

Enhanced Surveillance for Novel Influenza A (H1N1)

The CDPH Viral and Rickettsial Disease Laboratory (VRDL) serves as a statewide reference laboratory offering diagnostic testing for influenza and a broad array of other respiratory pathogens. VRDL routinely performs diagnostic testing in a variety of situations, including institutional or community respiratory outbreaks, individual cases of severe respiratory illness, and outpatient cases of influenza-like illness submitted by Centers for Disease Control and Prevention (CDC) Influenza Sentinel Providers. The VRDL testing capabilities include viral culture, polymerase chain reaction (PCR), serologic testing, subtyping, strain characterization and antiviral resistance testing.

In the current novel influenza A (H1N1) epidemic, the VRDL continues to serve as the state reference laboratory by providing PCR testing for influenza, confirmatory testing for novel influenza A (H1N1), and guidance and assistance to our local public health laboratory partners. Antiviral resistance testing will be performed on a subset of specimens tested to monitor for changing resistance patterns. VRDL is also working on development of new techniques and assays (e.g., neutralization assays to test for immunity) in order to enhance our repertoire of diagnostic testing that may be available in the current novel influenza A (H1N1) epidemic.

Novel Influenza A (H1N1) Surveillance for Week 26 (June 28 – July 4, 2009)

As the current pandemic of novel influenza A (H1N1) unfolds, CDPH continues to perform surveillance and provide PCR testing for influenza, confirmatory testing for novel influenza A (H1N1), and guidance and assistance to our local public health partners. Local health departments are currently asked to report all cases, with detailed report of hospitalizations, fatalities and outbreaks of novel influenza A (H1N1) cases, to CDPH. Laboratory testing is no longer recommended for outpatients but sporadic reports of non-hospitalized cases and sentinel provider surveillance data are also used to monitor H1N1 activity statewide.

1. Epi- Surveillance Update (Updated 7/2/2009)

Highlights:

- CDPH has received reports of 2,009 cases (1,658 confirmed, 351 probable) from 45 local health jurisdictions. Lake and Mono counties reported their first cases this week.
- 91 hospitalized cases were reported this week. A total of 233 cases have been hospitalized, with 64 requiring intensive care.
- Six fatal cases were reported this week in Marin (1), Orange (2), San Diego (1), San Mateo (1), and Santa Clara (1) counties. These were the first H1N1-related deaths reported in Marin and Santa Clara this year. A total of 23 fatal cases have been reported from the following counties: Alameda (2), Contra Costa (3), Los Angeles (2), Marin (1), Orange (5), Sacramento (1), San Bernardino (1), San Diego (2), San Mateo (3), Santa Clara (1), Solano (1), and Sonoma (1).
- Of all cases reported, 40 (32 confirmed, 8 probable) have been in pregnant women.
- Of all cases reported, 71 (61 confirmed, 10 probable) have occurred in health care workers.
- The majority of reported cases to date have been individuals under 35 years of age. In recent weeks, the median age of new reported cases has increased, reflecting current

testing and reporting recommendations for hospitalized cases. The median age of hospitalized cases (26 years) is older than the median age for cases overall (17 years).

- The proportion of Influenza A-positive specimens tested at VRDL that is positive for Novel Influenza A (H1N1) is about 98%, reflecting that the predominant circulating influenza strain in California at present is Novel Influenza A (H1N1).
- Outbreaks of influenza-like illness suspected or confirmed to be due to Novel Influenza A (H1N1) appear to be increasing, with the majority occurring in community settings, such as schools and day-cares, rather than in institutional settings; this reflects the age distribution seen for the Novel Influenza A (H1N1) outbreak overall, with a relative sparing of older individuals.

a. **Current California case counts for novel influenza A (H1N1) infection in humans:**

Table 1. Provisional number of novel influenza A (H1N1) cases by local health jurisdiction, as of 07/2/09.

