

Influenza and Other Respiratory Viruses as Weekly Report

California Influenza Surveillance Program

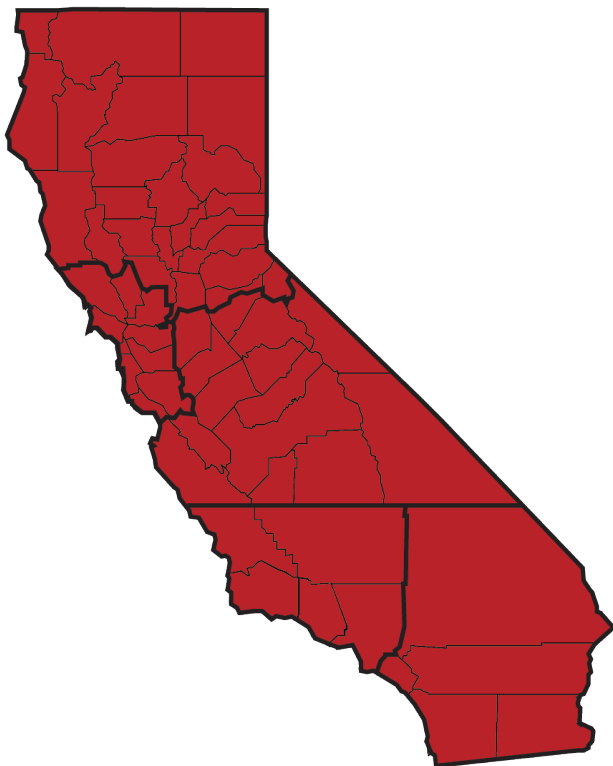


Highlights (Week 10: March 1, 2020 – March 7, 2020)

Statewide Activity



Regions with Elevated Activity



- ▶ **Deaths:** 598* since Sept. 29, 2019
- ▶ **Outbreaks:** 148 since Sept. 29, 2019
- ▶ **Laboratory:** 20.0% 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 A (H1)pdm09 viruses are predominating in California, but B (Victoria) viruses are still circulating.
- Since September 29, 2019, 15 influenza-associated pediatric deaths have been reported.
- Several more weeks of influenza activity are expected.
- It's not too late to get vaccinated – vaccination is the best protection against this potentially serious disease.

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.

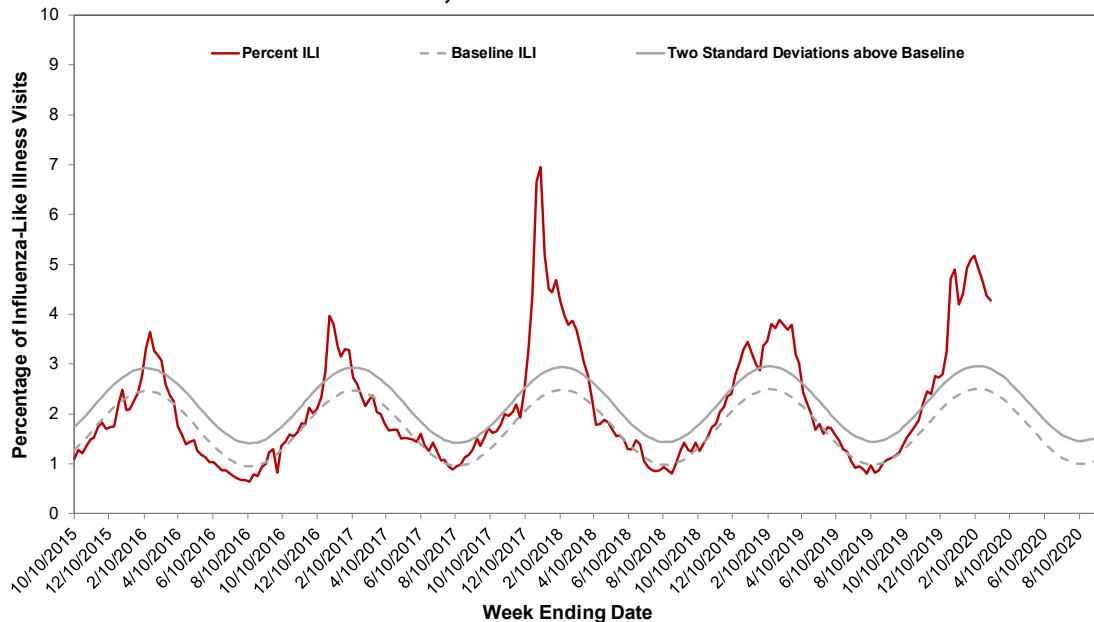
A. Outpatient, Inpatient, and Death Data

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 ($\geq 100^{\circ}\text{F}$ or 37.8°C) AND cough and/or sore throat (in the absence of a known cause other than influenza).

A total of 83 enrolled sentinel providers have reported data for Week 10. Based on available data, the percentage of visits for ILI during Week 10 was 4.3% compared to Week 9 (4.4%) and is above expected levels for this time of year (Figure 1).

Figure 1. Percentage of Influenza-like Illness Visits Among Patients Seen by California Sentinel Providers, 2015–2020



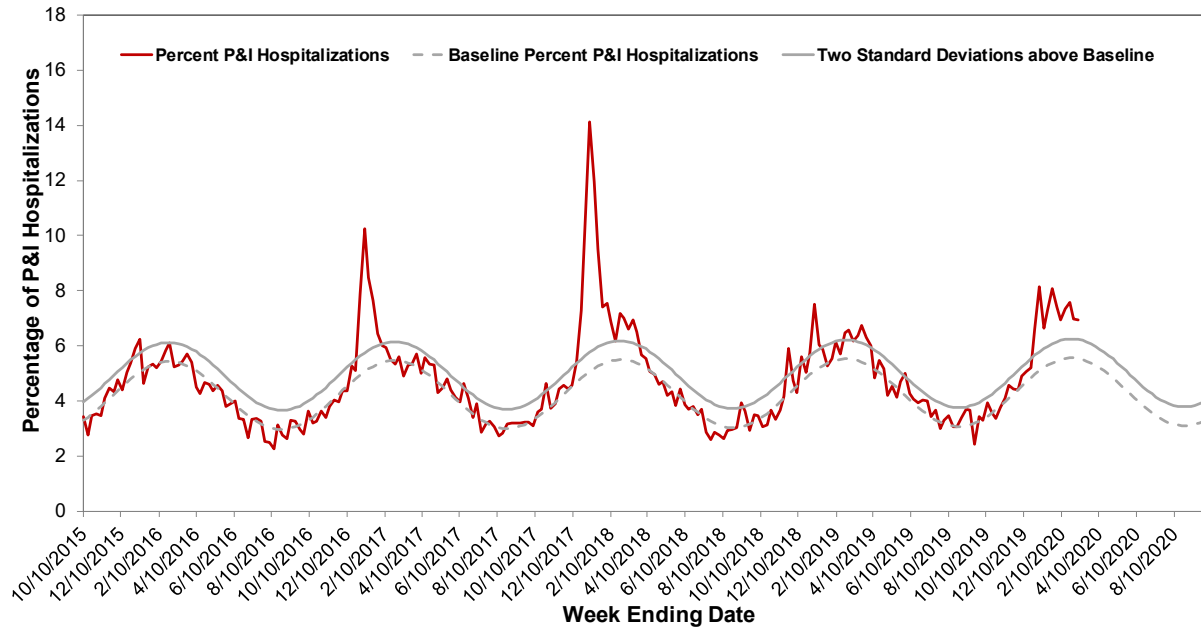
The seasonal baseline was calculated using a regression model applied to data from the previous five years. Two standard deviations above the seasonal baseline is the point at which the observed percentage of ILI is significantly higher than would be expected at that time of year.

