Figures 8 and 9 and Tables 1 and 2.

Neither the RLN nor CDPH-VRDL has identified any influenza viruses by polymerase chain reaction (PCR) that are suggestive of a novel influenza virus.

Figure 8. Percentage of Influenza Detections at Clinical Sentinel Laboratories, 2015–2020
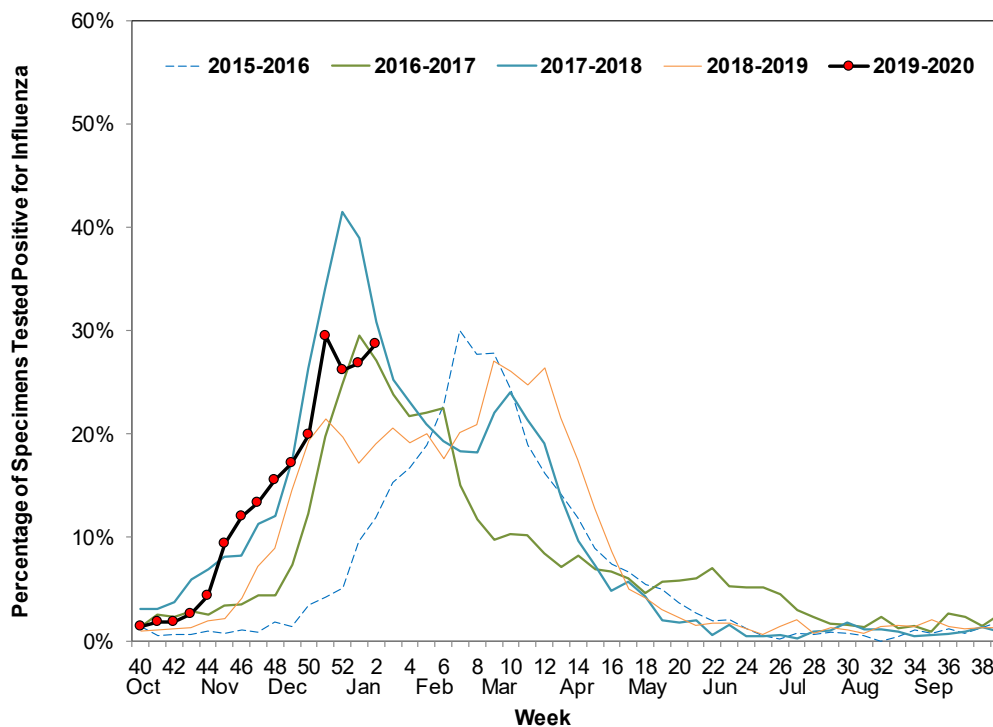
Figure 9. Number of Influenza Detections by Type and Subtype Detected in the Respiratory Laboratory Network, 2019–2020
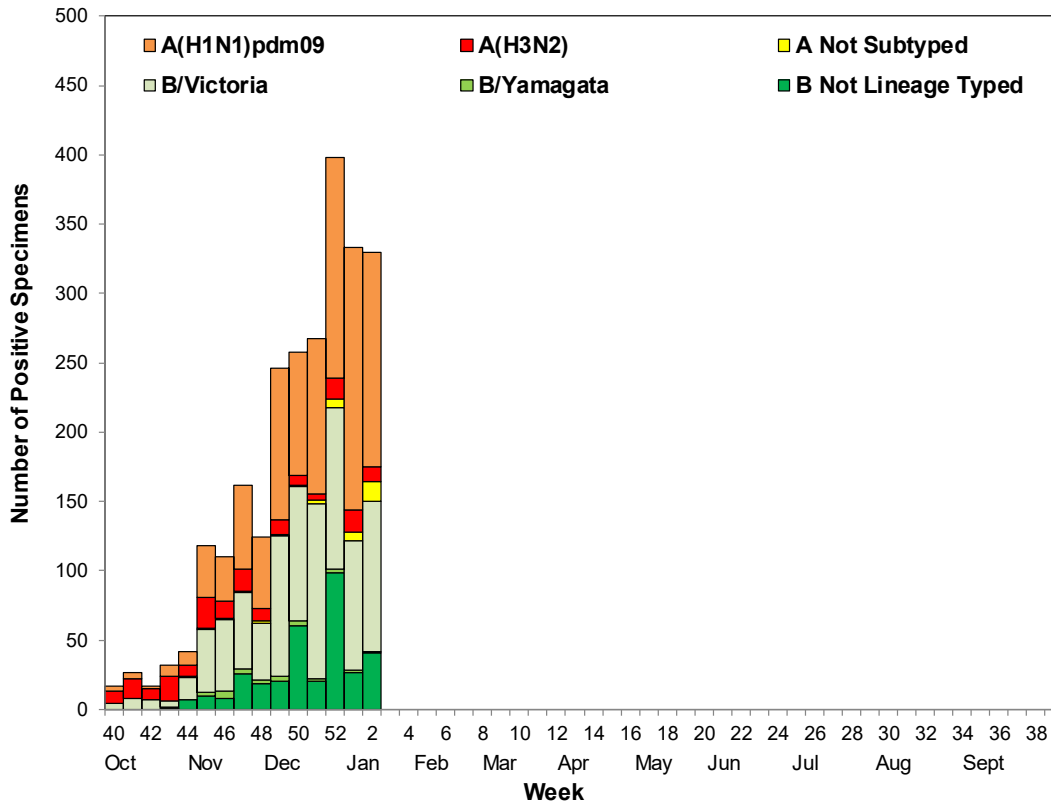
Table 1. Respiratory Specimens Testing Positive for Influenza — Clinical Sentinel Laboratories, Current Week and Season to Date

