

Acute Communicable Disease Control Program

Special Studies Report

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ACDC SPECIAL STUDIES REPORT 2014

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BOTULISM CASE REPORT SUMMARY LOS ANGELES COUNTY, 2014

Moon Kim, MD, MPH

One case of botulism was reported in 2014 that met the case definition. This was a case of wound botulism due to injection drug use and the patient recovered from their symptoms. Although both the mouse bioassay on serum for toxin A performed by the Los Angeles County (LAC) Public Health Laboratory and the Centers for Disease Control and Prevention's Matrix-assisted laser desorption/ionization-Time of Flight (MALDI-TOF) test for toxin A in serum¹ were negative, the case was classified as a case of probable botulism because the clinical history, risk factors, symptoms, and electromyography (EMG) testing were all consistent with botulism. The LAC Acute Communicable Disease Control Program also received one report of suspected botulism that tested negative for toxin A and MALDI-TOF and did not meet criteria for a case; the patient was diagnosed with seizures and drug withdrawal.

The local health department's only responsibility for infant botulism is immediate telephone reporting of suspected cases to the California Department of Public Health's (CDPH) Division of Communicable Disease Control. All suspected cases are investigated by the CDPH [Infant Botulism Treatment and Prevention Program](#).²

¹ Barr JR, Moura H, Boyer AE, Woolfitt AR, Kalb SR, Pavlopoulos A, et al. Botulinum neurotoxin detection and differentiation by mass spectrometry. *Emerg Infect Dis.* 2005; 11 (10): 1578-1583

² Infant Botulism Treatment and Prevention Program. Division of Communicable Disease Control, California Department of Public Health. <http://www.infantbotulism.org/>.





ENTEROVIRUS D68 ENHANCED SURVEILLANCE SPECIAL STUDY, LOS ANGELES COUNTY

Wendy Manuel, MPH and Rachel Civen, MD, MPH

BACKGROUND

Enteroviruses are a group of viruses that usually cause mild illness, such as the common cold, especially during the summer and fall. Infection with enteroviruses can also be associated with a broad range of clinical illness including gastrointestinal illness, rashes, and neurologic illness including aseptic meningitis, less commonly encephalitis and rarely, acute myelitis and paralysis.

Enterovirus D68 (EV-D68) was first detected in California in 1962 and is one of more than 100 non-polio enteroviruses. During August 2014, EV-D68 was identified in clusters of children with severe respiratory illness in Missouri and Illinois bringing national attention to this specific enterovirus type. In response, the Centers for Disease Control and Prevention (CDC) began conducting enhanced surveillance nationwide to better understand the full spectrum of this disease. From mid-August 2014 to January 15, 2015, 1,153 cases of EV-D68 in 49 states and the District of Columbia were identified (1). To identify clustering or unique manifestations of EV-D68, the CDC and California Department Public Health (CDPH) called for an increase in testing of cases of severe respiratory illness in children, as well as clusters or outbreaks of respiratory illness in any age group. On September 11, 2014 the Los Angeles County Department of Public Health (LACDPH) sent out a Health Alert notifying healthcare providers about the EV-D68 outbreak and requesting providers to report suspected cases of EV-D68 for testing at CDPH. Surveillance was passive and voluntary and cases of EV-D68 are not reportable to federal, state, or local health jurisdictions.

In parallel with the Midwest respiratory outbreaks, in September 2014, a cluster of nine cases of acute neurologic illness/acute flaccid paralysis (AFP) characterized by extremity weakness, cranial nerve dysfunction, or both was identified in Colorado among pediatric patients. Four cases had EV-D68 identified from nasopharyngeal specimens suggesting a causal association to EV-D68 infection. However, EV-D68 was not identified from cerebrospinal fluid (CSF) making the association of EV-D68 and neurologic illness less clear. On September 26, 2014, the CDC and CDPH sent local health departments a Health Advisory alerting healthcare providers to be vigilant for and report cases of sudden onset neurologic illness associated with limb weakness that meet CDC's case definition (see methods) (2).