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 10 was 6.9% compared to Week 9 (7.0%) 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

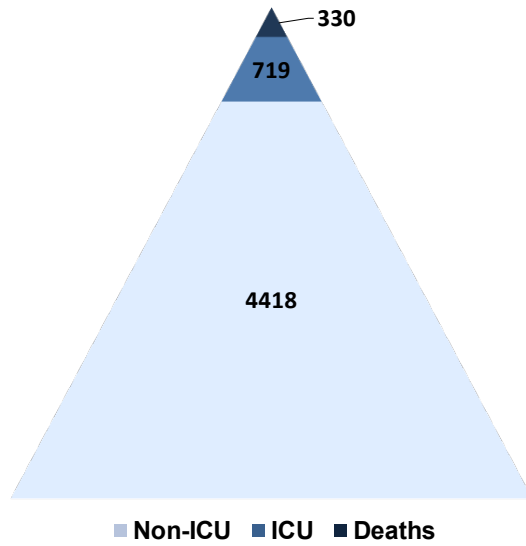


The seasonal baseline was calculated using a regression model applied to data from the previous five years. Two standard deviations above the seasonal baseline and is the point at which the observed percentage of pneumonia and influenza hospitalizations in Kaiser Permanente hospitals in Northern California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

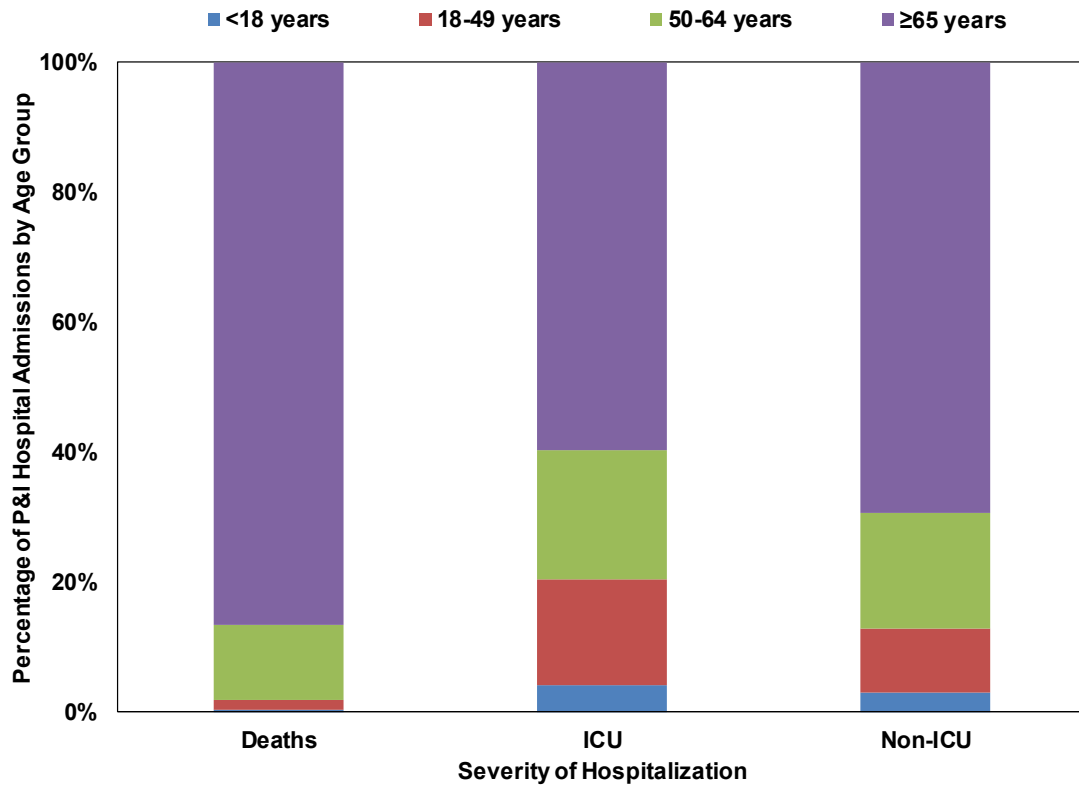
The majority of admissions for pneumonia and influenza did not result in intensive care unit (ICU) admission or death; however, 719 ICU admissions and 330 deaths have occurred among persons with P&I admission diagnoses (Figure 3a). The majority of P&I admissions occurred among persons ≥ 65 years of age 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)