	Current Week Number	Current Week Percent	Season to Date Number	Season to Date Percent
Number of Specimens Tested	4,946		51,415	
Influenza Positive	1,422	28.8	8,832	17.2
A	768	54.0[*]	3,529	40.0[*]
B	654	46.0[*]	5,303	60.0[*]

* Percent of specimens positive for influenza

Table 2. Respiratory Specimens Testing Positive for Influenza by Influenza Type and Subtype — Respiratory Laboratory Network, Current Week and Season to Date

	Current Week Number	Current Week Percent	Season to Date Number	Season to Date Percent
Influenza Positive	330		2,481	
A	180	54.5*	1,240	50.0*
A (H1)pdm09	155	86.1†	1,023	82.5†
A (H3)	11	6.1†	180	14.5†
A, not subtyped	14	7.8†	37	3.0†
B	150	45.5*	1,241	50.0*
B Victoria	108	72.0‡	876	70.6‡
B Yamagata	1	0.7‡	27	2.2‡
B, not lineage typed	41	27.3‡	338	27.2‡

* Percent of specimens positive for influenza
† Percent of influenza A positives
‡ Percent of influenza B positives

2. Influenza Virus Characterization

Close monitoring of influenza viruses is required to better assess the potential impact on public health. CDC characterizes influenza viruses through one or more tests including genetic characterization by analyzing viral genome sequences, and antigenic characterization by hemagglutination inhibition (HI) assays and/or neutralization based Focus Reduction assays (FRA). These data are used to compare how similar, or well-inhibited, currently circulating influenza viruses are to the reference viruses. Antigenic and genetic characterization of circulating influenza viruses gives an indication of the influenza vaccines ability to induce an immune response against the wide array of influenza viruses that are co-circulating every season. However, annual vaccine effectiveness estimates are needed to determine how much protection was provided to the population by vaccination.

Twenty-two influenza A (H3N2) viruses from California have been genetically characterized to date during the 2019–2020 influenza season, of which three were antigenically characterized. All 22 influenza A (H3N2) viruses were members of the 3c.2a1 subclade. Of the three influenza A (H3N2) viruses antigenically characterized, two (66.7%) were well-inhibited by A/Kansas/14/2017-like (H3N2) antisera and one (33.3%) was poorly inhibited by A/Kansas/14/2017-like (H3N2) antisera (Table 2a).

Thirty-one influenza A (H1N1)pdm09 viruses from California have been genetically characterized to date during the 2019–2020 influenza season, of which seven were antigenically characterized. All 31 influenza A (H1N1)pdm09 viruses were members of the 6B.1A clade. Of the seven influenza A (H1N1)pdm09 viruses antigenically characterized, seven (100%) were well-inhibited by A/Brisbane/02/2018-like (H1N1) antisera (Table 2b).