This report summarizes our findings of respiratory and neurological illness associated with EV-D68 from August to December 2014.

METHODS

Laboratory testing for EV-D68 was done based on CDC criteria which included: cases of severe respiratory infections, especially those in pediatric intensive care units who had already tested positive for entero/rhinoviruses or those involved in suspected respiratory outbreaks of unknown etiology. Emphasis was placed on children with underlying medical conditions such as asthma, since children with asthma were found to be at higher risk for severe complications from EV-D68. Healthcare providers were asked to fill out a standardized case history form developed by CDC. Specimens were packaged by LAC Public Health Laboratory (PHL) and sent to CDPH for testing. If enterovirus was identified by initial PCR screening, then an additional D68 PCR test was performed. Turnaround time for results from CDPH ranged from one to five months.

In addition to respiratory illness, we reviewed cases that met the CDC case definition of EV-D68 neurologic illness associated with limb weakness. Cases included patients ≤ 21 years old with acute onset of focal limb weakness and an MRI showing a spinal cord lesion restricted to gray matter. As with the respiratory illness, a standardized CDC case history form was completed and testing was performed at the CDPH laboratory.



RESULTS

Twenty-five isolated cases of EV-D68 associated with respiratory illness were identified in LAC residents, plus an additional two cases associated with AFP symptoms. During this surveillance period no clusters of EV-D68 were identified in LAC. All respiratory and AFP cases recovered and were released from the hospital.

Respiratory

Of the 25 cases of respiratory associated EV-D68 identified from August 2014 to February 2015, 15 were submitted by a hospital under the jurisdiction of Long Beach City Health Department and will be omitted from further description as LACDPH did not participate in investigations of those cases.

Fifteen LAC hospitals submitted 25 specimens for EV-D68 testing at the CDPH laboratory. Consistent with CDC's testing criteria, all suspect cases were hospitalized for respiratory symptoms; illness onset ranged from September 15 to November 5, 2014. As of May 19, 2015, 10 (40.0%) positive EV-D68 cases have been identified; 12 (48.0%) were negative; and three (12.0%) are still pending state lab results. The age range of positive cases included children 11 months to 12 years old (median age: 4.5 years). Demographic, clinical, and underlying disease data from the ten EV-D68 cases are shown in Table 1.

Age	Range	11 months - 12 years
	Median	4.5 years
Female		5 (50.0%)
Asthma		7 (70.0%)
ICU Admit		4 (40.0%)
Treated with supplemental oxygen		8 (80.0%)
Treated with bronchodilators		9 (90.0%)

AFP

Two cases of AFP associated with EV-D68 were identified in LAC during this surveillance period. Both had recent upper respiratory infection symptoms preceding their hospitalizations for AFP symptoms and met the CDC case definition for EV-D68 associated neurologic illness. In both cases, EV-D68 was isolated from respiratory specimens only. The patients' ages were six and seven years old, and the two cases shared no geographic or social links.

DISCUSSION AND CONCLUSION

Enterovirus is not a reportable disease and routine surveillance is not usually done. Therefore, no baseline incidence or prevalence data are available at the national or local level for either enterovirus generally or EV-D68 specifically. Sentinel laboratories in LAC report weekly data on enterovirus/rhinovirus detection during respiratory virus season; however, cross-reactivity between these two viruses requires specific PCR testing to identify enterovirus. Furthermore, the PCR test for enterovirus does not distinguish between specific strain types and additional testing must be performed to identify D68.

Data gathered from enhanced surveillance of EV-D68 focused specifically on pediatric cases and clusters of respiratory illness and, therefore, does not provide information on the full burden or spectrum of disease. Illness in the adult population or the outpatient setting has not been studied and broad conclusions cannot be drawn from this surveillance.



The CDC reported that from mid-August 2014 to January 15, 2015, a total of 1,153 confirmed cases of respiratory illness caused by EV-D68 were detected across 49 states. Almost all of the confirmed cases were among children with underlying medical conditions of asthma or a history of wheezing. Out of approximately 2,600 specimens CDC received for enterovirus testing, 36% tested positive for EV-D68 and 33% tested positive for an enterovirus or rhinovirus other than EV-D68. Fourteen fatal cases were associated with EV-D68.

