



LOS ANGELES COUNTY'S 2010-2011 INFLUENZA SEASON: SUMMARY AND HIGHLIGHTS

Sadina Reynaldo, PhD and Elizabeth Bancroft, MD, SM

OVERVIEW

The 2010-2011 respiratory illness season in Los Angeles County (LAC), occurring approximately 18 months following the emergence of pandemic influenza H1N1 (pH1N1), was a moderate season with a return to LAC's typical cycle of influenza and respiratory illness activity. Unlike pH1N1 which yielded significant peaks in influenza illness at atypical times (late spring and early fall 2009), 2010-2011 returned to a usual respiratory illness season of bimodal peaks: a smaller peak in activity just prior to the New Year, increasing to a more substantial peak in mid-February. Influenza and respiratory syncytial virus (RSV) continued to be the dominant viruses and the unique consequences of pH1N1 virus remained: such as a shift in influenza deaths affecting younger individuals and a high prevalence of obesity among those fatalities.

RESPIRATORY VIRUS SURVEILLANCE IN LAC

Tracking the incidence of influenza, and other respiratory viruses, in LAC is unique and challenging—foremost because identifying all individual cases and requiring that all cases be reported to LAC Department of Public Health (DPH), is not possible. For example, influenza affects numerous individuals each year; on average during a mild season, roughly 10% of the population can contract this disease. Thus in LAC, with a population of roughly 10 million, even light seasons can result in roughly 1 million residents affected by this disease—an amount that would overwhelm any health department. Therefore, without the capability to identify the full gamut of individual cases of influenza, or other respiratory virus infections in LAC, the LAC DPH implements a broad range of surveillance methods that successfully determine the impact these diseases have in our communities. A summary of LAC DPH's annual surveillance activities is updated yearly and posted on LAC DPH's website.¹

The cornerstone to LAC DPH's surveillance is our summary of viral test results sent weekly by several sentinel laboratories throughout LAC. Most laboratories report both influenza and RSV; several laboratories also report results on parainfluenza, adenovirus, entero/rhinovirus, and the emerging pathogen human metapneumovirus. Our participating sentinel laboratories generate and submit thousands of viral test results every year; nearly 22,000 in the 2010-2011 season alone (Table 1). Aggregating the findings from these sentinel sites enhances LAC DPH's ability to determine the onset, peak and decline of influenza and respiratory illness activity. LAC DPH's surveillance is also instrumental in characterizing the prevalent viral strains circulating in our communities (Figures 2-4). LAC DPH also monitors and investigates reports of illness clusters and outbreaks due to respiratory illnesses; a total of 50 respiratory illness outbreaks due to a range of etiologies were confirmed by LAC DPH during the 2010-11 season (Table 1 and 2). In addition, LAC DPH conducts several special studies. For instance, in 2010-2011 LAC DPH initiated a study, funded by the Centers for Disease Control and Prevention (CDC) and the Council of State and Territorial Epidemiologists, assessing rates of influenza-like illness (ILI) among several outpatient facilities across LAC.² This study included viral tests to determine the etiology of the illness. LAC DPH also conducts extensive year-round syndromic surveillance that enhances our influenza surveillance including an assessment of ILI rates among emergency department visits across LAC (Figure 1). These aggregated longitudinal findings further support LAC DPH's assessment of the severity of the season as well as the onset, peak and decline of respiratory illness activity.

CHANGES IN REPORTING FATAL AND SEVERE CASES OF INFLUENZA

While, as described previously, individual reports of influenza cases are not reportable in LAC, there are two exceptions: 1) cases likely to due to a novel strain of influenza should be reported immediately so that

¹ <http://publichealth.lacounty.gov/acd/FluSurveillance.htm>

² See "Overview of Influenza Incidence Surveillance Project" in the 2011 ACDC Special Reports



LACDPH can assist in determining the true cause and etiology of illness, and 2) fatalities that are confirmed to have resulted from influenza. The reporting of influenza fatalities and severe cases has changed over the past several years. In 2003, the California Department of Public Health (CDPH) mandated the reporting of pediatric influenza-related fatalities and cases in intensive care units. As such, LACDPH has been able to track the impact of this disease among our children for several years. In 2009, with the advent of pH1N1, the mandatory reporting of severe cases and fatalities was expanded to all ages. However, as the impact of pH1N1 declined, reporting was streamlined. In October 2010, LAC DPH removed the reporting requirement for cases in intensive care units, but retained the requirement that all fatalities, of any age, with confirmation of influenza infection should be reported to LACDPH within 7 days of identification. This reporting standard differs from CDPH which only requires reports for fatalities among those younger than 65 years of age. LACDPH's reporting standard allows for an understanding of the impact of influenza across the full age spectrum and will be especially useful as pH1N1, which tends to affect younger individuals, is supplanted by other strains of influenza.