Forty-six influenza B (Victoria) viruses from California have been genetically characterized to date during the 2019–2020 influenza season, of which seven were antigenically characterized. Four influenza B (Victoria) viruses were members of the V1A.1 subclade and 42 were members of the V1A.3 subclade. Of the seven influenza B (Victoria) viruses antigenically characterized, four (57.1%) were well-inhibited by B/Colorado/06/2017-like (Victoria) antisera and three (42.9%) were poorly inhibited by B/Colorado/06/2017-like (Victoria) antisera (Table 2c).

Five influenza B (Yamagata) viruses from California have been genetically characterized to date during the 2019–2020 influenza season, of which one was antigenically characterized. All five influenza B (Yamagata) viruses were members of the Y3 clade. The antigenically characterized virus was well inhibited by B/Phuket/3073/2013-like (Yamagata) antisera (Table 2d).

Table 2 a–d. Influenza virus antigenic characterization and genomic sequencing by influenza A subtype and influenza B lineage type — California, 2019–2020 influenza season

a. Influenza A (H3N2) viruses

Antigenic Characterization	Virus Clade/Subclade		
	3C.2a1	3C.3a*	Total
Well inhibited by A/Kansas/14/2017*	2	0	2
Poorly inhibited by A/Kansas/14/2017*	1	0	1
Not antigenically characterized	19	0	19
Total A (H3N2)	22	0	22

* A/Kansas/14/2017 is the influenza A (H3N2) component included in the 2019–2020 quadrivalent and trivalent influenza vaccines and is a member of the 3c.3a clade

b. Influenza A (H1N1)pdm09 viruses

Antigenic Characterization	Virus Clade		
	6B.1	6B.1A*	Total
Well inhibited by A/Brisbane/02/2018*	0	7	7
Poorly inhibited by A/Brisbane/02/2018*	0	0	0
Not antigenically characterized	0	24	24
Total A (H1N1)pdm09	0	31	31

* A/Brisbane/02/2018 is the influenza A (H1N1)pdm09 component included in the 2019–2020 quadrivalent and trivalent influenza vaccines and is a member of the 6B.1A clade

c. Influenza B (Victoria) viruses

Antigenic Characterization	Virus Subclade		
	V1A.1*	V1A.3	Total
Well inhibited by B/Colorado/06/2017*	0	4	4
Poorly inhibited by B/Colorado/06/2017*	0	3	3
Not antigenically characterized	4	35	35
Total B (Victoria)	4	42	46

* B/Colorado/06/2017-like is the influenza B (Victoria) lineage component included in the 2019–2020 quadrivalent and trivalent influenza vaccines and is a member of the V1A.1 subclade

d. Influenza B (Yamagata) viruses

Antigenic Characterization	Virus Clade	
	Y3*	Total
Well inhibited by B/Phuket/3073/2013*	1	1
Poorly inhibited by B/Phuket/3073/2013*	0	0
Not antigenically characterized	4	4
Total B (Yamagata)	5	5

* B/Phuket/3073/2013 is the influenza B (Yamagata) component included in the 2019–2020 quadrivalent influenza vaccine and is a member of the Y3 clade

C. Influenza-Associated Outbreaks

Sixteen laboratory-confirmed influenza outbreaks were reported to CDPH during Week 2. To date, 35 laboratory-confirmed influenza outbreaks have been reported to CDPH for the 2019–2020 season.