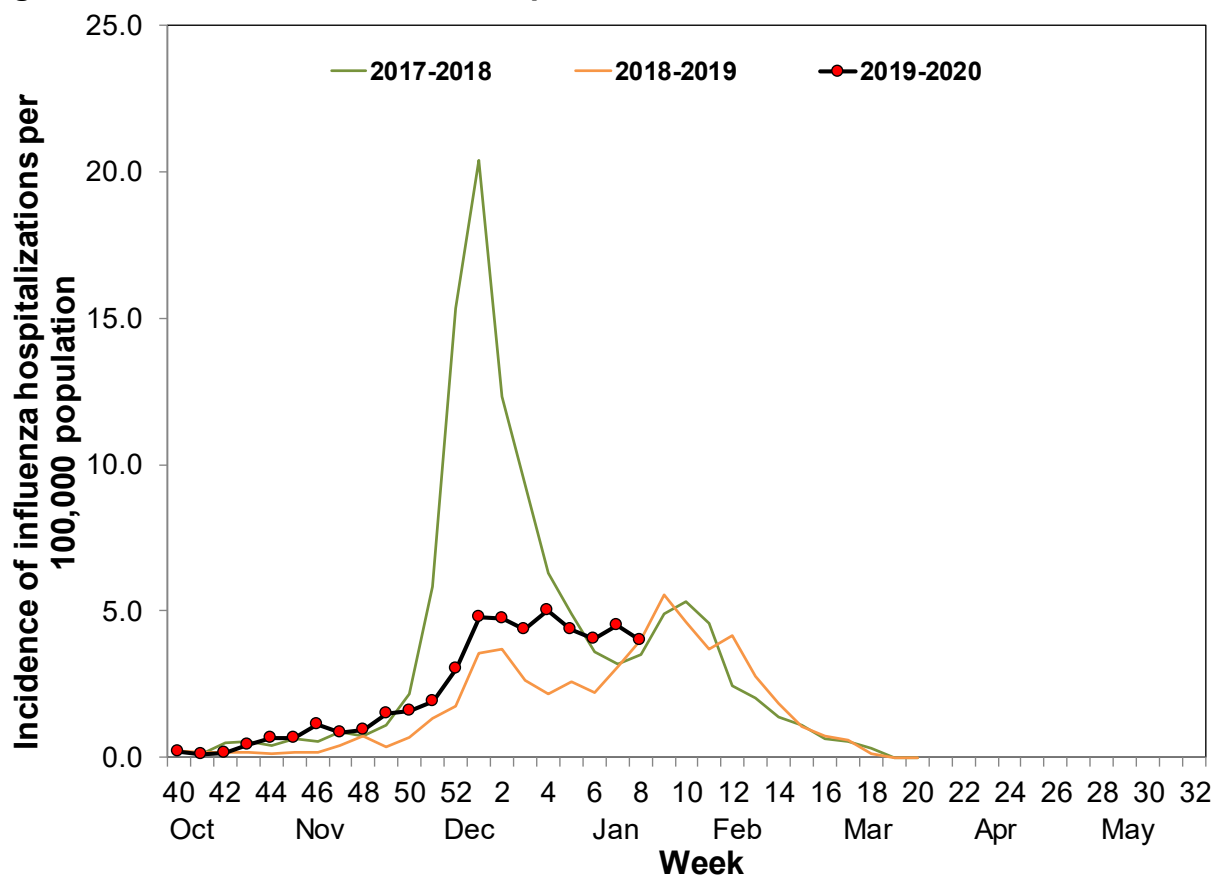


3. Influenza-Associated Hospitalizations, California Emerging Infections Program

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 lower in week 8 (4.0) compared to Week 7 (4.52) (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

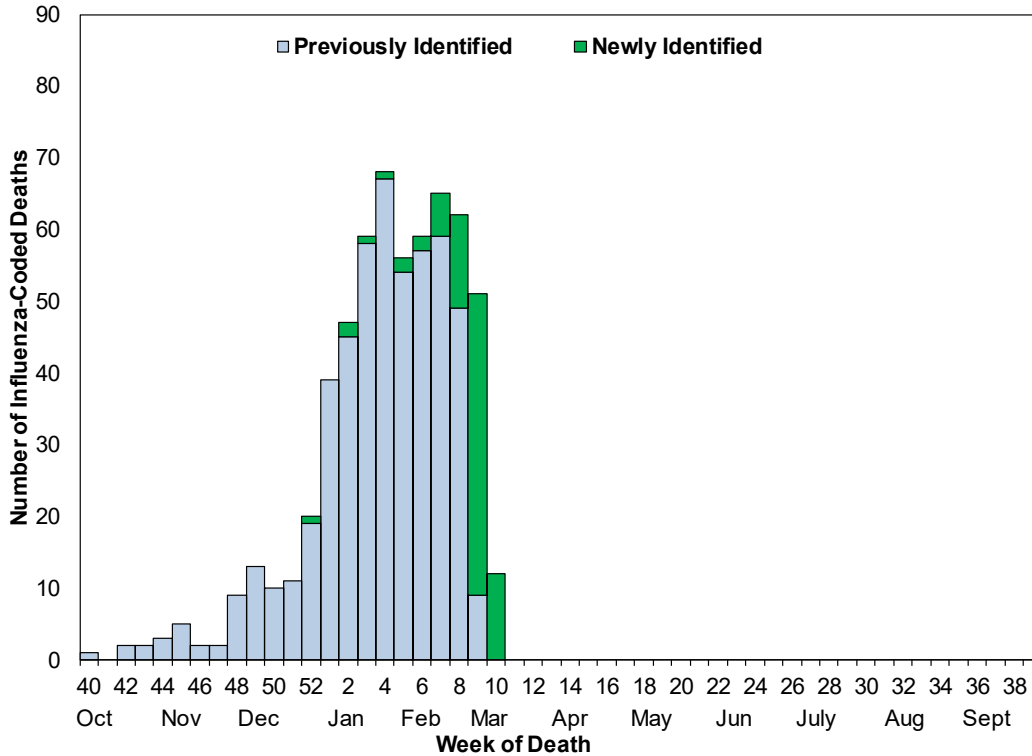


4. Influenza Mortality Surveillance from Death Certificates

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.