SEASON SUMMARY: A RETURN TO NORMAL CYCLES OF INFLUENZA

Overall for the 2010-2011 influenza season, LAC experienced moderate and fairly typical flu activity. The advent of pandemic H1N1 in April 2009 produced atypical peaks of activity in the spring and fall of that year,³ but 2010-2011 saw the return to a "typical" influenza season with a peak of positive influenza tests occurring in February. By mid-February nearly one-fourth (24.5%) of all submitted viral tests from our sentinel laboratories were positive for influenza (Table 1). Furthermore, the positive percentage of influenza in March (~10%) was just as high as in December, which illustrates the importance of continuing influenza vaccination past the New Year and into spring.

In addition during this season, there were aspects of LAC's influenza activity that were unique to our jurisdiction as compared to the rest of the nation. While the same three primary influenza strains were identified across the nation, overall, LAC saw significantly more type B influenza than the rest of the US. As shown in Table 1, from the beginning to the end of the season (August 29, 2010 to May 21, 2011) nearly 22,000 respiratory specimens were tested in sentinel laboratories in LAC; of these specimens, 2,122 (9.7%) tested positive for flu, and of these slightly less than half (43%) tested as type B. In contrast, the CDC's national surveillance collected a total of 137,139 specimens throughout the season, yielding 27,186 (19.8%) positive for flu and further identifying only 26% as type B (Figure 2). This season, treatment and prophylaxis recommendations for influenza were identical for all circulating strain types—but this is not always the case. The differences that can occur in LAC as compared to the rest of the nation demonstrate the importance of maintaining local surveillance for influenza and to tailor influenza guidance to match local findings.

OTHER RESPIRATORY VIRUSES

Beyond influenza, several other respiratory viruses were prevalent during 2010-2011, and these viruses contributed to the overall burden of respiratory illness. As shown in Figure 4, RSV peaked several weeks earlier in the season (around week 1) than influenza and yielded similar rates of detection. Levels of enterovirus/rhinovirus, parainfluenza, human metapneumovirus, and adenovirus, did not increase substantially until both RSV and influenza declined; more importantly, these viruses continued to circulate and cause illness long after the "influenza" season was considered over. This expanded viral surveillance illustrates that several viruses, other than just influenza, comprise what is commonly referred to as "flu season," and ILI activity can have a range of causes.

RESPIRATORY OUTBREAKS SUMMARY

Another aspect of LAC DPH's illness surveillance that greatly assists with our understanding of the severity and impact of disease is the reporting and investigation of respiratory illness outbreaks. During 2010-2011, respiratory outbreaks were reported from across LAC. As shown in Table 2, of the 50 confirmed respiratory outbreaks in "community" settings (non-healthcare settings), most (84%) occurred

³ Summarized at http://publichealth.lacounty.gov/acd/docs/Flu/Season09-10/IW_Summary.pdf



in elementary schools. The average duration of the outbreaks was 12 days with a range of 2 to 41 days. Only 30% of the outbreaks had a laboratory confirmed etiology: of those, most (86%) were due to the vaccine preventable viruses, influenza A and B. Of the 48 confirmed outbreaks in schools, only four reported offering the influenza vaccine at the school prior to the outbreak. To prevent outbreaks, it is important to get vaccinated to be protected against influenza, especially for elementary and school-aged children.

CHARACTERISTICS OF CONFIRMED INFLUENZA DEATHS

LAC DPH's monitoring and investigation of influenza-related fatalities provides valuable insight into those who are most affected by this disease. While 2010-2011 was no longer considered a "pandemic" season, and the impact of novel pH1N1 was lessened (Figure 5), the unique groups predominantly affected by this virus continued, as was especially evident in the season's flu fatalities (Table 3).

Table 1. LAC Influenza Surveillance Summary (2010-2011)		
LAC Surveillance Summary	Influenza Peak Week Week 7 (2/13/11-2/19/11)	2010-11 Season Summary (8/29/10-5/21/11)
Positive Flu Tests / Total Tests (Percent Positive Flu Tests)	354 / 1,442 (24.5%)	2,122 / 21,987 (9.7%)
Percent Flu A / B	56% / 44%	57% / 43%
Positive RSV Tests / Total Tests (Percent Positive RSV Tests)	100 / 730 (13.7%)	1,304 / 12,720 (10.3%)
Community-Based Respiratory Outbreaks*	3	50
Flu Deaths, Confirmed* (Pediatric Deaths, Confirmed*)	3 (0)	34 (3)
* By date of onset.		