AFP can have numerous etiologies and can prove diagnostically challenging. Worldwide, AFP surveillance is done as part of polio virus eradication programs as this virus once was the most common cause of AFP. However, with widespread implementation of the polio vaccination, AFP is rarely seen. Over a two-year surveillance period, CDPH identified 23 cases of AFP in patients between the ages of one to 73 years (median age: ten years); no common viral or bacterial etiology could be determined. In two of 23 AFP cases, EV-D68 was identified in respiratory specimens only (3). In 2014, Colorado identified a cluster of AFP cases associated with EV-D68 respiratory illness; no additional AFP clusters related to EV-D68 have been documented in the United States (4). The association between AFP and EV-D68 remains unclear. A complete analysis of the 2014 national EV-D68 surveillance data may lead to a better understanding of the role of EV-D68 in neurological illness. However, in the meantime physicians treating patients with AFP of unknown etiology should work with their local health departments to rule out poliomyelitis for cases that are unimmunized and have travelled to countries with endemic polio or countries that use OPV for routine immunization and also consider enterovirus and West Nile virus as possible etiologies(3).

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RESOURCES

[Non-Polio Enteroviruses](#) | [About EV-68](#) | [EV-D68 for Health Care Professionals](#)





INCREASE OF INVASIVE MENINGOCOCCAL DISEASE AMONG MEN WHO HAVE SEX WITH MEN IN LOS ANGELES COUNTY, 2012-2014

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BACKGROUND

Invasive meningococcal disease (IMD) is a life-threatening infection caused by the bacteria *Neisseria meningitidis*. IMD occurs most often as meningitis, an infection of the cerebrospinal fluid (CSF), or meningococemia, an infection of the bloodstream. It is transmitted via direct or droplet contact with nose or throat secretion of persons colonized with the bacteria. There are 13 serogroups; however, serogroups A, B, C, Y, and W-135 are the most common and are preventable by vaccination in the United States (U.S.). [1,2,3,4,5] Serogroup C IMD account for the greatest proportion of outbreaks in the U.S. [6]

The incidence of IMD has declined from 0.59 cases per 100,000 in 1995 to 0.38 cases per 100,000 in 2011 within Los Angeles County (LAC). [7,8] Despite an overall decrease in cases of IMD over the past several decades in LAC, the number of cases among gay men/men who have sex with men (MSM) has increased since 2012.

In fall 2012, the Los Angeles County Department of Public Health (LAC DPH) Acute Communicable Disease Control Program (ACDC) became aware of reports from the New York City (NYC) Department of Health and Mental Hygiene (DOHMH) documenting an outbreak of serogroup C invasive meningococcal disease cases among MSM from 2010 to 2012. [9] In December 2012, ACDC documented two male serogroup C IMD cases who identified themselves as MSM. In response, ACDC initiated enhanced surveillance of IMD to document IMD among MSM and to detect epidemiologic linkage among MSM cases. This report summarizes IMD surveillance among MSM from October 1, 2012 to September 30, 2014.

METHODS

This report includes IMD cases who are LAC residents that meet the case definition of confirmed, probable, and suspect IMD as defined by the Council of State and Territorial Epidemiologists (CSTE), with onset of disease between October 1, 2012 and September 30, 2014. [10] Only one case was <18 years old and was excluded in this report. For each suspected case of IMD, medical records are reviewed, and LAC DPH Community Health Service (CHS) public health nursing staff interviews the case, or their proxies when the case is unavailable, with a standardized reporting form that includes demographics, laboratory evidence of infection, and exposure to schools and confined spaces (e.g., college dormitories or military barracks). Serotyping is performed by the LAC Public Health Laboratory (PHL) on *N. meningitidis* isolates from culture positive cases by bacterial slide agglutination, or by polymerase chain reaction (PCR) analysis at the California Department of Public Health Microbial Diseases Laboratory for culture-negative cases.