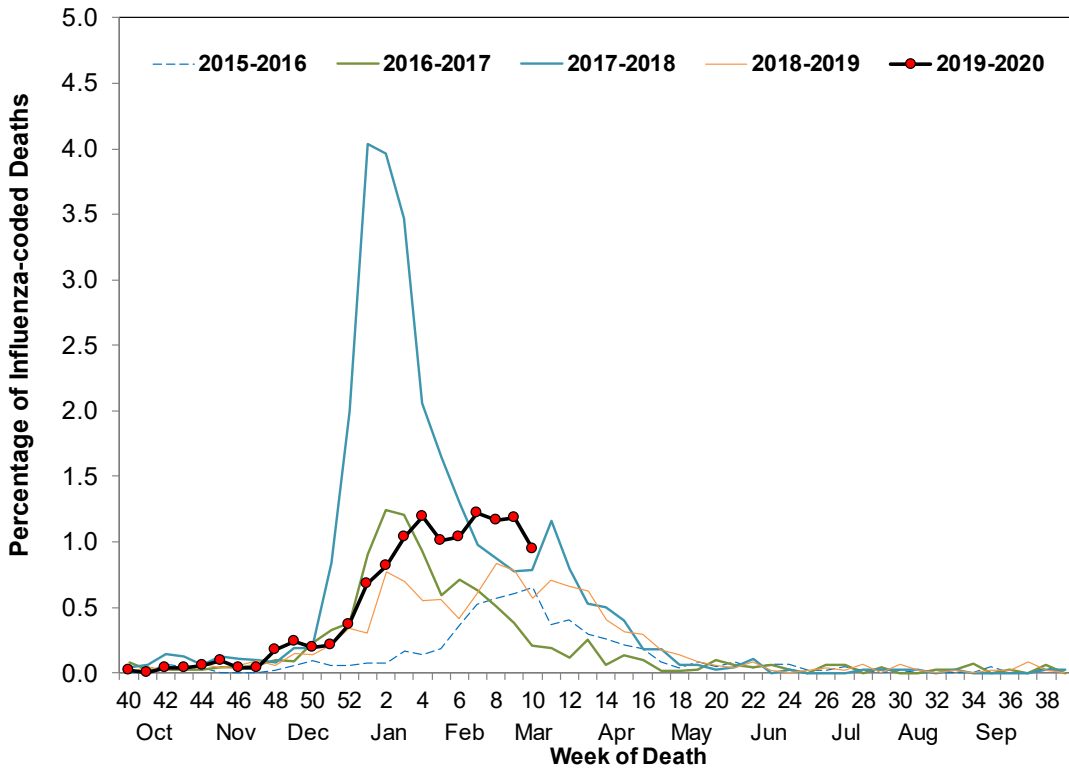
During Week 10, 82 new influenza-coded deaths were identified. To date during the 2019–2020 influenza season, 598 influenza-coded deaths have been identified (Figure 5). The percentage of deaths coded as influenza during Week 10 was 0.9% compared to 1.2% during Week 9 (Figure 6).

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



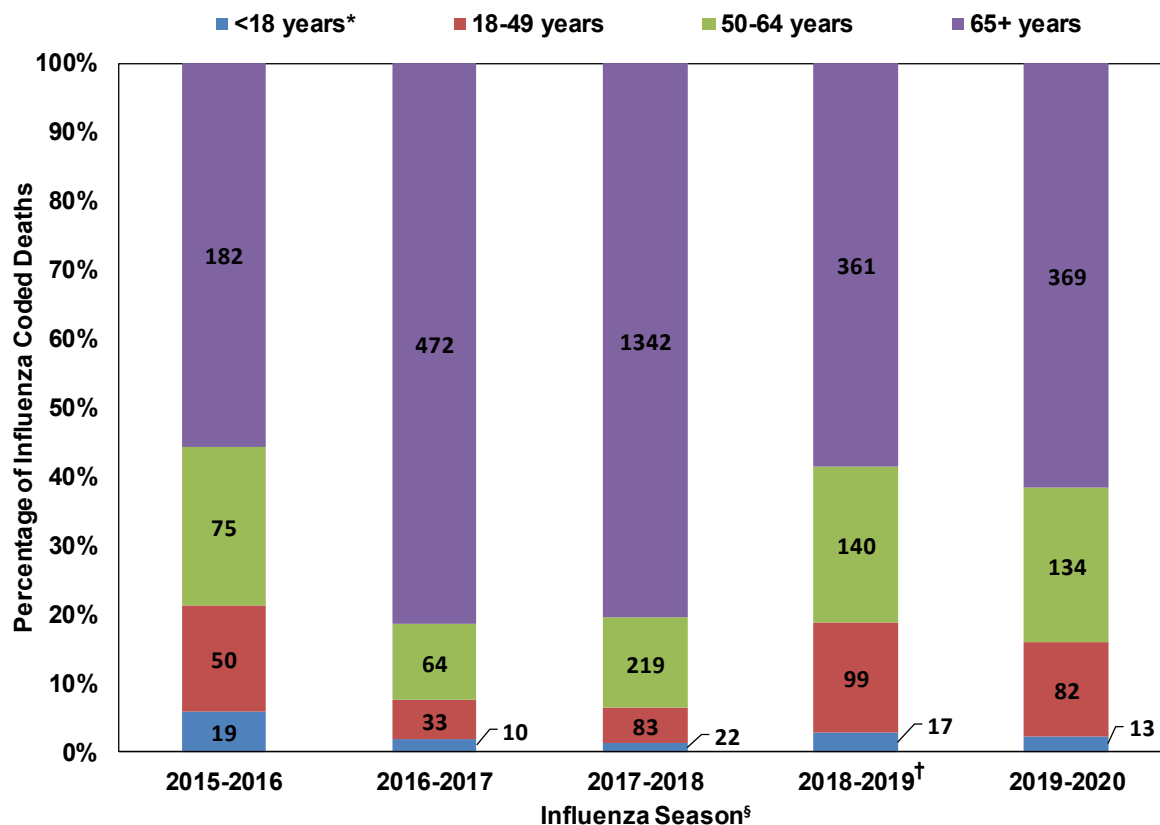
Note: Coding of deaths can be delayed by several weeks. Influenza-coded deaths will be included once enough information is available to identify them.

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 (61.7%) 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 (38.3%) 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; mixed influenza B (Victoria) and influenza A (H1N1)pdm09 season

5. Laboratory-Confirmed 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 March 7, 2020 (Week 10). Methods used to identify pediatric influenza-coded deaths on death certificates differ from those used to identify the influenza-associated pediatric deaths presented below and might not include the same individuals.

No laboratory-confirmed influenza-associated fatalities in children <18 years of age were reported to CDPH during Week 10. To date, CDPH has received 15 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 10 (20.0%) was lower than Week 9 (24.0%) (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

