

California Influenza Surveillance Project

California Department of Public Health

2008-2009

Influenza Update

Influenza Surveillance for September 17 – September 23, 2009

As the current H1N1 pandemic unfolds, CDPH continues to perform surveillance and provide PCR testing for influenza, confirmatory testing for pandemic (H1N1) 2009, and guidance and assistance to our local public health partners. Effective July 15, 2009, local health departments were asked to no longer report outpatient cases. Effective August 12, 2009, local health departments were asked to report hospitalized cases of pandemic (H1N1) 2009 as weekly aggregate numbers. Intensive care unit (ICU) cases and fatal cases continue to be reported with individual case report forms.

This week, overall influenza activity in California was upgraded to “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). Laboratory detections and reports of influenza like illness from sentinel providers have steadily increased in recent weeks.

1. Pandemic (H1N1) 2009 Epi- Surveillance Update (Updated September 23, 2009)

Highlights:

- Effective August 12, 2009, local health departments began reporting hospitalized pandemic (H1N1) 2009 cases as weekly aggregate numbers. From September 13 – September 19, 2009, 246 hospitalized/fatal cases were reported; there have been 2,258 hospitalizations and/or fatalities, with 569 cases requiring intensive care, reported to date.
- CDPH received 7 reports of fatal pandemic (H1N1) 2009 cases this week as of September 19, 2009; a total of 174 pandemic (H1N1) 2009 deaths have been reported to CDPH to date.
- In recent weeks, almost all influenza A-positive specimens tested by PCR at VRDL and by the Respiratory Laboratory Network have been subsequently confirmed as pandemic (H1N1) 2009, reflecting that the predominant circulating influenza strain in California remains pandemic (H1N1) 2009.
- Surveillance for the detection of antiviral resistance in pandemic (H1N1) 2009 influenza is ongoing. To date, of 466 specimens tested at VRDL, all but one have tested negative for the resistance mutation. VRDL detected one specimen with the H275Y resistance mutation (associated with oseltamivir resistance); the result was confirmed by the CDC. VRDL and CDC are continuing prospective antiviral resistance testing from a sampling of pandemic (H1N1) 2009 influenza viruses through the summer and the 2009-10 influenza season.
- At this time, the data indicate that the prevalence of oseltamivir-resistant pandemic (H1N1) 2009 is quite limited. On September 22, 2009, the CDC released updated interim recommendations for the use of antiviral medications in the treatment and prevention of influenza. These recommendations are available at: <http://www.cdc.gov/h1n1flu/recommendations.htm>.

- Seventeen (17) new cases meeting the case definition for severe pediatric influenza were reported this week. Sixteen of the cases are confirmed/probable pandemic (H1N1), and one is seasonal influenza A/H3.

California case counts for pandemic (H1N1) 2009 hospitalizations and fatalities in humans:

Table 1. Provisional number of pandemic (H1N1) 2009 hospitalizations, ICU and fatal cases in California, by local health jurisdiction, April 3 – September 19, 2009.

Jurisdiction	Total Hospitalizations, ICU cases and Deaths ^{a,b}	Incidence of Hospitalizations per 100,000 population	Deaths ^c
CALIFORNIA	2258	5.84	174
County Undetermined	0	0.00	0
Alameda	167	10.84	13
Berkeley City	7	6.53	1
Butte	14	6.17	0
Colusa	1	4.29	0
Contra Costa	141	13.24	6
El Dorado	5	2.68	1
Fresno	81	8.40	9
Glenn	1	3.29	0
Humboldt	10	7.46	1
Imperial	8	4.33	0
Inyo	1	5.24	0
Kern	28	3.28	1
Kings	10	6.21	1
Lake	4	5.99	0
Long Beach City	45	9.13	2
Los Angeles	281	2.69	31
Madera	2	1.26	0
Marin	30	11.83	4
Mendocino	10	10.81	0
Merced	28	10.46	1
Monterey	53	12.31	1
Napa	4	2.84	1
Nevada	1	0.98	0
Orange	230	7.21	18
Pasadena City	2	1.33	0
Placer	10	2.94	2
Riverside	40	1.84	6
Sacramento	136	9.46	6
San Benito	8	12.81	0
San Bernardino	80	3.74	8
San Diego	256	8.08	19
San Francisco	65	7.98	7
San Joaquin	72	9.95	2
San Luis Obispo	9	3.36	1
San Mateo	48	6.54	7
Santa Barbara	24	5.57	0
Santa Clara	132	7.24	9
Santa Cruz	17	6.37	1
Shasta	8	4.23	0
Siskiyou	10	21.34	0
Solano	17	3.90	2
Sonoma	52	10.58	6
Stanislaus	57	10.37	6
Sutter	7	7.00	0
Tehama	4	6.19	0
Tulare	25	5.48	0
Yolo	12	5.92	1
Yuba	5	6.37	0

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

^b Includes the following individuals: (1) non-fatal hospitalized cases, (2) fatal hospitalized cases, (3) fatal non-hospitalized cases

^c Not all fatal cases were hospitalized.