Figure 1
Influenza-like Illness ED Visits in LA County (2007-2011)
Surveillance Week 20

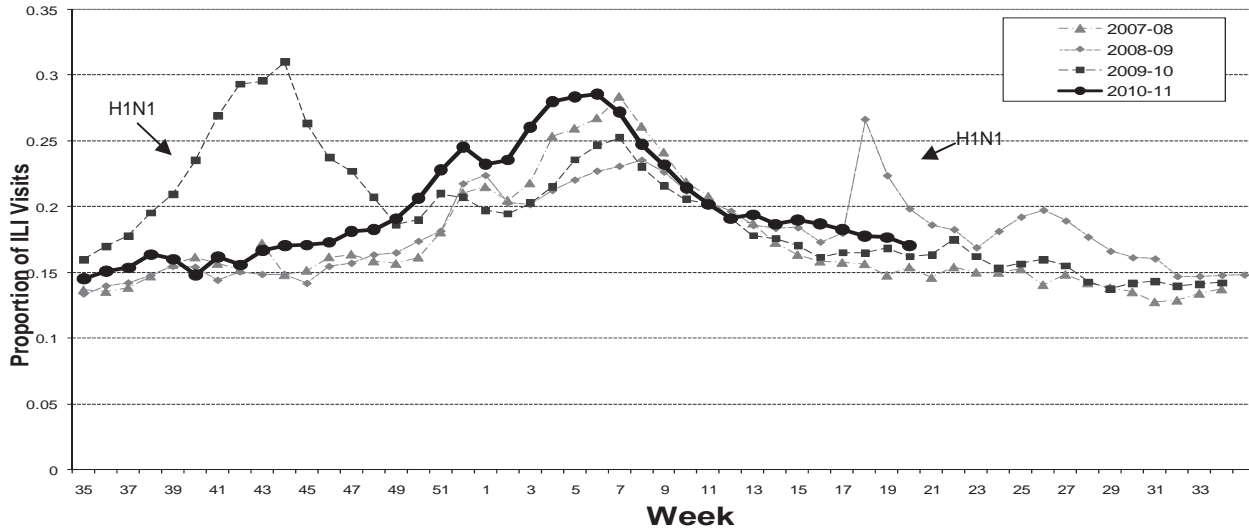


Figure 2
Percentage of Type A versus Type B Influenza
LA County and Nationwide
(2010-2011)

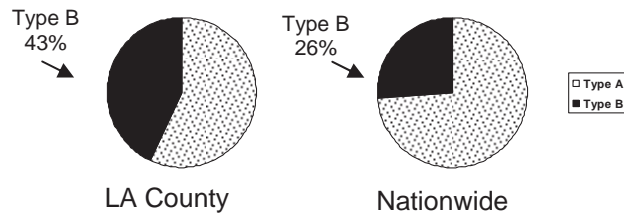


Figure 3
Percent Positive Flu (All Types, Type A, Type B)
LA County (2010-2011)

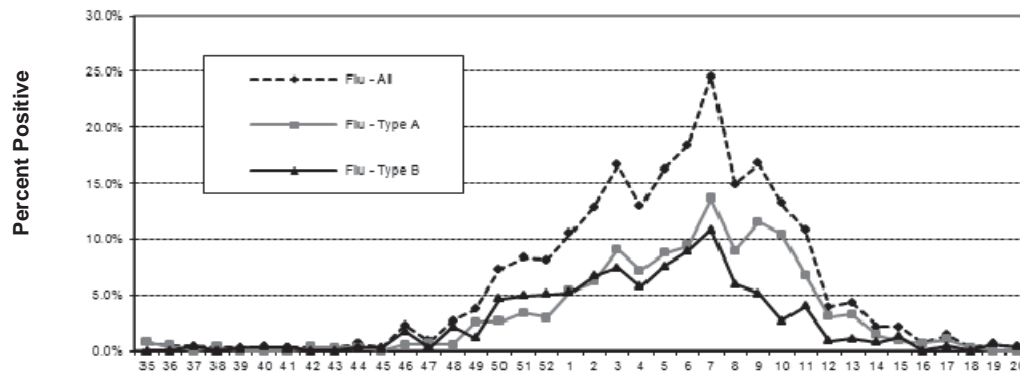




Figure 4
Percent Positive for Seven Respiratory Viruses from
Three Laboratories by MMWR Week
LA County (2010-2011)