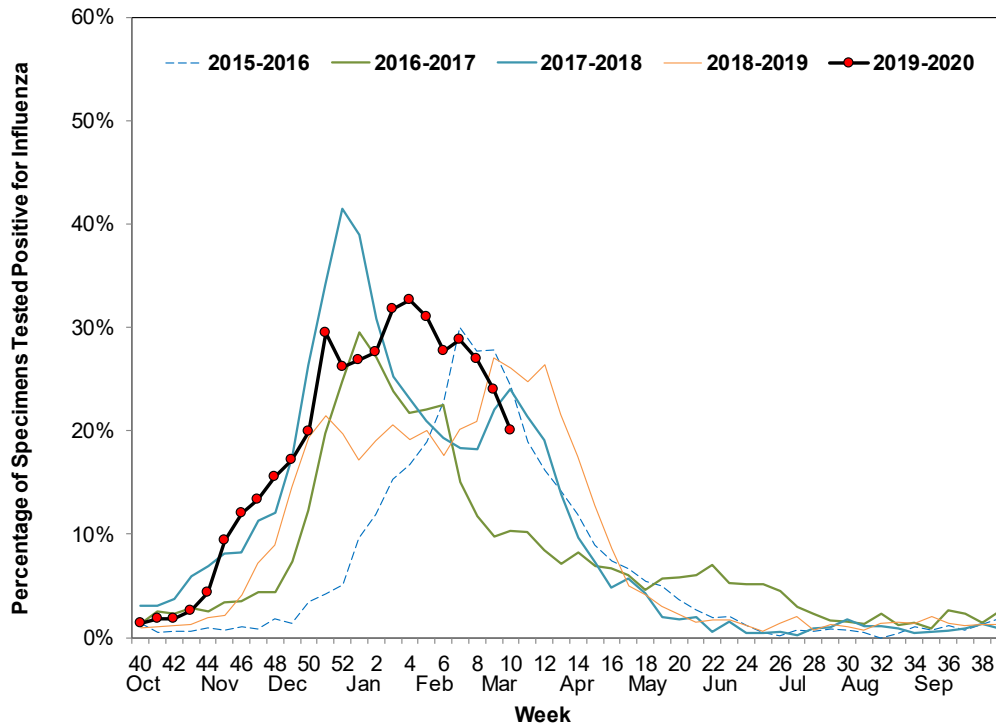


Figure 9. Number of Influenza Detections by Type and Subtype Detected in the Respiratory Laboratory Network, 2019–2020

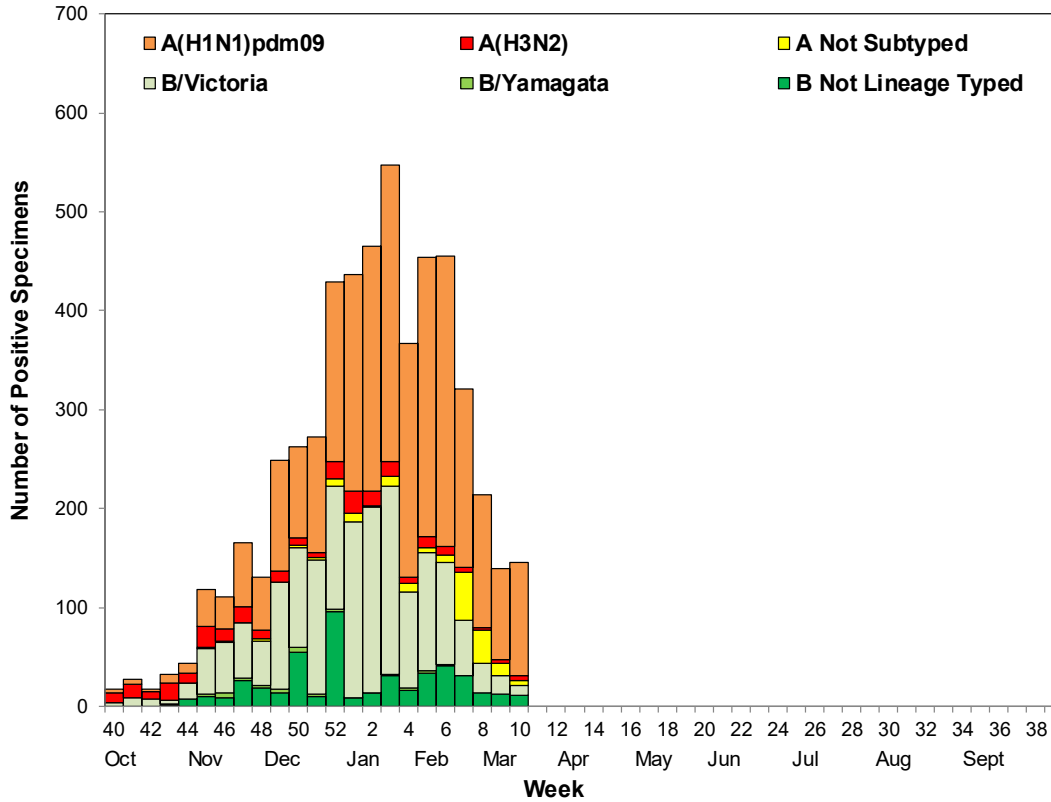


Table 1. Respiratory Specimens Testing Positive for Influenza — Clinical Sentinel Laboratories, Current Week and Season to Date

	Current Week Number	Current Week Percent	Season to Date Number	Season to Date Percent
Number of Specimens Tested	5,892		103,563	
Influenza Positive	1,178	20.0	23,413	22.6
A	875	74.3*	13,593	58.1*
B	308	25.7*	9,820	41.9*

* 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	145		5,417	
A	124	85.5*	3,228	59.6*
A (H1)pdm09	114	91.9 [†]	2,819	87.3 [†]
A (H3)	5	4.0 [†]	252	7.8 [†]
A, not subtyped	5	4.0 [†]	157	4.9 [†]
B	21	14.5*	2,189	40.4*
B Victoria	10	47.6 [‡]	1,700	77.7 [‡]
B Yamagata	0	0.0 [‡]	34	1.6 [‡]
B, not lineage typed	11	52.4 [‡]	455	20.8 [‡]

* Percent of specimens positive for influenza

[†] Percent of influenza A positives

[‡] Percent of influenza B positives

2. Antiviral Resistance Testing

Of the influenza specimens tested by the CDPH-VRDL to date this season, none have been found to be resistant to Oseltamivir (Table 3).

Table 3. Number of Specimens Tested for Oseltamivir Resistance, 2019–2020

	Oseltamivir Resistance
Influenza A (H1)pdm09	0/56
Influenza A (H3)	0/32
Influenza B	0/71

3. 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-nine influenza A (H3N2) viruses from California have been genetically characterized to date during the 2019–2020 influenza season, of which eight were

antigenically characterized. One influenza A (H3N2) virus was a member of the 3c.3a clade and 28 viruses were members of the 3c.2a1 subclade. Of the eight influenza A (H3N2) viruses antigenically characterized, four (50%) were well-inhibited by A/Kansas/14/2017-like (H3N2) antisera and four (50%) were poorly inhibited by A/Kansas/14/2017-like (H3N2) antisera (Table 4a).

Fifty-eight influenza A (H1N1)pdm09 viruses from California have been genetically characterized to date during the 2019–2020 influenza season, of which nine were antigenically characterized. All 58 influenza A (H1N1)pdm09 viruses were members of the 6B.1A clade. Of the nine influenza A (H1N1)pdm09 viruses antigenically characterized, nine (100%) were well-inhibited by A/Brisbane/02/2018-like (H1N1) antisera (Table 4b).