Figure 10. Number of Laboratory-Confirmed Influenza-Associated Outbreaks by Week of First Onset, 2018–2020

Week of Symptom Onset*
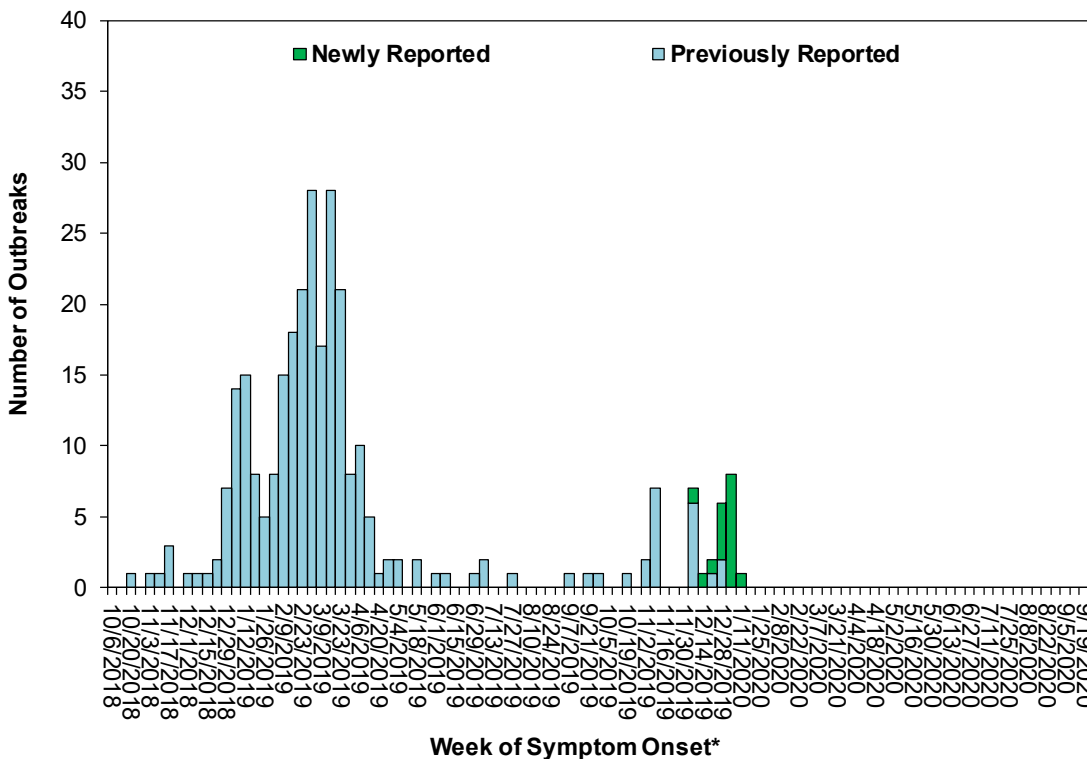
*Earliest date associated with the outbreak was used for outbreaks without reported date of first patient's symptom onset.

## D. California Border Region Influenza Surveillance Network Data

The border influenza surveillance network is comprised of outpatient provider sentinel sites whose geographical coverage extends approximately 100 kilometers (60 miles)

north of the California-Baja California border and includes Imperial and San Diego Counties, as well as some parts of Riverside County.

1. Syndromic Surveillance Update
A total of 13 border region sentinel providers reported data during Week 2. The total number of patients screened by all sentinel sites for ILI during Week 2 was 13,033. Outpatient ILI activity was 3.9% in Week 2. ILI activity for the California border region during Week 2 was lower when compared to activity for the same week during the 2017–2018 season and higher when compared to activity for the same week during the 2018–2019 season (Figure 11). All influenza syndromic data summarized for the border region represent a subset of CDC influenza sentinel providers in California.