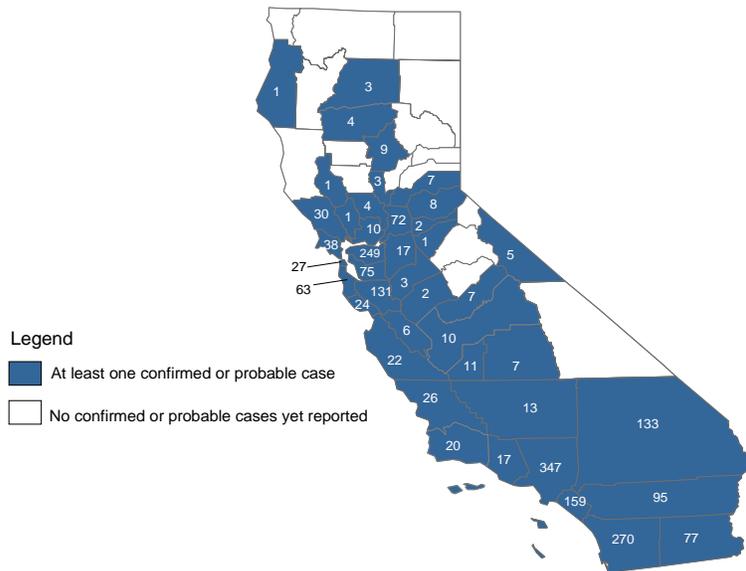
Jurisdiction	Total Cases	Confirmed	Probable	Hospitalizations ^a	Deaths
CALIFORNIA	2009	1658	351	233	23
County Undetermined	0	0	0	0	0
Alameda	69	62	7	8	2
Amador	2	2	0	0	0
Berkeley City	5	4	1	1	0
Butte	9	8	1	5	0
Calaveras	1	1	0	0	0
Contra Costa	249	218	31	40	3
El Dorado	8	6	2	0	0
Fresno	10	6	4	2	0
Humboldt	1	1	0	2	0
Imperial	77	68	9	6	0
Kern	13	13	0	0	0
Kings	11	11	0	0	0
Lake	1	0	1	0	0
Long Beach City	18	14	4	1	0
Los Angeles	324	225	99	24	2
Madera	7	3	4	2	0
Marin	38	19	19	5	1
Merced	2	2	0	1	0
Mono	5	5	0	0	0
Monterey	22	17	5	2	0
Napa	1	1	0	0	0
Orange	159	149	10	25	5
Pasadena City	5	5	0	1	0
Placer	7	6	1	1	0
Riverside	95	91	4	7	0
Sacramento	72	69	3	10	1
San Benito	6	1	5	2	0
San Bernardino	133	128	5	14	1
San Diego	270	260	10	27	2
San Francisco	27	18	9	6	0
San Joaquin	17	14	3	6	0
San Luis Obispo	26	23	3	0	0
San Mateo	63	37	26	10	3
Santa Barbara	20	19	1	1	0
Santa Clara	131	90	41	18	1
Santa Cruz	24	14	10	0	0
Shasta	3	1	2	0	0
Solano	10	5	5	3	1
Sonoma	30	11	19	1	1
Stanislaus	3	3	0	0	0
Sutter	3	3	0	0	0
Tehama	4	4	0	0	0
Tulare ^b	7	7	0	1	0
Ventura	17	10	7	0	0
Yolo	4	4	0	1	0

a. This number does not include reports of hospitalized cases not yet validated by LHJ, represents cases ever hospitalized

b. Includes one patient diagnosed out of county
Bold indicates the first (ever) report of probable or confirmed cases by the county

Figure 1. Novel influenza A (H1N1) virus infections in humans - California, 2009.

**California counties reporting novel influenza A (H1N1) virus infections in humans
 Current as of July 2, 2009**



2. Laboratory Surveillance Update

VRDL Influenza PCR Results (Updated 7/2/09)

- VRDL performs PCR testing for influenza A, influenza A subtyping, and novel influenza A (H1N1). Some specimens are screened at local public health or reference laboratories before being submitted to VRDL for additional or confirmatory testing.
- VRDL has received 3,607 specimens for novel influenza A (H1N1)-related testing.
- Of 3,030 specimens tested at VRDL for influenza A, 1,887 (62%) have been positive.
- A total of 943 influenza A-positive specimens have been subtyped at VRDL (Figure 5). Almost all influenza A-positive specimens that have been referred to VRDL in recent weeks have been unsubtypeable, i.e. probable novel influenza A (H1N1) (Figure 6).
- Of 1,146 unsubtypeable specimens tested at VRDL for novel influenza A (H1N1), 1,110 (97%) have been positive.

Respiratory Laboratory Network (RLN) Influenza PCR Surveillance Results (Updated 7/2/09)

As noted in the RLN tables below, during week 25 (June 21-27, 2009), approximately 42% of specimens received by the Respiratory Laboratory Network have been positive for influenza A. Of these, 98% are unsubtypeable. This is a notable difference since the beginning of this pandemic, when seasonal influenza was still circulating in approximately

half of specimens tested. At the present time almost all influenza A viruses tested are novel influenza A (H1N1).