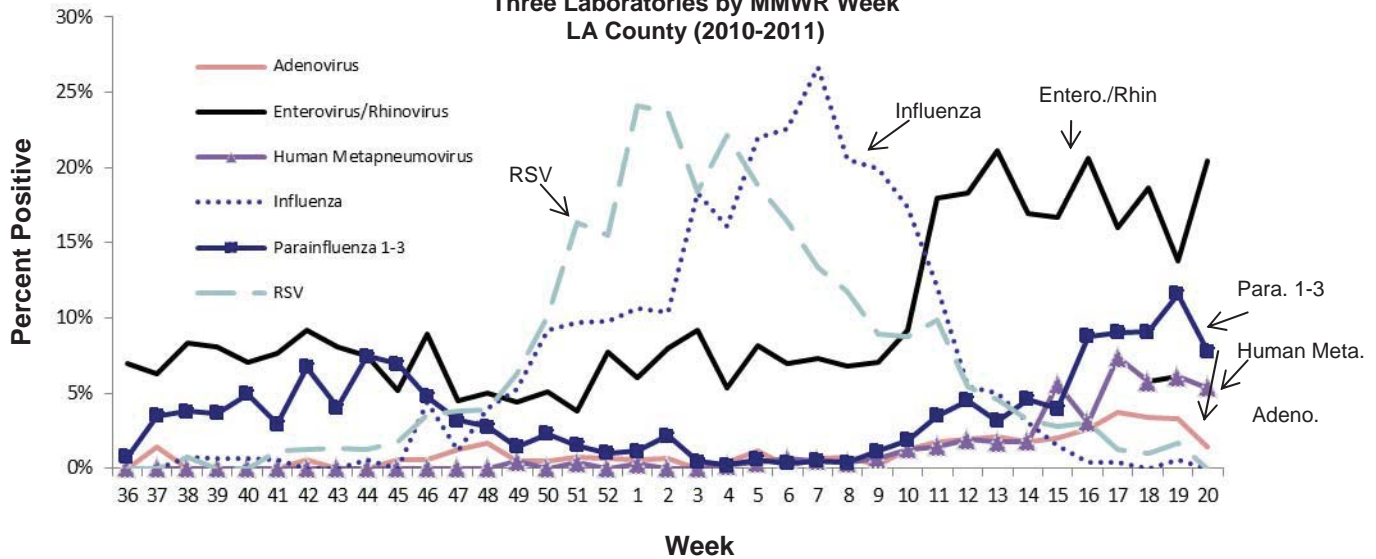
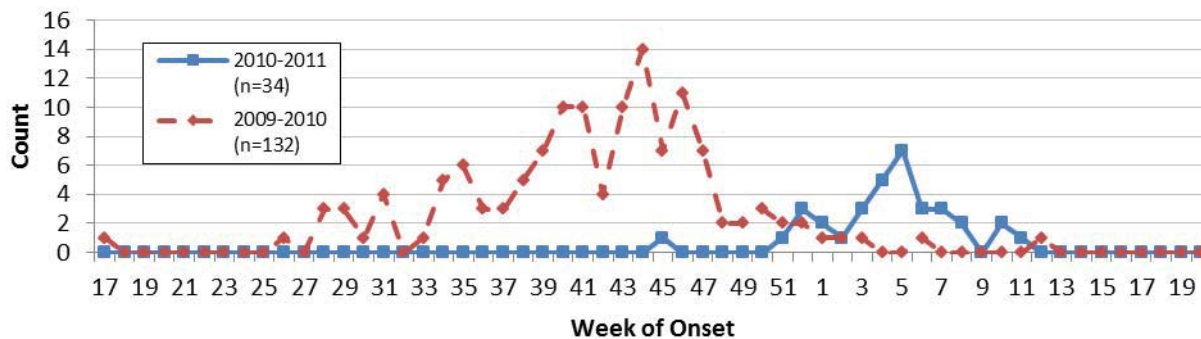


Table 2. Confirmed Community-Based Respiratory Outbreaks		
LAC 2010-2011 (n=50)		
Location of Outbreak	n	%
Childcare	3	6
Elementary School	42	84
High School	2	4
K-12 School	1	2
Assisted Living	2	4
Etiology		
Influenza A	2	4
Influenza B	7	14
Streptococcal	2	4
Mixed *	3	6
Unknown	36	72

* All the mixed outbreaks reported involved influenza.