Figure 11. Percentage of Influenza-like Illness Visits among Patients Seen by Sentinel Providers — California Border Region, 2017–2020
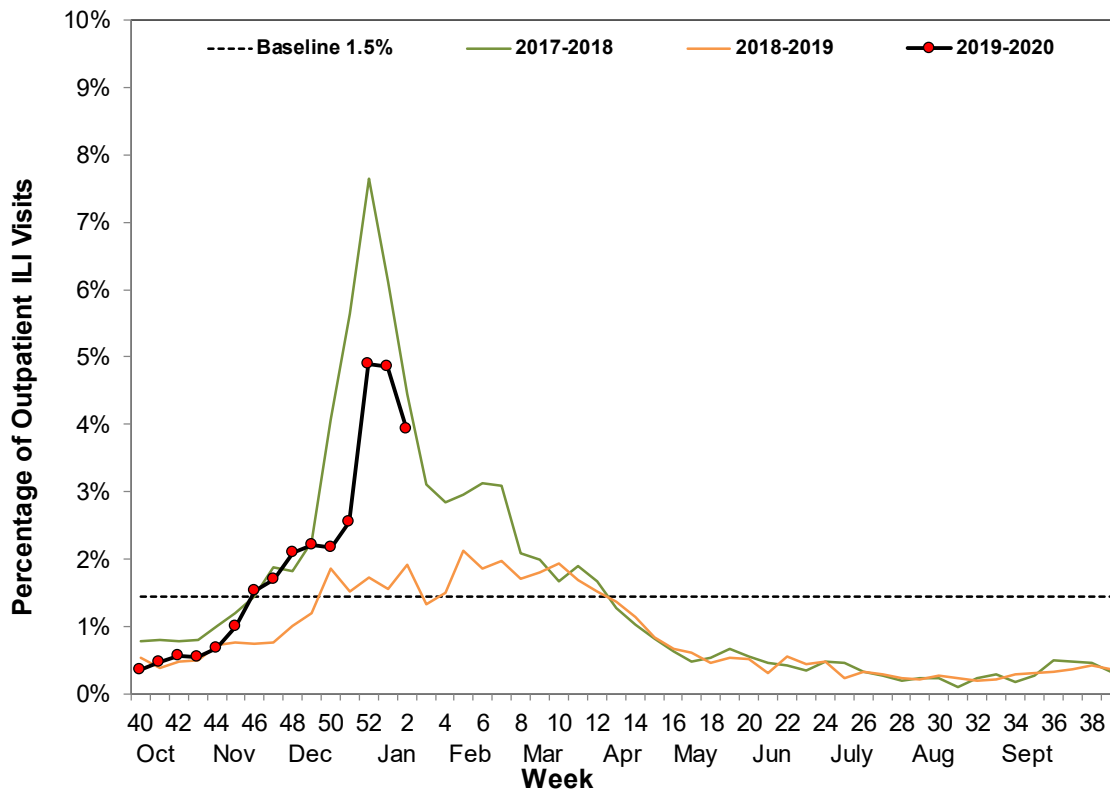

2. Virologic Surveillance Update
During Week 2, 782 respiratory specimens were tested from border region sentinel clinical laboratories; of these, 214 (27.4%) tested positive for influenza (102 [47.7%] influenza A and 112 [52.3%] influenza B). Cumulatively this season, a total of 7,272 respiratory specimens were tested from border region sentinel clinical laboratories; of these, 1,435 (19.7%) tested positive for influenza (405 [28.2%] influenza A; 1,030 [71.8%] influenza B).

During Week 2, 26 influenza positive specimens were detected at border region RLN laboratories; of which, 19 (73.1%) were influenza A and seven (26.9%) were influenza

B. Of the 19 specimens that tested positive for influenza A at RLN laboratories, 19 (100.0%) were subtyped as A (H1)pdm09. Of the 7 specimens that tested positive for influenza B at RLN laboratories, seven (100.0%) were lineage typed as B (Victoria). Cumulatively this season, a total of 287 influenza positive specimens have been detected at border region RLN laboratories; of which, 134 (46.7%) were influenza A and 153 (53.3%) were influenza B. Of the 134 specimens that tested positive for influenza A at RLN laboratories, 105 (78.4%) were subtyped as A (H1)pdm09 and 29 (21.6%) were subtyped as A (H3). Of the 153 specimens that tested positive for influenza B, five (3.3%) were lineage typed as B (Yamagata) and 148 (96.7%) were lineage typed as B (Victoria).

Laboratory data summarized in Figure 12 include data from border region influenza clinical sentinel laboratories (percentage of specimens testing positive for influenza) as well as data from border region RLN laboratories (influenza type and subtype/lineage type).