Bold indicates the first report of hospitalized and/or fatal cases by the county

For more information, please visit: <http://www.cdph.ca.gov/data/statistics/Pages/H1N1FluData.aspx>

Table 2. Characteristics of reported severe (ICU or fatal), ICU and fatal cases of pandemic (H1N1) 2009 in California, April 3 – September 19, 2009.

		SEVERE CASES [*]	ICU CASES	FATAL CASES
		No. (%)	No. (%)	No. (%)
Number		605	569	174
Sex	Male	308 (51%)	289 (51%)	85 (49%)
	Female	297 (49%)	280 (49%)	89 (51%)
Age	Median (years)	34	33	45
	Mean (years)	34	33 ^{€€}	42 ^{€€}
	Min - Max	<1 - 87 years	<1 - 87 years	<1 - 85 years
	0 - 18 years	164 (27%)	160 (28%)	20 (12%)
Race/Ethnicity [†]	Hispanic	198 (41%)	187 (41%)	63 (45%)
	Non-Hispanic White	159 (33%)	148 (33%)	50 (36%)
	Asian/ Pacific Islander	56 (12%)	53 (12%)	10 (7%)
	Black	50 (10%)	48 (11%)	14 (10%)
	Other	15 (3%)	15 (3%)	1 (1%)
	Native American	3 (1%)	3 (1%)	1 (1%)
Symptoms [‡]	Fever	536 (89%)	508 (89%)	148 (85%)
	Shortness of breath	415 (69%)	393 (69%)	129 (74%)
	Nausea / vomiting	193 (32%)	185 (33%)	39 (22%)
	Chills	122 (20%)	119 (21%)	42 (24%)
	Altered mental status	62 (10%)	56 (10%)	19 (11%)
	Chronic co-morbid illness [‡]		497 (82%)	468 (82%) [€]
Chronic lung disease [§]		229 (38%)	219 (39%)	68 (39%)
Obesity [†]		229 (51%)	210 (50%) [€]	92 (63%) [€]
Chronic cardiac disease [¶]		126 (21%)	116 (20%)	41 (24%)
Metabolic disease		151 (25%)	137 (24%) [€]	56 (32%) [€]
Other immunosuppression ^{**}		89 (15%)	86 (15%) ^{€€}	43 (25%) ^{€€}
Neuromuscular disorder		97 (16%)	94 (17%)	25 (14%)
Pregnancy ^{††}		27 (23%)	27 (24%)	6 (18%)
Clinical Findings and Course				
	Infiltrates on chest radiograph	428 (71%)	406 (71%) ^{€€}	145 (83%) ^{€€}
	Mechanical ventilation [†]	345 (65%)	321 (64%) ^{€€}	148 (91%) ^{€€}
	Antiviral treatment [†]	451 (87%)	434 (88%) ^{€€}	111 (77%) ^{€€}
Secondary bacterial infections ^{‡‡}		40 (7%)	35 (6%)	15 (9%)
	<i>Staphylococcus aureus</i> [#]	19 (3%)	19 (3%)	8 (5%)
	Group A <i>Streptococcus</i>	9 (2%)	6 (1%)	4 (2%)
	<i>Streptococcus pneumoniae</i>	12 (2%)	10 (2%)	3 (2%)
Days from illness onset to death [†]				
	Median number of days Min - Max			12 0 - 88 days
Hospitalized		590 (98%)		159 (91%)
ICU		569 (94%)		138 (79%)

^{*} Includes cases that were in the ICU, fatal cases that were in the ICU, and fatal cases that were not in the ICU

[†] Includes cases with known information only

[‡] Symptoms and conditions listed are not mutually exclusive due to the presence in some patients of multiple symptoms and multiple underlying chronic diseases

[§] Includes asthma, chronic obstructive pulmonary disorder, bronchopulmonary dysplasia/respiratory distress syndrome, bronchiolitis obliterans organizing pneumonia, Sjogren's syndrome and obstructive sleep apnea

