



SUMMARY AND HIGHLIGHTS OF THE 2012-2013 INFLUENZA SEASON IN LOS ANGELES COUNTY

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OVERVIEW

The 2012-2013 influenza season in Los Angeles County (LAC) was moderately severe with an increased number of confirmed fatal cases. LAC experienced the highest number of deaths since the 2009-2010 H1N1 pandemic, primarily in the older population. The highest percent positive cases of influenza tests from our sentinel laboratories in LAC occurred during the same week that influenza-like illness (ILI) visits in emergency departments peaked (Figure 1). Overall activity reached a highpoint during the last week of January/beginning of February with 13 respiratory community outbreaks confirmed and 13 influenza attributed fatalities, including one pediatric death (Table 1). Locally and nationally type A dominated, specifically the H3N2 strain (1,2).

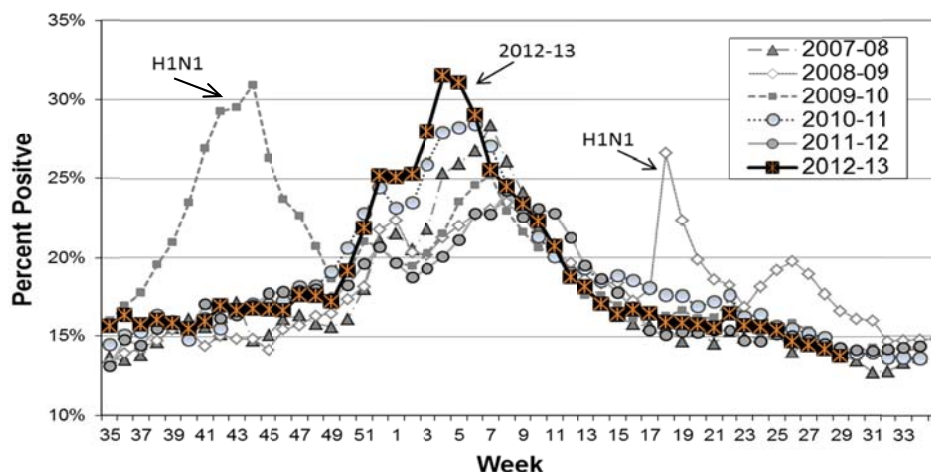
**Table 1. Surveillance Summary for LA County (2012-2013)
Peak Activity MMWR Week 5**

LA County Surveillance Summary	Influenza Peak Week 5 1/27/13-2/2/13	2012-13 Season Summary 9/30/12-7/20/13
Positive Flu Tests/Total Tests (Percent Positive Flu Tests)	552/1,904 (29.0%)	3163/28,642 (11.0%)
Percent Flu A/B	79%/21%	68%/32%
Community Respiratory Outbreaks (Influenza, Confirmed [†])	13 (2)	62 (9)
Flu Deaths, Confirmed ^{††} (Pediatric Deaths, Confirmed ^{††})	13 (1)	69 (7)

[†]Confirmed influenza outbreak is defined by 2 or more positive lab tests for Influenza

^{††}Confirmed influenza death is defined by a positive lab test, compatible symptoms, and clear progression from illness to death

Figure 1. Percent Positive Emergency Department Visits for Influenza-Like Illness, LA County (2007-2013)