Figure 12. Number of Influenza Detections by Type and Subtype Detected in Respiratory Laboratory Network Laboratories and the Percentage of Specimens Testing Positive at Clinical Sentinel Laboratories — California Border Region, 2019–2020
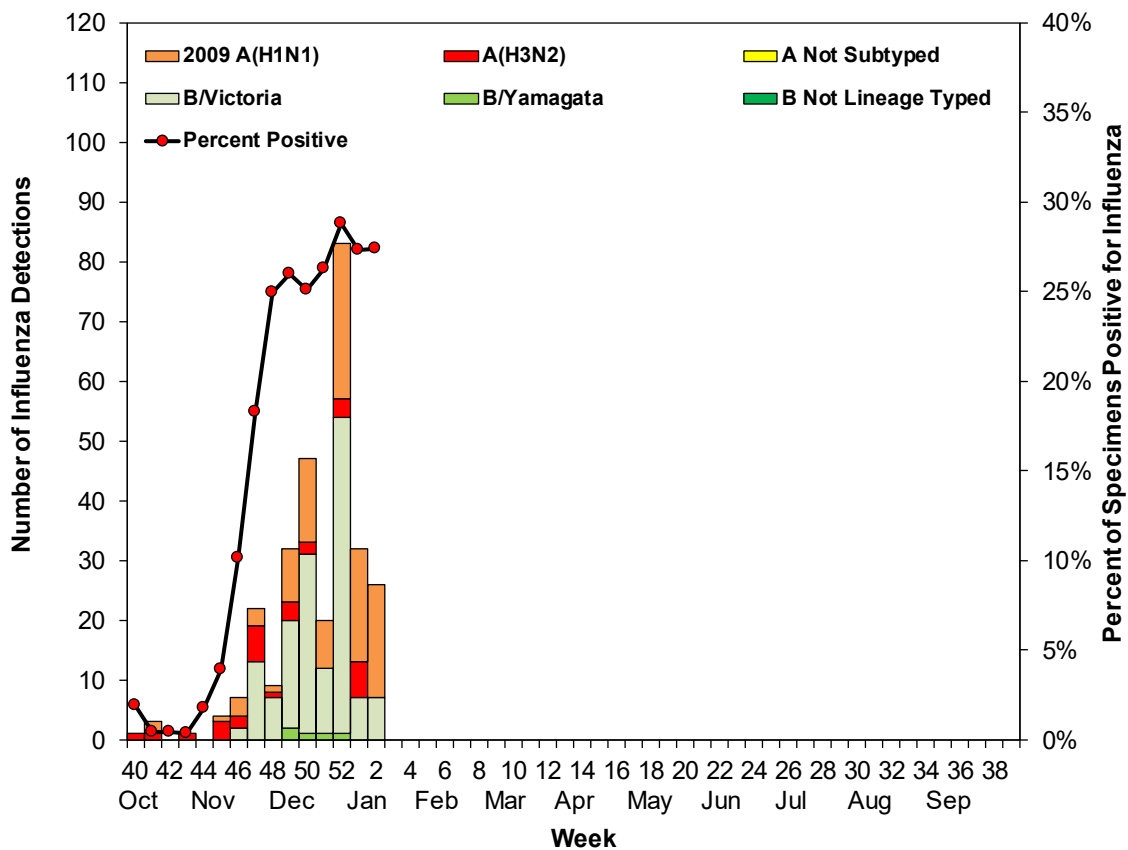
E. Other Respiratory Viruses

1. Laboratory-Confirmed Severe Respiratory Syncytial Virus Case Reports

Currently, as mandated under Section 2500 of the California Code of Regulations, deaths among children aged 0–4 years with laboratory-confirmed respiratory syncytial virus (RSV) are reportable to CDPH. The weekly influenza report includes confirmed deaths formally reported to CDPH through January 11, 2020 (Week 2).

No laboratory-confirmed RSV-associated deaths among children <5 years of age were reported to CDPH during Week 2. To date, CDPH has received no reports of laboratory-confirmed RSV-associated deaths among children <5 years of age during the 2019–2020 influenza season.

2. Other Respiratory Virus Laboratory Update

During Week 2, 4,446 specimens were tested for RSV and 547 (12.3%) were positive, which is lower compared to Week 1 (13.6%) (Figure 13). During Week 2, coronavirus and human metapneumovirus activity increased; and adenovirus, rhinovirus/enterovirus, and parainfluenza virus activity decreased (Figure 14).