Sixty influenza B (Victoria) viruses from California have been genetically characterized to date during the 2019–2020 influenza season, of which eight were antigenically characterized. Five influenza B (Victoria) viruses were members of the V1A.1 subclade and 55 were members of the V1A.3 subclade. Of the eight influenza B (Victoria) viruses antigenically characterized, four (50%) were well-inhibited by B/Colorado/06/2017-like (Victoria) antisera and four (50%) were poorly inhibited by B/Colorado/06/2017-like (Victoria) antisera (Table 4c).

Seven 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 seven 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 4d).

Table 4 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		Total
	3C.2a1	3C.3a*	
Well inhibited by A/Kansas/14/2017*	3	1	4
Poorly inhibited by A/Kansas/14/2017*	4	0	4
Not antigenically characterized	21	0	21
Total A (H3N2)	28	1	29

* 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		Total
	6B.1	6B.1A*	
Well inhibited by A/Brisbane/02/2018*	0	9	9
Poorly inhibited by A/Brisbane/02/2018*	0	0	0
Not antigenically characterized	0	49	49
Total A (H1N1)pdm09	0	58	58

* 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		Total
	V1A.1*	V1A.3	
Well inhibited by B/Colorado/06/2017*	0	4	4
Poorly inhibited by B/Colorado/06/2017*	0	4	4
Not antigenically characterized	5	47	52
Total B (Victoria)	5	55	60

* 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

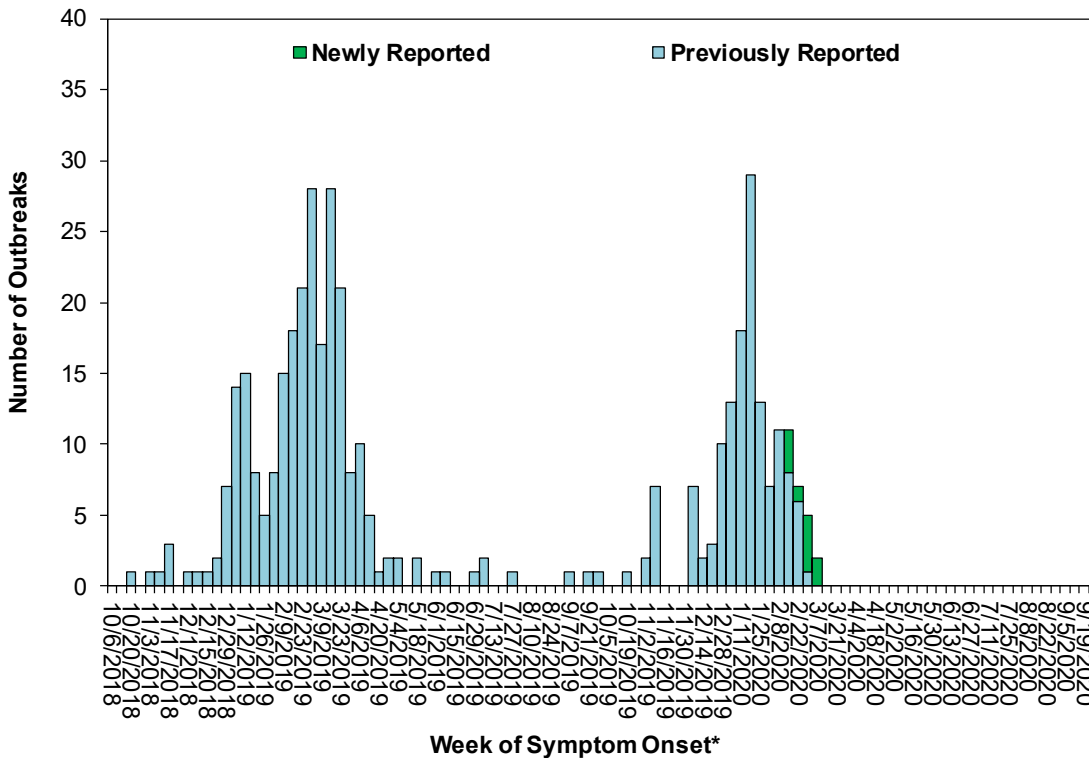
Antigenic Characterization	Virus Clade	
	Y3*	Total
Well inhibited by B/Phuket/3073/2013*	1	1
Poorly inhibited by B/Phuket/3073/2013*	0	0
Not antigenically characterized	6	6
Total B (Yamagata)	7	7

* 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

Ten laboratory-confirmed influenza outbreaks were reported to CDPH during Week 10. To date, 148 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



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

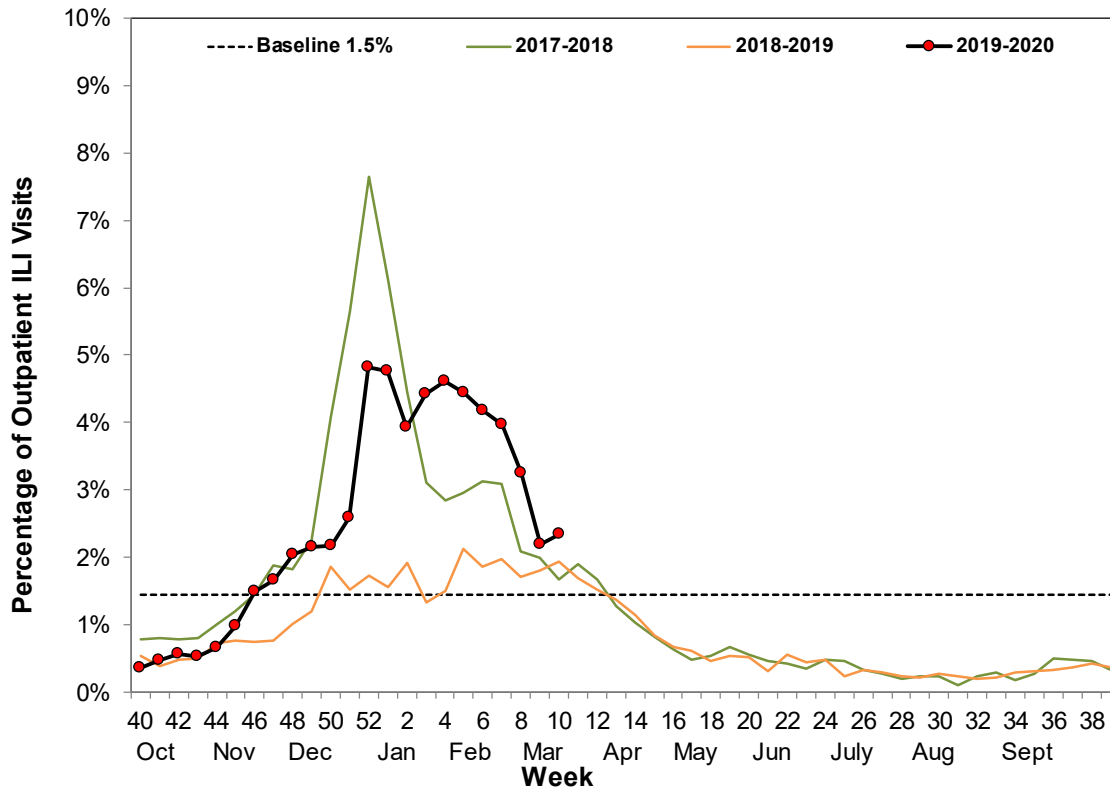
D. California Border Region Influenza Surveillance Network Data