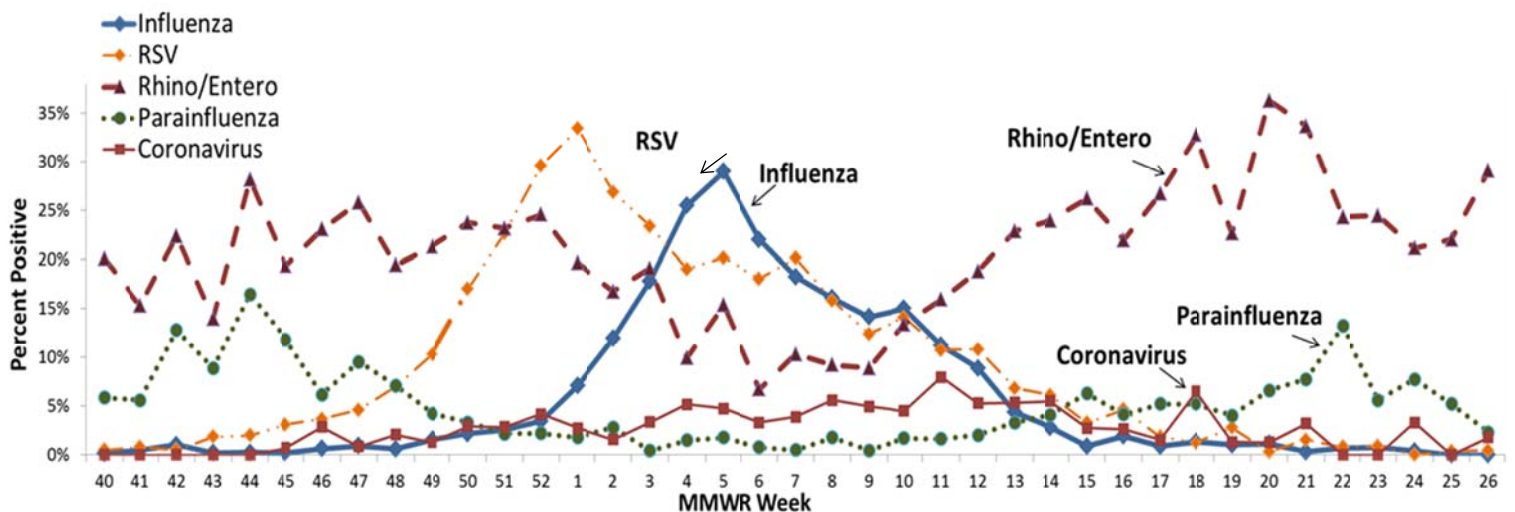


SURVEILLANCE IN LAC

Respiratory illness and responsible pathogens are tracked in LAC from nine sentinel laboratory sites geographically spread across the county that report weekly data on influenza test rates at their facilities. In addition some sites return reports on the following respiratory viruses: respiratory syncytial virus (RSV), rhino/enterovirus, parainfluenza, human metapneumovirus, and coronavirus. Figure 2 shows the percent positive lab results for the various respiratory viruses by MMWR week. Los Angeles County Department of Public Health (LAC DPH) also monitors syndromic surveillance of ILI from participating emergency departments (ED) throughout the county. ILI symptoms include: fever, sore throat or cough, runny nose, sneezing, and congestion. The percent positive of ILI visits over total ED visits is monitored as an additional measure of regional influenza activity. Figure 1 compares percent positive ILI visits to participating EDs over the past 6 influenza seasons.

LAC DPH requires that all influenza related deaths be reported; therefore, data collection differs in fatal cases from routine surveillance. Data collection of fatal influenza cases has changed over the past decade. In 2003, the California Department of Public Health (CDPH) began requiring reports of fatal pediatric cases attributed to influenza. A few years later in 2009 with the emergence of the type A pH1N1 pandemic strain, LAC DPH required that all intensive care and fatal cases of influenza be reported in order to monitor the rapidly changing status of the pandemic. Once the emergency situation was over, data collection was revised and as of October 2010 intensive care cases were no longer reportable however all influenza related fatalities remained reportable to LAC DPH within seven days of identification. Currently CDPH only collects influenza fatality data for those 0-64 years old, however LAC tracks fatalities of all age groups in order to monitor a more comprehensive scope of the impact of influenza in our region. These longitudinal findings allow us to track changes in severity from season to season and help identify high risk groups that would benefit from future prevention methods aimed at decreasing morbidity. Additional information about surveillance methods can be found at the LAC DPH website (3).

Figure 2. Respiratory Viruses LA County 2012-2013, Percent Positive Cases by MMWR Week



INCREASED FATALITIES: 4 YEAR COMPARISON

During the 2012-13 influenza season LAC experienced a substantial increase in fatalities attributed to influenza compared with the previous two seasons. The past three influenza seasons have been predominated by type A influenza (H3N2) however for the 2012-13 season a different strain emerged antigenically characterized as A/Victoria/361/2011, whereas the previous two seasons were primarily of the Perth lineage, A/Perth/16/2009. Despite the Victoria strain being included in the 2012-13 seasonal