Figure 13. Percentage of RSV Detections at Clinical Sentinel Laboratories, 2015–2020
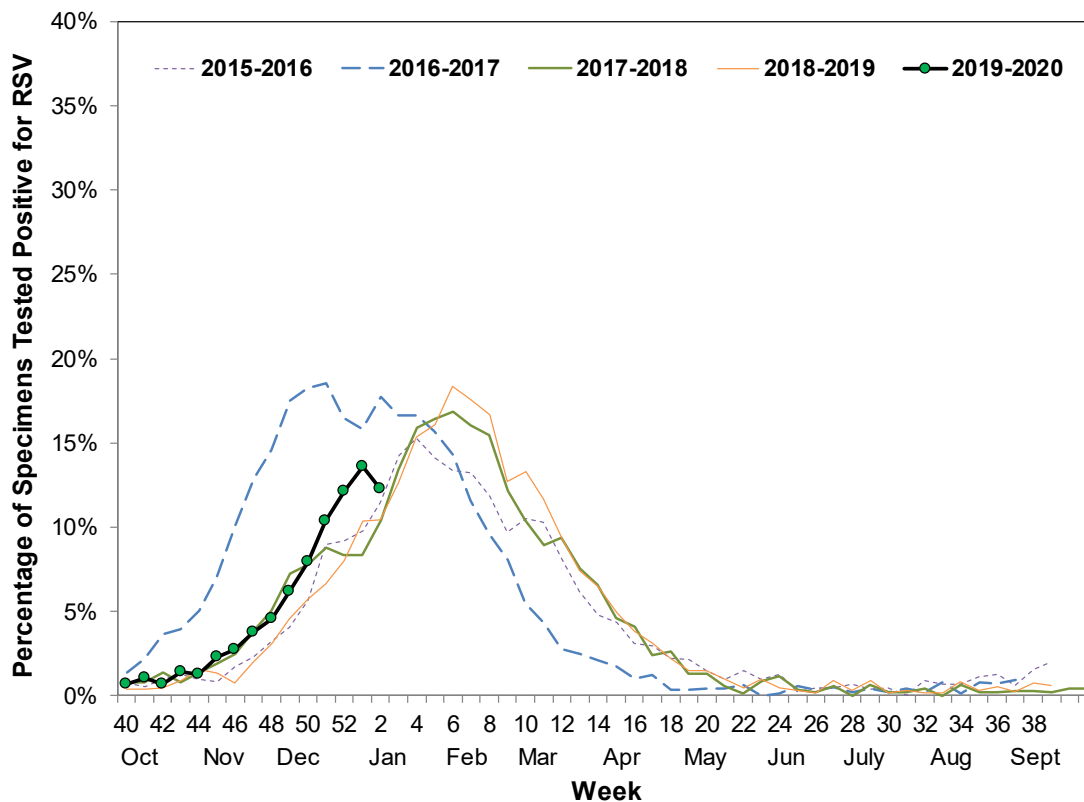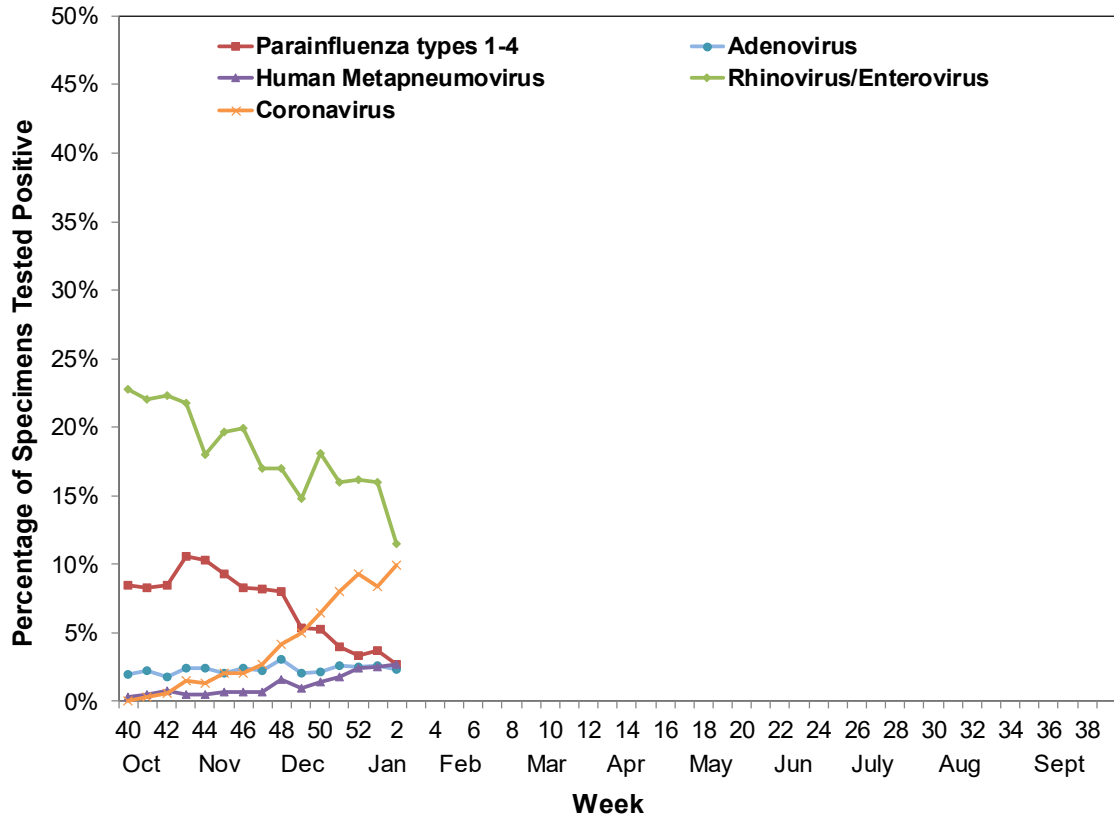
Figure 14. Percentage of Other Respiratory Pathogen Detections at Clinical Sentinel Laboratories, 2019–2020