^{||} Includes cases ≥ age 2 years where BMI ≥ 30 (adults) or BMI-for-age is above the overweight percentile (age 2-19 years) and/or those who were clinically considered obese

[¶] Includes congenital heart disease, atrial fibrillation, status-post aortic valve replacement, congestive heart failure, hypertensive heart disease and coronary artery disease

^{**} Includes immunosuppressive drugs, cancer, congenital immunodeficiency, and HIV

^{††} Includes only females of childbearing age (15-44 years)

^{‡‡} Only includes *S. aureus*, group A *Streptococcus*, and *S. pneumoniae*

[#] Includes MRSA, MSSA, and *S. aureus* with unknown susceptibility pattern

[€] Statistically significant at <0.05 level (when fatal cases are compared with non-fatal ICU cases)

^{€€} Statistically highly significant at ≤0.001 level (when fatal cases are compared with non-fatal ICU cases)

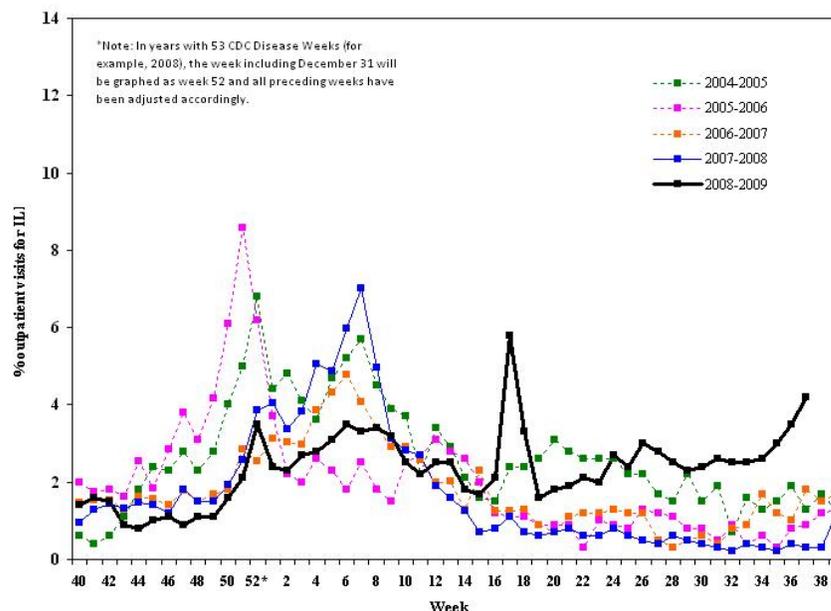
The case report form used to report ICU and fatal cases of pandemic (H1N1) 2009 is available at:
<http://www.cdph.ca.gov/pubsforms/forms/Documents/PandemicH1N1HospFatalCaseReportForm.doc>

A template for reporting aggregate hospitalized cases is available at:
<http://www.cdph.ca.gov/pubsforms/forms/Documents/H1N1LHJAggHospitalizedCaseReportTemplate.xls>

2. CDC Influenza Sentinel Providers

Sentinel providers report the number of outpatient visits for influenza-like illness (ILI) and the total number of visits per week. These data are reported weekly as a percentage of total visits. Figure 2 shows a peak in Weeks 17-18 (April 26 – May 9, 2009) when pandemic (H1N1) 2009 was first identified. ILI has been increasing in recent weeks. A total of 45 sentinel providers reported during Week 37 (September 13 – 19, 2009).