influenza vaccine, LAC identified the highest number of influenza deaths since the H1N1 pandemic (pH1N1) season reflecting a moderately severe season. Consistent with last season, those 65 years of age and older comprised the majority (52%) of deaths (Table 2). The CDC found a low vaccination efficacy rate for those over 65 years old which suggests a failure to mount a sufficient immune response (4). In contrast, table 2 shows the atypically high percentage of deaths in those under 65 years old (77%) that were most affected during the 2009 pandemic year relative to those 65 and up. During pandemic influenza seasons mortality rates skew disproportionately towards the young (5). Pandemic mortality burden is contrary to normal seasonal influenza years, where 90% of deaths nationally occur in those over 65 years old (6). Comparing the past four influenza seasons, with each consecutive season since pH1N1 the majority of fatal cases shifts back to the typical seasonal influenza trend that disparately affects the elderly. This measure of morbidity burden shift to an older age group progressively increases each year as we move farther away from the pandemic. Comorbid factors related to influenza fatalities remain similar to previous years, with high blood pressure, overweight/obesity, and heart disease continuing to be the top 3 risk factors. Overweight/obesity is a relatively new risk factor for influenza mortality first identified during the 2009 pH1N1 season, however in LAC it was the second most common comorbidity found in 42% of adult influenza deaths (Table 3).

Table 2. Demographic Characteristics of Influenza Fatalities by Flu Season 2009-2013		2012-13	2011-12	2010-11	2009-10†
		N (%)	N (%)	N (%)	N (%)
Age (years)	Median	68	64	45	48
	Range	0-100	0-104	0-92	0-94
	0-5	5 (7)	2 (8)	4 (9)	3 (2)
	6-17	2 (3)	2 (8)	2 (5)	10 (8)
	18-40	4 (6)	2 (8)	14 (33)	37 (29)
	41-64	22 (32)	6 (25)	19 (44)	60 (47)
	65+	36 (52)	12 (50)	4 (9)	17 (13)
Gender	Female	35 (51)	14 (58)	23 (53)	70 (55)
	Male	34 (49)	10 (42)	20 (47)	57 (45)
Race	Hispanic	28 (42)	12 (50)	26 (60)	56 (49)
	White Non-Hispanic	25 (37)	5 (21)	9 (21)	39 (34)
	Black	8 (12)	4 (17)	4 (9)	11 (9)
	Asian/Pacific Islander	6 (9)	3 (12)	4 (9)	9 (8)
SPA ‡	1: Antelope Valley	3 (4)	0 (0)	1 (2)	6 (5)
	2: San Fernando	18 (26)	4 (17)	16 (37)	25 (21)
	3: San Gabriel	8 (12)	2 (8)	4 (9)	32 (26)
	4: Metro	12 (17)	5 (21)	3 (7)	14 (12)
	5: West	8 (12)	2 (8)	1 (2)	8 (7)
	6: South	7 (10)	3 (13)	6 (14)	6 (5)
	7: East	6 (9)	4 (17)	8 (19)	24 (20)
	8: South Bay	7 (10)	4 (17)	4 (9)	8 (7)
Total Fatalities		69	24	43	127

†2009-10 season is missing race data for n=12 and SPA data for n=4

‡ Service Planning Areas in LA County, <http://publichealth.lacounty.gov/chs/SPAMain/ServicePlanningAreas.htm>



Table 3. Top 10 Underlying Medical Conditions, Confirmed Adult Influenza Fatalities LA County 2009-201

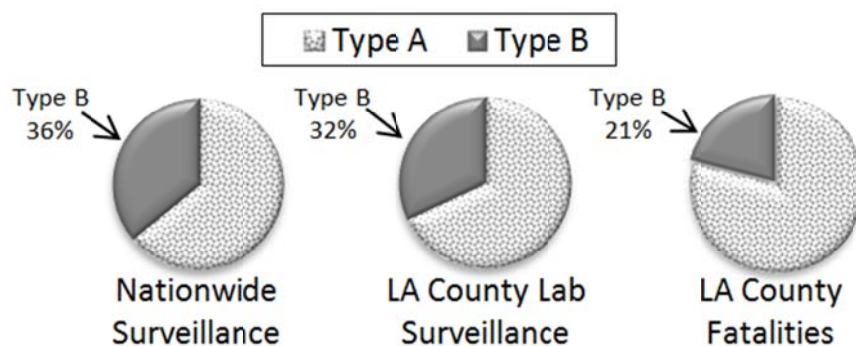
Sorted by % for 2012-13 Season	2012-13 N (%)	2011-12 N (%)	2010-11 N (%)	2009-10 N (%)
Hypertension	32 (52)	13 (65)	17 (47)	34 (27)
Overweight or obese	26 (42)	9 (45)	31 (86)	69 (54)
Heart Disease	23 (38)	12 (60)	6 (17)	40 (31)
Diabetes	19 (31)	7 (35)	10 (28)	44 (35)
Lung Disease	11 (18)	3 (15)	6 (17)	42 (33)
Immunosuppression	9 (15)	7 (35)	5 (14)	30 (24)
History of tobacco use	8 (13)	8 (40)	9 (25)	12 (9)
History of drug or alcohol abuse	5 (8)	4 (20)	3 (8)	7 (5)
Asthma	5 (8)	3 (15)	3 (8)	9 (7)
Pregnancy	0	0	1 (3)	4 (3)
Total Adult Fatalities	62	20	37	114