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 10. The total number of patients screened by all sentinel sites for ILI during Week 10 was 11,910. Outpatient ILI activity was 2.3% during Week 10. ILI activity for the California border region during Week 10 was higher when compared to activity for the same week during the 2017–2018 and 2018–2019 seasons (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



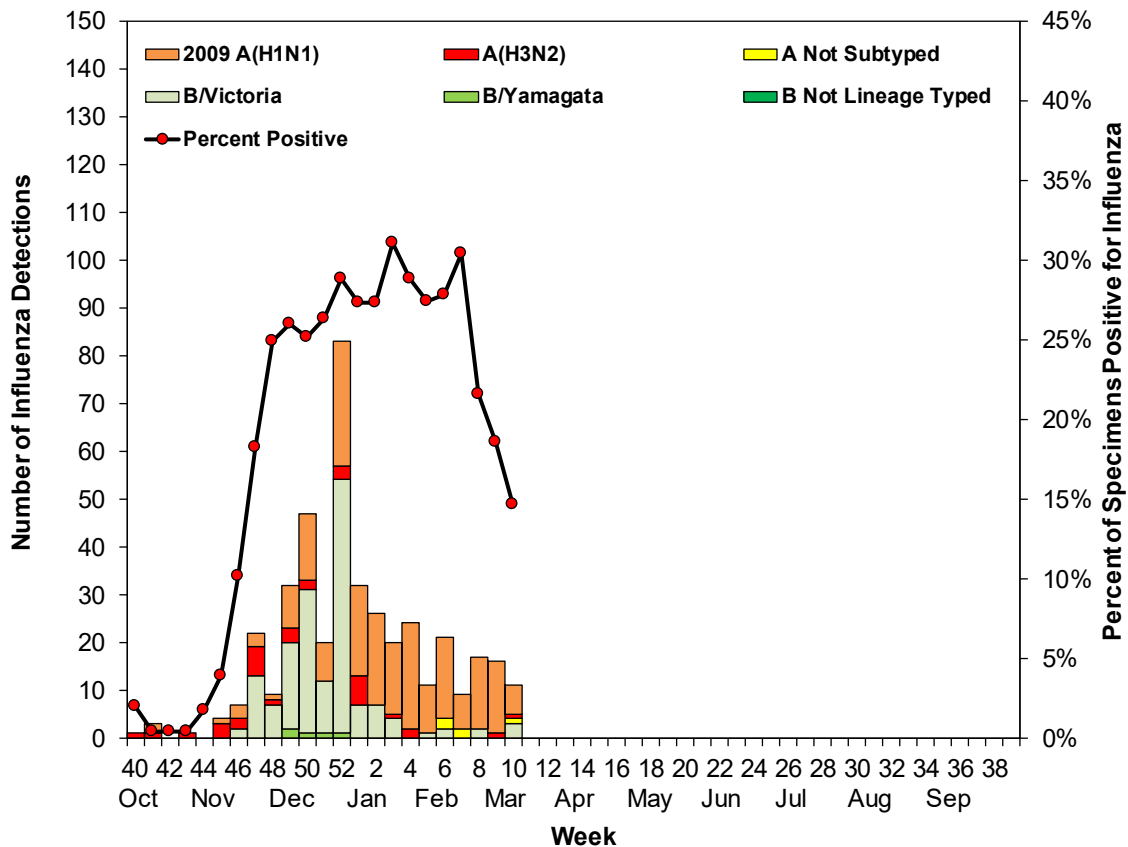
2. Virologic Surveillance Update

During Week 10, 691 respiratory specimens were tested from border region sentinel clinical laboratories; of these, 101 (14.6%) tested positive for influenza (85 [84.2%] influenza A and 16 [15.8%] influenza B). Cumulatively this season, a total of 14,293 respiratory specimens were tested from border region sentinel clinical laboratories; of these, 3,243 (22.7%) tested positive for influenza (1,759 [54.2%] influenza A; 1,484 [45.8%] influenza B).

During Week 10, 11 influenza positive specimens were reported from border region RLN laboratories; of which 8 (72.7%) were influenza A and three (27.3%) were influenza B. Of the 8 specimens that tested positive for influenza A at RLN laboratories, six (75.0%) were subtyped as A (H1)pdm09, one (12.5%) was subtyped as A (H3), and one (12.5%) had no further subtyping performed. Of the three specimens that tested positive for influenza B at RLN laboratories, three (100.0%) were lineage typed as B (Victoria). Cumulatively this season, a total of 416 influenza positive specimens have been detected at border region RLN laboratories; of which, 251 (60.3%) were influenza A and 165 (39.7%) were influenza B. Of the 251 specimens that tested positive for influenza A at RLN laboratories, 212 (84.5%) were subtyped as A (H1)pdm09, 34 (13.5%) were subtyped as A (H3), and five (2.0%) had no further subtyping performed. Of the 165 specimens that tested positive for influenza B, five (3.0%) were lineage typed as B (Yamagata) and 160 (97.0%) 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 March 7, 2020 (Week 10).

No laboratory-confirmed RSV-associated deaths among children <5 years of age were reported to CDPH during Week 10. To date, CDPH has received one report of a laboratory-confirmed RSV-associated death among a child <5 years of age during the 2019–2020 influenza season.