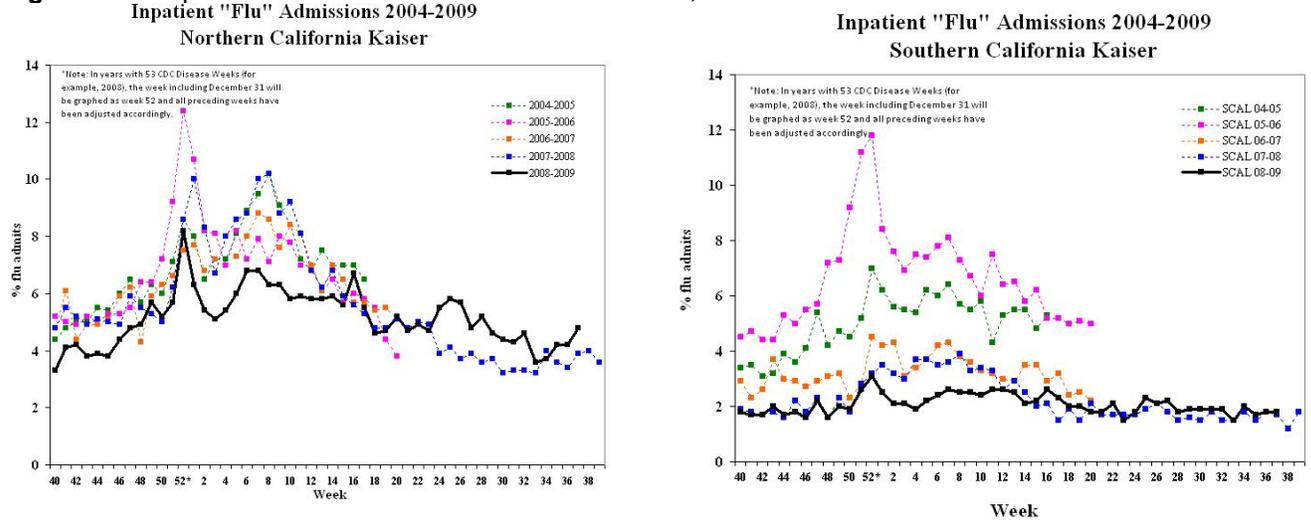
Figure 1. California Sentinel Providers – Influenza-Like Visits, 2004-2009.



3. 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 show that in both Northern and Southern California, the percentage of Kaiser hospitalizations for pneumonia and influenza (P&I) peaked during Week 17 (April 26 – May 2, 2009), with a smaller peak occurring in Week 24 (June 14 – June 20, 2009). Hospitalizations in Northern California appear to be increasing.

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



5. Laboratory Surveillance Update

VRDL Influenza PCR Results (Updated September 23, 2009)

- VRDL performs PCR testing for influenza A, influenza A subtypes H1 and H3, and pandemic (H1N1) 2009. Some specimens are screened at local public health or reference laboratories before being submitted to VRDL for additional or confirmatory testing.
- VRDL has received 5,437 specimens for pandemic (H1N1) 2009 testing, including specimens submitted by sentinel providers.
- Of 4,936 specimens tested at VRDL for influenza A, 3,350 (68%) have been positive.
- A total of 1,043 influenza A-positive specimens have been subtyped at VRDL.
- Of 2,299 unsubtypeable specimens tested at VRDL for pandemic (H1N1) 2009, 2,060 (90%) have been positive.

Respiratory Laboratory Network (RLN) Influenza PCR Surveillance Results (Updated September 23, 2009)

As noted in the Table 3 below, during Week 37 (September 13 – 19, 2009), 47% of specimens received by the Respiratory Laboratory Network were positive for influenza A. This is an increase from 34% in the previous week. Due to a change in testing policy, some labs within the RLN are no longer subtyping Flu A specimens. Of the RLN labs that performed subtyping during Week 37, all but one specimen was unsubtypeable. Pandemic (H1N1) 2009 continues to be the predominant strain circulating in California at this time.

Table 3. Respiratory Laboratory Network (RLN) Influenza PCR Surveillance Results, Week 37 (September 13 – 19, 2009)

	Total Flu A tested	Flu A (% of total)	H1 (% of Flu A)	H3 (% of Flu A)	Unsubtypeable (% of Flu A)	Total Flu B tested	Flu B (% of total)
All RLN*	652	305 (47%)	0 (0%)	1 (0%)	300 (98%)	496	5 (1%)
Northern	227	76 (33%)	0 (0%)	1 (1%)	71 (93%)	200	5 (3%)
Central	276	127 (46%)	0 (0%)	0 (0%)	127 (100%)	164	0 (0%)
Southern	149	102 (68%)	0 (0%)	0 (0%)	102 (100%)	132	0 (0%)

* 15 RLN laboratories reporting, including:

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

Central CA: Fresno, Tulare

Southern CA: Long Beach, Los Angeles, Riverside, Santa Barbara, Ventura

Laboratory Positive Results Data (Updated September 23, 2009)

The table below shows positive influenza and other virus results from sentinel laboratories, local public health laboratories and VRDL.

Table 4. Influenza and other respiratory virus detections, September 13 – 19, 2009.