Notes: Overlapping conditions and complications may total over 100%, data not available for all categories, data taken from self-reported medical records

H3N2 TYPE A DOMINATED THIS SEASON

Nationally and locally type A, H3N2 subtype dominated this influenza season. 68% of positive influenza lab tests from sentinel sites returned type A results. Type A was the major strain responsible for influenza mortality in LAC found in 79% of fatal cases (Figure 3). Out of 69 fatal cases, 52 were type A and of those, 23 (32%) were further subtyped H3N2. The pandemic H1N1 strain that emerged during the 2009-10 pandemic season was still circulating during the 2012-2013 season but in low numbers (7% of fatalities). Figure 4 provides an overview of percent positive reports by our sentinel sites by MMWR week (weeks are counted starting at the beginning of the calendar year where week 1 is the first week of January). Consistent with ILI activity from reporting EDs in LAC (Figure 1), LAC sentinel laboratories also reported peak positive influenza tests at the end of January (week 5). The majority of positive influenza during the 2012-2013 season was type A, however type B was simultaneously circulating and showed increased activity over type A later in the season starting in March through the beginning of May until overall influenza activity in LAC dropped. Table 4 shows the waning effect of pH1N1 mortality over time as the rate of fatal pH1N1 cases continue to decrease by about half each consecutive year from 2009-2010.