Table 2. Respiratory Laboratory Network (RLN) Influenza PCR Surveillance Results, Week 25 (June 21-27, 2009)

	Total tested	Flu A (% of total)	H1 (% of Flu A)	H3 (% of Flu A)	Unsubtypeable (% of Flu A)
All RLN*	490	207 (42%)	1 (0%)	3 (1%)	203 (98%)
Northern	217	106 (49%)	1 (1%)	1 (1%)	104 (98%)
Central	98	38 (39%)	0 (0%)	1 (3%)	37 (97%)
Southern	175	63 (36%)	0 (0%)	1 (2%)	63 (98%)

Table 3. Respiratory Laboratory Network (RLN) Influenza PCR Surveillance Results, April 27 – July 2, 2009.

	Total tested	Flu A (% of total)	H1 (% of Flu A)	H3 (% of Flu A)	Unsubtypeable (% of Flu A)
All RLN*	13704	1918 (14%)	296 (15%)	346 (18%)	1272 (66%)
Northern	5736	879 (15%)	101 (11%)	128 (15%)	647 (74%)
Central	3564	264 (7%)	97 (37%)	56 (21%)	111 (42%)
Southern	4404	776 (18%)	98 (13%)	162 (21%)	524 (68%)

* 22 of 23 RLN laboratories reporting, including:

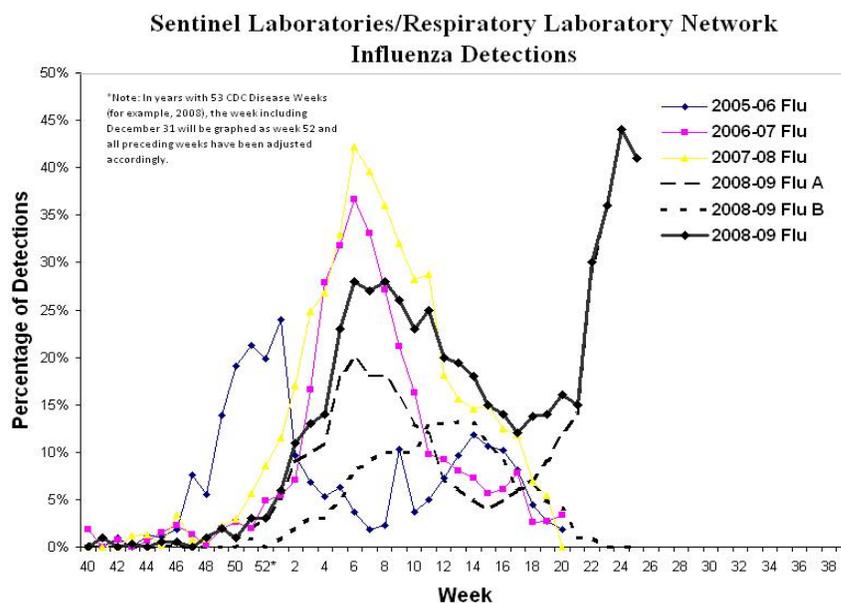
Northern CA: Contra Costa, El Dorado, Marin, Monterey, Sacramento, San Francisco, San Mateo, Santa Clara, Shasta, Sonoma

Central CA: Fresno, Stanislaus, San Joaquin, Tulare

Southern CA: Long Beach, Los Angeles, Orange, Riverside, San Bernardino, San Diego, Santa Barbara, Ventura

Figure 5 below shows that laboratory detection for influenza increased during week 22, reaching a peak of 45% in week 24. Laboratory detections for influenza declined slightly to 41% in week 25.

Figure 2. Influenza Detections at Sentinel Laboratories/Respiratory Laboratory Network (RLN).



Antiviral Resistance for Novel Influenza A (H1N1)

At VRDL, antiviral resistance testing is being performed on a subset of specimens tested to monitor for changing resistance patterns.

Table 7. Antiviral resistance testing at VRDL, 2009.