		Sentinel Laboratories/Respiratory Laboratory Network [‡]	Sentinel Providers
Week 37	Number of Sites Reporting	19	1201 specimens submitted (565 positive by PCR)
	Influenza A	849 ^a Total tested week 37: 2488	0 Total tested week 37: 0
	Influenza B	6 ^b Total tested week 37: 2331	0 Total tested week 37: 0
	RSV	3 ^c Total tested week 37: 1542	N/A
	Other Respiratory Viruses	3 ^d Total tested week 37: 107	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 (54); Contra Costa (30); Fresno (45); Kern (4); Long Beach (6); Los Angeles (126); Marin (4); Monterey (17); Napa (1), Orange (17); Placer (33); Riverside (30); Sacramento (127); San Diego (6); San Francisco (11); San Joaquin (29); San Mateo (14); Santa Barbara (4); Santa Clara (79); Shasta (9); Solano (22); Sonoma (64); Stanislaus (15); Tulare (95); Ventura (4); Yolo (3)

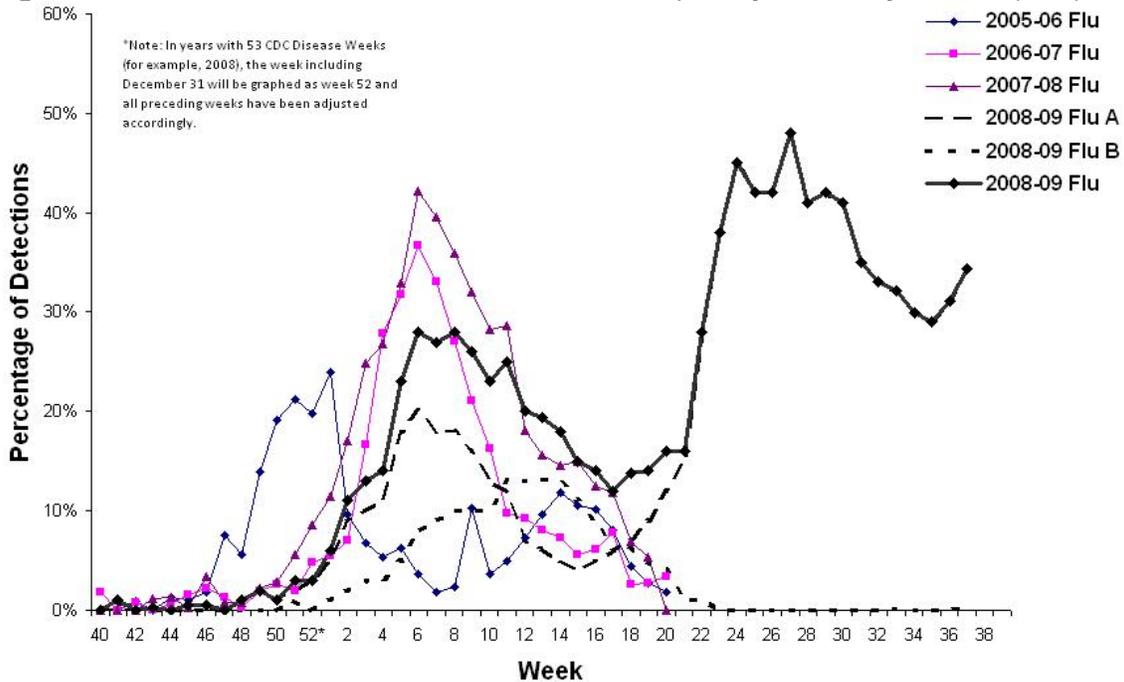
^b Contra Costa (5); Sacramento (1)

^c Alameda (1); Placer (1); Sonoma (1)

^d parainfluenza type 1 (2); adenovirus (1)

Figure 4 shows that laboratory detections peaked in week 24 (June 14 –20, 2009) and is rising once again.

Figure 4. Influenza detections at sentinel laboratories/Respiratory Laboratory Network (RLN), 2005-2009.



Antiviral Resistance for Pandemic (H1N1) 2009

At VRDL, antiviral resistance testing is being performed on a subset of specimens tested to monitor for changing resistance patterns. During Week 33 (August 16 – 22, 2009), VRDL detected a specimen with the H275Y resistance mutation (associated with oseltamivir resistance); this result was confirmed by the CDC. This is the first case of this mutation detected by VRDL.

Table 5. Antiviral resistance testing at VRDL, 2009*.

Pandemic (H1N1)	Oseltamivir Resistant	Adamantanes Resistant
VRDL testing	1/466	87/87

* One additional oseltamivir-resistant virus was identified by an outside laboratory in a San Francisco resident who traveled to Hong Kong.