Beginning December 2012, enhanced surveillance for MSM status and additional risk factors was conducted. ACDC requested Public Health Nurses (PHNs) to interview all cases using a supplemental form querying risk factor information during the three months prior to symptom onset including MSM status, recent travel and attendance at bars and parties. MSM status was either self-designated or designated by a sexual partner. All adult male IMD cases with symptom onset starting from October 1 to December 1, 2012 were re-interviewed to collect this additional information. All serogroup C culture-positive isolates had pulsed field gel electrophoresis (PFGE) analysis completed at the Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia. PFGE analysis was performed using the NheI restriction enzyme.

Descriptive analyses were conducted to compare characteristics of adult IMD cases who were MSM with males who were not MSM during this time period. U.S. Census estimates from 2012 were used to calculate LAC population incidence rates. An estimate of 8.2% MSM among the California adult male population was



used to estimate incidence rates among MSM in LAC. [11]

RESULTS

Thirty-four IMD cases ≥ 18 years old had onset during the study time period between October 1, 2012 and September 30, 2014, of whom 13 (38%) were identified as MSM (Table 1). The MSM cases had onset dates ranging from December 15, 2012 through July 28, 2014. Twelve cases were non-MSM males and nine were adult females. Using estimates of the MSM population within LAC, the incidence rate of IMD among LAC MSM was 2.39 cases per 100,000 per year. IMD incidence among non-MSM males is estimated as 0.26 per 100,000 per year and among females as 0.13 per 100,000 per year.

Table 1. Demographics of IMD Cases ≥ 18 Years, Los Angeles County (LAC), October 1, 2012-September 30, 2014, N=34

		MSM (N=13) n (%)	Non-MSM Males (N=12) n (%)	Females (N=9) n (%)	All Cases (N=34) n (%)
Annual Incidence (per 100,000)		2.39	0.26	0.13	0.25
Age (yrs)	Mean	32.4	45.8	58	43.9
	Median	28	47	54	40.5
	Range	21-50	22-72	24-94	21-94
Sex (M:F)		--	--	--	25:9
Race n (%)	White	3 (23)	3 (25)	3 (33)	9 (26)
	Latino	6 (46)	6 (50)	4 (44)	16 (47)
	Black	3 (23)	2 (17)	1 (11)	6 (21)
	Asian/Other	1 (8)	1 (8)	1 (11)	3 (9)
Health District*	Hollywood-Wilshire	4 (31)	1 (8)	3 (33)	8 (24)
	East Valley	0 (0)	4 (33)	1 (11)	5 (15)
	Central	1 (7)	0 (0)	2 (33)	3 (9)

* Most common health districts (HD) reported among all cases out of 24 HD in LAC.

The median age of MSM cases (28 years) was younger than the median age of non-MSM male cases (47 years). Race/ethnicity distribution was similar in both groups of cases, with Latinos accounting for 46% and 50% of MSM cases and non-MSM males, respectively. The largest proportion of MSM cases resided in the Hollywood-Wilshire Health District (HD) (n=4, 31%), an area that includes a large MSM community. The remainder of MSM cases was distributed across eight different Health Districts across Los Angeles County. Among non-MSM males, only one resided in Hollywood-Wilshire HD. The largest number resided in East Valley HD (n=4, 33%).