	Oseltamivir Resistant	Adamantanes Resistant
Novel influenza virus (H1N1)	0/28	28/28

An updated version of the novel influenza A (H1N1) case report form is available at:

<http://www.cdph.ca.gov/HealthInfo/discond/Pages/SwineInfluenzaLHD.aspx>

<http://www.cdph.ca.gov/pubsforms/forms/Documents/Novel-Influenza-A-H1N1-Virus-Case-Report-Form.doc>

Overall California Influenza Activity for Week 26 (June 28 – July 4, 2009)

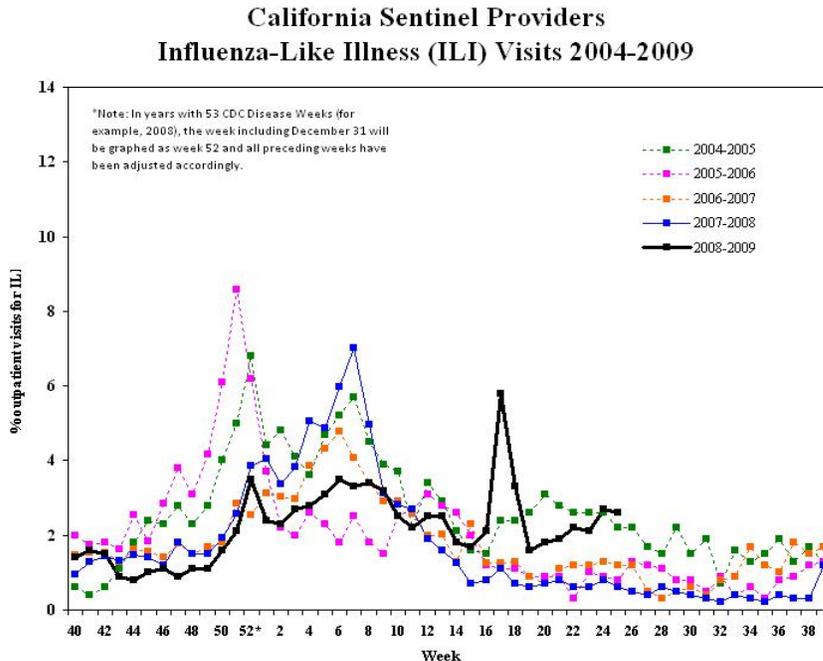
This week, influenza activity in California remained “widespread” (defined by CDC as outbreaks of influenza or increases in ILI cases and recent laboratory confirmed influenza in at least half of the regions in the state) based on the high level of laboratory detections of novel swine influenza A (H1N1) throughout the state. Activity is high statewide in Northern, Central and Southern California. Outbreaks continue to be reported in hospitals, long term care facilities, summer camps, military bases and residential facilities. An increase in hospitalizations and fatalities has been observed.

Seasonal Influenza A Surveillance

1. CDC Influenza Sentinel Providers

Sentinel providers report the number of outpatient visits for influenza-like illness and the total number of visits per week. These data are reported weekly as a percentage of total visits. Figure 1 shows that following a peak in weeks 17-18 (April 26 – May 9, 2009) when novel influenza A (H1N1) was first identified and then declined, the percentage of outpatient ILI visits increased slightly but has leveled off in week 25. A total of 44 sentinel providers reported during Week 25.

Figure 1. California Sentinel Providers – Influenza-Like Visits, 2004-2009.