Figure 3. Percent Positive Influenza Type Nationwide and LA County 2012-2013



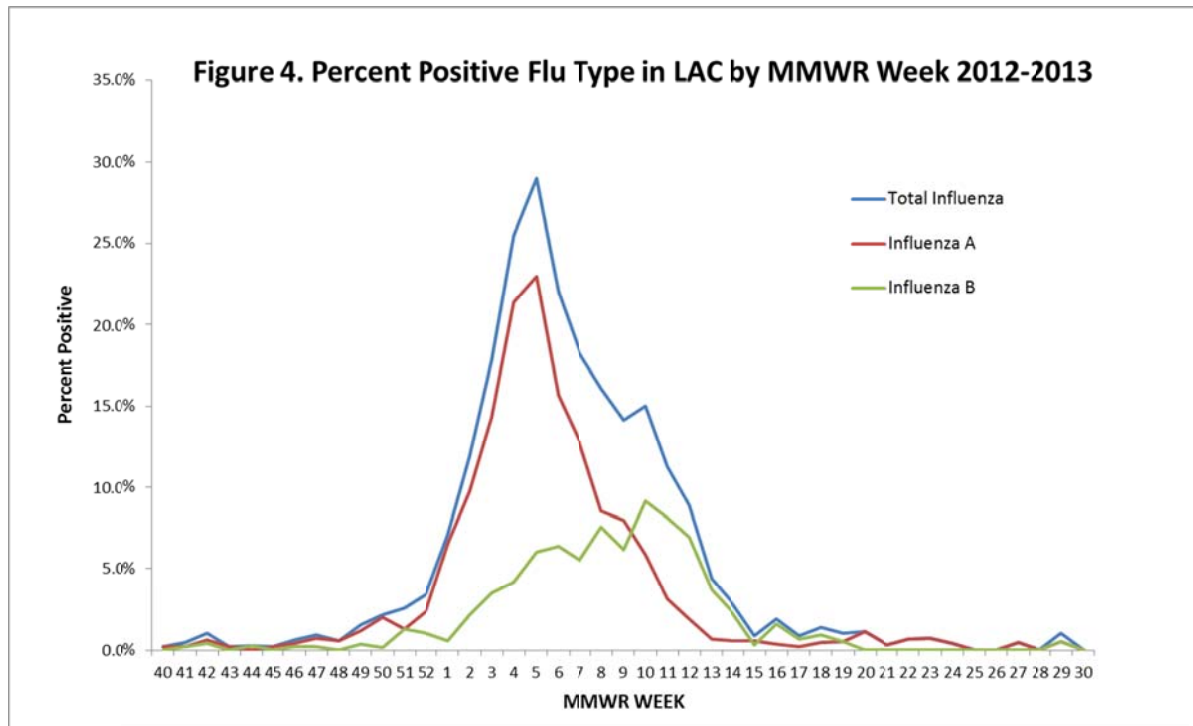


Table 4. Viruses Associated with Confirmed Influenza Fatalities 2009-2013

	2012-13 [†]	2011-12	2010-11 [‡]	2009-10
	N (%)	N (%)	N (%)	N (%)
A no type	29 (42)	14 (58)	15 (35)	19 (16)
A H1N1p	5 (6)	5 (21)	18 (42)	104 (82)
A H3N2	23 (32)	1 (4)	3 (7)	0
B no type	14 (20)	4 (17)	7 (16)	3 (2)
Total	69	24	43	127

[†]One case tested positive for H1N1p & H3N2, and one tested positive for Flu A&B, both counted twice

[‡]Two cases tested positive Flu A&B counted twice

RESPIRATORY COMMUNITY OUTBREAKS

A total of 50 respiratory outbreaks were confirmed, of those nine were attributed to influenza having at least two positive lab tests (3 A, 4 B, and 2 A& B mixed). Consistent with previous influenza seasons, the majority (over 80%) of 2012-13 outbreaks in LAC were school based (Table 4). This steady trend emphasizes the continued need to monitor influenza activity in school settings and encourage parents to vaccinate their children. Outbreak locations were mapped across service planning areas with most occurring in the San Fernando, Metropolitan, and San Gabriel areas.



Table 5. Characteristics of Confirmed Community Respiratory Outbreaks in LA County 2009-2013				
Characteristic	2012-13	2011-12	2010-11	2009-10
	N (%)	N (%)	N (%)	N (%)
Total†	50	27	53	432
Location				
School or Pre-School	41 (82)	22 (81)	46 (87)	376 (87)
Assisted Living	6 (12)	2 (7)	3 (6)	20 (5)
Daycare/child care	3 (6)	3 (11)	3 (6)	6 (1)
Juvenile Detention/Jail	0	0	0	13 (3)
Hospital	0	0	0	8 (2)
Other	0	0	1 (1)	9 (2)
Etiology				
Influenza††	9 (18)	3 (11)	14 (26)	82 (19)
Streptococcal	1 (2)	5 (19)	3 (6)	0
Other respiratory	40 (80)	19 (70)	36 (68)	350 (81)

†Totals from previous seasons have been updated

††Confirmed influenza outbreaks must include at least 2 positive lab tests

CONCLUSION

Influenza disease causes significant morbidity and mortality every year. Estimating overall influenza burden is difficult since only a small portion of those who are sick seek treatment and of those not all are tested. Therefore only a small percentage of the population who actually suffer from the disease are counted towards morbidity values. With those limitations in mind, LAC DPH tracks specific measures of influenza in the county from year to year to compare between seasons. The level of activity in LAC during the 2012-2013 influenza season was more severe compared with the previous two seasons as the county suffered the highest number of fatalities since the H1N1 pandemic in 2009-2010. The elderly were disproportionately affected as well as those with underlying medical conditions. Type A H3N2 was the dominant strain both nationally and locally, however type B and A pH1N1 were also present and contributed to morbidity and mortality. As the remarkable effects of the H1N1 pandemic diminish over time, regular seasonal influenza patterns return to normal where activity peaks from December to February and the elderly are most susceptible. The 2009-2010 influenza season is used as a marker to compare other seasons since it was a unique event with lasting effects on our population. Four influenza pandemics have occurred in the past century and because influenza viruses can mutate and adapt to new hosts, public health officials need to diligently monitor for new strains in the event that another pandemic situation emerges.

REFERENCES

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3. Department of Public Health - Acute Communicable Disease Control
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5. Nguyen AM, Noymer A (2013) [Influenza Mortality in the United States, 2009 Pandemic: Burden, Timing and Age Distribution.](#) PLoS ONE 8(5): e64198. doi:10.1371/journal.pone.0064198
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