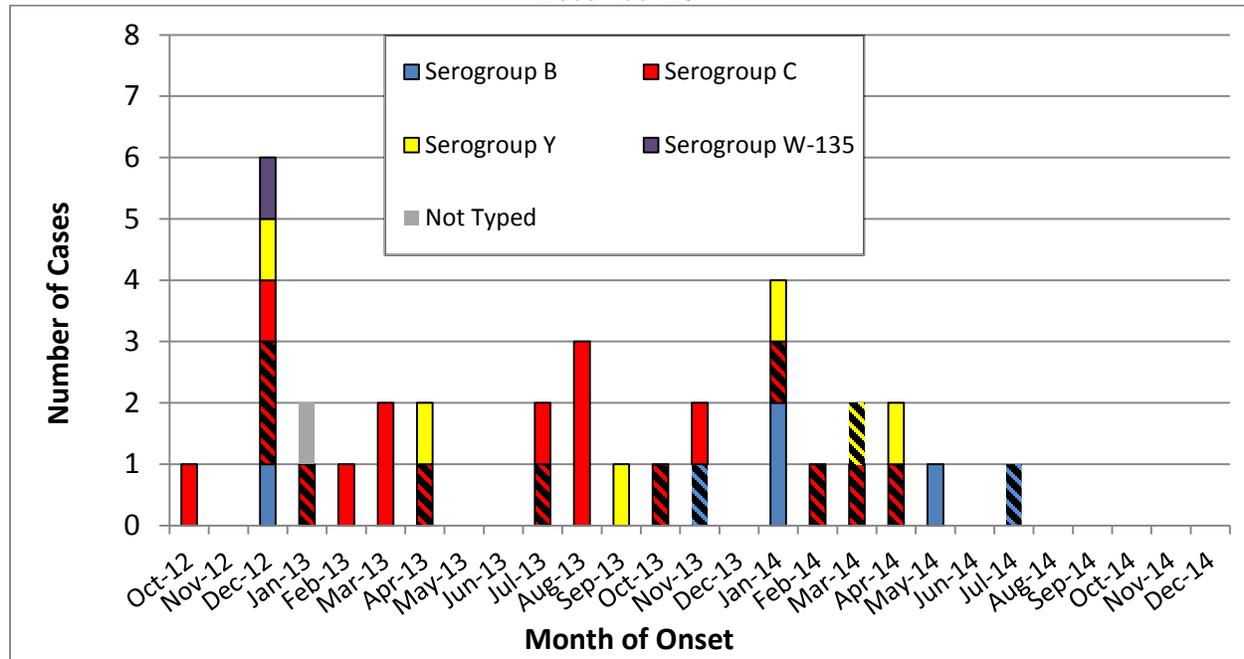
Serotyping was completed on all but one of the 34 IMD cases during the investigation period, with four identified by PCR. Serogroup C was predominant (59%). The remaining serogroups identified were B (18%), Y (18%), and W-135 (3%). Among 13 MSM IMD cases, ten (77%) were serogroup C, two were serogroup B, and one was serogroup Y. A large proportion of non-MSM males also had serogroup C IMD (67%). Nine cases were fatal (26%). The fatality rate among MSM cases (39%) was similar to that of non-MSM males (33%). Four cases were HIV-positive with onset dates from November 15, 2013 through March 24, 2014, all of whom were MSM (31% of all MSM). Two of the HIV-positive cases were fatal. No cases reported travel to New York City within the prior three months. No cases identified any social gatherings that they attended in common.

The epidemic curve in Figure 1 shows the occurrence of serogroups B, C, and Y from October 2012 through December 2014, with MSM cases identified by the cross-hatching. A temporal cluster of four MSM serogroup C cases occurred beginning December 14, 2012 lasting through April 5, 2013, and a second cluster occurred in early 2014 from January 27 through April 6. Of the 20 cases that were serogroup C, 12



were analyzed by PFGE. Among the ten cases of serogroup C among MSM, two cases with onsets on December 14, 2012 and January 5, 2013 had PFGE patterns that matched each other as well as one of the patterns identified in the NYC outbreak. Thus, in neither of the temporal clusters, was there spread of a common strain.

Figure 1. Invasive Meningococcal Disease Cases ≥18 Years, Los Angeles County, October 2012-December 2014



DISCUSSION

Although incidence rates of IMD have been decreasing both in LAC and nationwide, an unusually high proportion of cases among MSM, over one-third of all cases, was reported to LAC DPH between October 1, 2012 and September 30, 2014. PFGE analysis identified two MSM cases with a pattern matching to each other and to several MSM cases associated with the NYC outbreak. However, other than MSM status, no other epidemiological links were identified, including travel to NYC. Though PFGE has been useful in augmenting and supporting identified common source exposures for foodborne and healthcare-related outbreaks, it has not been frequently used and can be difficult to interpret in IMD investigations. PFGE results should always be interpreted in conjunction with the epidemiological case investigation. The PFGE analysis results may indicate that the strain found both in NYC and LAC is a common *N. meningitidis* strain colonizing persons in both cities.