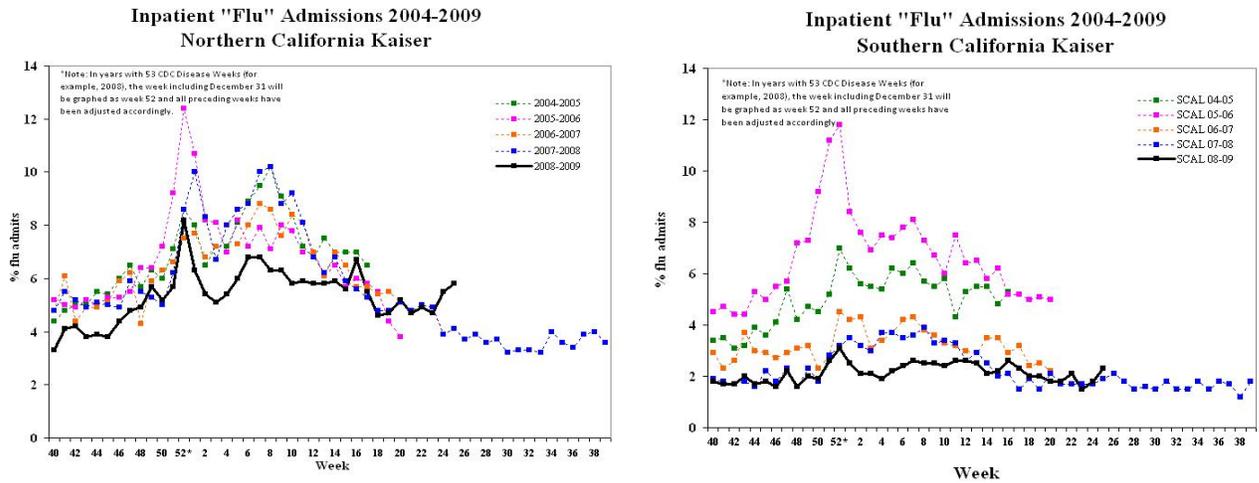


2. Kaiser Permanente Hospitalization Data (“Flu Admits”)

The admission diagnoses of flu, pneumonia, and influenza (“Flu Admits”) serve as surrogate markers for the more accurate discharge diagnoses. Influenza activity is tracked by dividing the number of Flu Admits by the total number of hospital admissions for the same day to obtain a percentage of influenza and pneumonia admissions. Figures 2 and 3 below show

that in Northern and Southern California the percentage of Kaiser hospitalizations for P&I (pneumonia and influenza) peaked during Week 17, declined, and is rising again.

Figures 2-3. Inpatient “Flu” Admissions at Kaiser Facilities, 2004-2009.



5. Laboratory Positive Results Data

With respect to positive influenza and other virus results from sentinel laboratories, local public health laboratories and VRDL, Influenza A detections declined slightly from a peak of 1018 in week 24. Detections for influenza B remain low.

Table 2. Influenza and other respiratory virus detections, June 21– June 27, 2009.

		Sentinel Laboratories/Respiratory Laboratory Network [‡]	Sentinel Providers
Week 25	Number of Sites Reporting	22	714 specimens submitted (282 positive by PCR)
	Influenza A	988 ^a Total tested week 25: 2419 Total detections to date: 9004	0 Total tested week 25: 0 Total detections to date: 178
	Influenza B	4 ^b Total tested week 25: 1947 Total detections to date: 3199	0 Total tested week 25: 0 Total detections to date: 104
	RSV	1 ^c Total tested week 25: 1629 Total detections to date: 7407	N/A
	Other Respiratory Viruses	8 ^d Total tested week 25: 91 Total detections to date: 426	N/A

[‡]Sentinel laboratories are hospital, academic, private, and public health laboratories located throughout California that provide data on the number of laboratory-confirmed influenza and other respiratory virus detections and isolations. The Respiratory Laboratory Network (RLN) is a network of 23 local public health laboratories that offer enhanced diagnostic testing with the “R-mix” shell vial assay, which detects several respiratory pathogens, including influenza A and B viruses, respiratory syncytial virus, parainfluenza virus, and adenovirus. Some RLN labs also offer PCR testing for influenza A and B.

^a Alameda (159); Contra Costa (123); Fresno (22); Long Beach (44); Los Angeles (16); Marin (8); Monterey (2); Orange (23); Placer (6); Riverside (7); Sacramento (79); San Diego (54); San Francisco (101); San Joaquin (10); San Mateo (81);

Santa Barbara (3); Santa Clara (93); Shasta (1); Solano (67); Sonoma (49); Stanislaus (3); Tulare (26); Ventura (9); Yolo (1); Unknown (1)

^b Alameda (1); Contra Costa (2); Orange (1);

^c San Francisco (1)

^d parainfluenza type 3 (6); parainfluenza type 1 (1); adenovirus (1)

About the Respiratory Laboratory Network:

The Respiratory Laboratory Network (RLN) consists of 24 local public health laboratories that offer enhanced diagnostic testing. RLN labs use the “R-mix” shell vial assay that detects the respiratory pathogens influenza A and B viruses, respiratory syncytial virus, parainfluenza virus and adenovirus. Twenty-three RLN labs also offer PCR testing for influenza A and B and subtyping. The existence of such an extensive network of public health laboratories offering influenza PCR testing greatly enhances the testing capacity to identify circulating influenza virus throughout the state and is a critical component of California’s pandemic preparedness efforts.

	R-mix	PCR		R-mix	PCR
Contra Costa		X	San Diego	X	X
El Dorado	X	X	San Francisco	X	X
Fresno	X	X	San Joaquin	X	X
Humboldt		X	San Mateo	X	X
Imperial	X		Santa Barbara		X
Long Beach	X	X	Santa Clara	X	X
Los Angeles		X	Shasta	X	X
Monterey		X	Solano	X	X
Orange	X	X	Sonoma	X	X
Placer	X		Stanislaus	X	
Riverside		X	Tulare	X	X

Sacramento	X	X	Ventura	X	X
San Bernardino		X			

Additional Links

[CDPH Novel Influenza A \(H1N1\) Homepage](#)

[Viral and Rickettsial Disease Laboratory Testing of Novel Influenza A \(H1N1\)](#)