Figure 5
Number of Influenza-Related Deaths by Week of Onset
LA County (2009-2011)



Demographic Characteristics		Number (%)
Age Group	0-18	3 (8.8%)
	19-64	28 (82.4%)
	65+	3 (8.8%)
	Median	46.5
	Range	4-92
Race	Hispanic	21 (61.8%)
	White Non-Hispanic	7 (20.6%)
	Asian	4 (11.8%)
	African-American	2 (5.9%)
Gender	Female	18 (52.9%)
	Male	16 (47.1%)
Viruses Associated with Influenza Fatalities		
Type A (all)	30 (88%)	
	- pH1N1	15 (44%)
	- A (no subtype)	14 (41%)
	- H3N2	1 (3%)
Type B	4 (12%)	
Underlying Medical Condition*		
Obesity	18 (52.9%)	
Cardiac	16 (47.1%)	
Metabolic (Diabetes, Kidney Failure)	13 (38.2%)	
Overweight	9 (26.5%)	
Pulmonary	7 (20.1%)	
Current Smoker	6 (17.6%)	
Past Smoker	3 (8.8%)	
Acquired Neurologic Disease	3 (8.8%)	
Immunosuppression	1 (2.9%)	
Developmental Disability		

* Individuals may have more than one condition.

There were only 34 deaths due to influenza in 2010-2011 versus 139 during the pandemic of 2009-2010. Despite the difference in magnitude of deaths, there were some significant similarities between the two respiratory seasons. In both seasons, people older than 65 years represented a very small minority of the reported cases, which may represent pre-existing immunity to the pH1N1 virus and/or decreased testing in the elderly. Another unique and significant continuing risk category is obesity. Obesity (BMI >30) was first identified in 2009 with the advent of pH1N1 as independent risk factor for influenza death, and this condition continued to be highly prevalent this season 2010-2011 among LAC fatalities, occurring in more than half of the deaths—combining both the categories of obesity and overweight (BMI >25) accounted



for almost 80% of LAC's influenza fatalities. However, there were some notable differences between the two seasons: in 2009-2010, the majority of the fatalities occurred early in the flu season (October-December) versus this past year when the majority of the fatalities had onset in February during our normal peak influenza season (Figure 4). Also compared to the previous season,⁴ during 2010-2011 the proportion of severe influenza cases in pregnant women or people with developmental disabilities decreased. Finally, while last season almost all deaths were due to pH1N1, or influenza A which was presumed to be pH1N1, in 2010-2011 additional influenza strains regained prominence; for instance, this season there were several (n=4, 12%) deaths associated with influenza B.

CONCLUSION

The influenza virus is always mutating, always changing—new strains emerge almost every season. As such, influenza, including its impact and severity, is also always unpredictable. This phenomenon was clearly illustrated by pH1N1; not only did it emerge unexpectedly, it yielded significant peaks of illness during atypical times in the year. Another unpredictable consequence of pH1N1 is that this strain tends to predominantly affect, and continued to impact, younger, as opposed to older, individuals.

Despite the unpredictability of influenza, there are several factors illustrated by the 2010-2011 season that should serve as a basis for future education, prevention and policy. First, while LAC DPH urges all residents to be vaccinated to protect themselves and their loved ones from contracting influenza, and LAC DPH urges that vaccination occur as early in the season as possible, LAC's cycle of influenza activity, which persists well into the spring, should encourage physicians and the public to continue to provide and receive influenza vaccination even in January and February. Second, LAC DPH's surveillance also revealed that our influenza activity in 2010-2011 differed from the rest of the nation. As such, our residents, and especially our medical communities, should focus on local guidance and recommendations which might differ from state and federal statements.

Finally, as demonstrated from the findings from 2010-2011, it is also especially important to improve vaccination and other preventive strategies for LAC's children and other high risk groups including people that are obese: the vast majority of LAC's influenza fatalities (80%) were either overweight or obese. While there were limited fatalities in children this season, the predominance of influenza outbreaks in elementary schools is evidence that this virus can circulate in the young and possibly spread the virus to those more vulnerable. Traditional and past influenza campaigns tend to focus mostly on other groups, such as the elderly and those with medical risk factors (such as those with respiratory issues). For future efforts, it is critical to improve outreach, education and policies that can advance vaccination and other preventive strategies for both for people who are at risk for severe consequences of influenza as well as healthy individuals who are likely to spread this disease through our communities.

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Monica Sovero, MPH—Acute Communicable Disease Control Program, Epidemiology Analyst

⁴ Summarized at http://publichealth.lacounty.gov/acd/docs/Flu/Season09-10/IW_Summary.pdf