2. Other Respiratory Virus Laboratory Update

During Week 10, 5,111 specimens were tested for RSV and 454 (8.9%) were positive, which is lower compared to Week 9 (10.6%) (Figure 13). During Week 10, adenovirus and human metapneumovirus activity increased; and coronavirus, rhinovirus/enterovirus, and parainfluenza virus activity decreased (Figure 14).

Figure 13. Percentage of RSV Detections at Clinical Sentinel Laboratories, 2015–2020

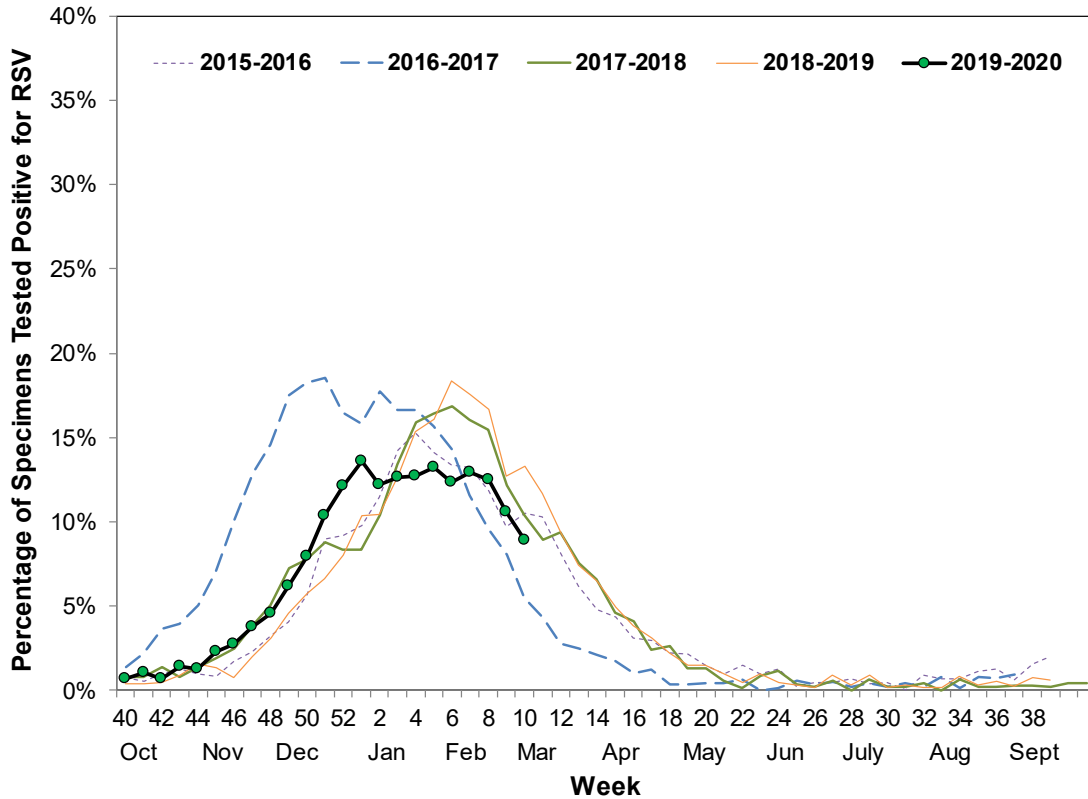
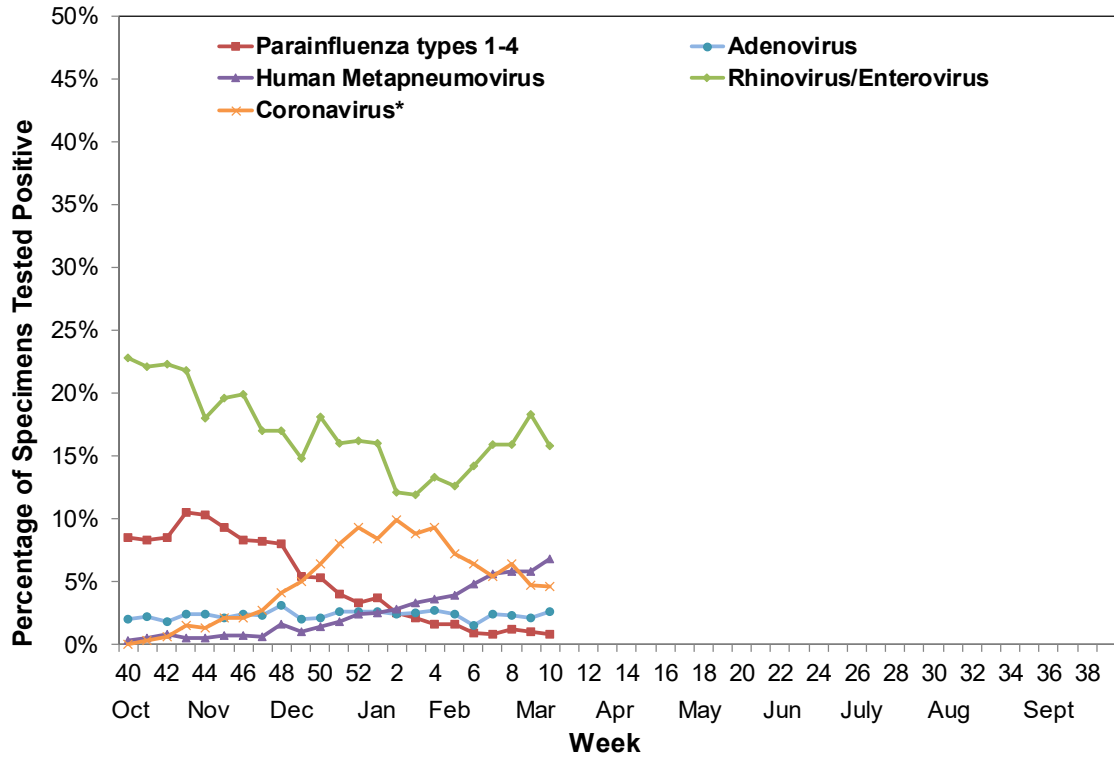


Figure 14. Percentage of Other Respiratory Pathogen Detections at Clinical Sentinel Laboratories, 2019–2020



*Coronaviruses identified include common human coronaviruses 229E, NL63, OC43, and HKU1 and do NOT include the 2019 novel coronavirus associated with the outbreak in China

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) (<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) (<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) (<https://www.cdc.gov/flu/weekly/index.htm>) and [FluView Interactive](https://www.cdc.gov/flu/weekly/fluviewinteractive.htm) (<https://www.cdc.gov/flu/weekly/fluviewinteractive.htm>) websites.

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