Activity Levels:
No Activity: No laboratory-confirmed cases of influenza and no reported increase in the number of cases of ILI.
Sporadic: Small numbers of laboratory-confirmed influenza cases or a single laboratory-confirmed influenza outbreak has been reported, but there is no increase in cases of ILI.
Local: Outbreaks of influenza or increases in ILI cases and recent laboratory-confirmed influenza in a single region of the state.
Regional: Outbreaks of influenza or increases in ILI and recent laboratory confirmed influenza in at least two but less than half the regions of the state with recent laboratory evidence of influenza in those regions.
Widespread: Outbreaks of influenza or increases in ILI cases and recent laboratory-confirmed influenza in at least half the regions of the state with recent laboratory evidence of influenza in the state.

California Regions:
Northern: Alpine, Amador, Butte, Colusa, Del Norte, El Dorado, Glenn, Humboldt, Lake, Lassen, Mendocino, Modoc, Nevada, Placer, Plumas, Sacramento, Shasta, Sierra, Siskiyou, Sutter, Tehama, Trinity, Yolo, and Yuba counties
Bay Area: Alameda, Contra Costa, Marin, Napa, Solano, San Francisco, San Mateo, Santa Clara, Santa Cruz, and Sonoma counties
Central Valley: Calaveras, Fresno, Inyo, Kings, Mono, Madera, Mariposa, Merced, Monterey, San Benito, San Joaquin, Stanislaus, Tulare, and Tuolumne counties
Upper Southern: Kern, Los Angeles, San Luis Obispo, Santa Barbara, and Ventura counties
Lower Southern: Imperial, Orange, Riverside, San Bernardino, and San Diego counties

For questions regarding influenza surveillance and reporting in California, please email InfluenzaSurveillance@cdph.ca.gov. This account is monitored daily by several epidemiologists.

To obtain additional information regarding influenza, please visit the CDPH influenza website
(https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Influenza.aspx).

A copy of the case report form for reporting any laboratory-confirmed influenza case that was either admitted to the ICU or died can be downloaded from the CDPH influenza website
(https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Influenza.aspx).

For information about national influenza activity, please visit the Centers for Disease Control and Prevention's FluVIew (https://www.cdc.gov/flu/weekly/index.htm) and FluView Interactive (https://www.cdc.gov/flu/weekly/fluviewinteractive.htm) websites.

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