When LAC documented its first case of IMD in MSM in December 2012, NYC already was issuing recommendations to vaccinate HIV positive MSM due to 56% of the NYC outbreak cases having HIV-positive status [9,12]. LAC did not document its first HIV-positive MSM IMD case until November 2013 and then documented three additional HIV-positive cases in a period of less than five months, contributing 31% of MSM cases. Though HIV-positive patients have not been targeted for routine vaccination as a group, recent epidemiologic studies support HIV infection as an independent risk factor for meningococcal disease. [13, 14] The Advisory Committee on Immunization Practices (ACIP) is currently considering if HIV infection should be added to the list of underlying conditions for which meningococcal vaccine should be recommended.

From October 2012 to September 2014, the incidence of IMD among MSM was estimated to be 2.39 cases per 100,000 population per year. [11] This is nine times the rate in non-MSM males in LAC (0.26 cases per 100,000 per year) and 18 times the rate among females (0.13 cases per 100,000 per year). The rate among



LAC MSM is higher than found in young adults 15 to 24 years old (0.78 per 100,000 population) in a national study between 1998 and 2007. [15] Further, the LAC MSM rate is comparable to college freshmen and college dormitory residents, and about half the rate of college freshmen who live in dormitories. College freshman living in dormitories experienced IMD at a rate of 5.1 per 100,000 [1]. The ACIP has recommended routine vaccination of all persons aged 11-18 years in order to address the increased rates of IMD in these groups. [16]

In April 2014, in the midst of the second cluster of MSM cases, LAC DPH recommended meningococcal vaccination for MSM due to the increase in IMD cases in this population and high levels of concern expressed by the MSM community and their medical providers. The recommendation was for vaccination of:

- all HIV-positive MSM,
- all MSM, regardless of HIV status, who regularly have close or intimate contact with multiple partners or who seek partners through the use of digital applications (“apps”), particularly those who share cigarettes/marijuana or use illegal drugs.

Following the recommendation, LAC DPH distributed 3,500 doses of vaccine to clinics that serve MSM and HIV-positive populations and made vaccination available at district public health clinics. Since the LAC DPH recommendation was initiated in April 2014, four IMD cases have occurred in LAC, two of which were among MSM (Figure 2). The last MSM case in 2014 occurred on July 28th.

In response to the outbreak of IMD among MSM in NYC, the NYC DOHMH also recommended vaccination of MSM at high risk for IMD. [17] In NYC, outbreak-associated cases were clonal with many meningococcal isolates matching by PFGE analysis, though several additional strains have emerged. Furthermore, outbreak-associated cases reported strong social and geographic epidemiologic links. By contrast, nearly all LAC MSM cases were affected by different strains and none were epidemiologically linked. NYC will continue vaccinating through the 2015 IMD season.

LIMITATIONS

MSM classification can be challenging as cases are not always forthcoming about their intimate behaviors. A few cases were identified through interview of close contacts, such as in situations where the case was deceased. Further, MSM status has not been considered a risk factor for IMD and so has not been collected during routine patient interviews. LAC DPH began actively collecting MSM status information in December 2012. Prior to that only two male cases occurred in 2012, one of whom was deceased and we were able to re-interview the single close contact and determine he was likely not a MSM. We are confident that the second male case in 2012 was also likely not a MSM.

Incidence rates for MSM in LAC were calculated using an estimate published by a Lieb *et al* study estimating that 8.2% of the adult male population in the state of California is identified as MSM [11]. The estimate was derived by mathematical modeling based on assumptions that have not been validated. Further, we infer that the same prevalence applies in LAC as it does across the state.

CONCLUSION

Between October 1, 2012 and September 30, 2014, IMD incidence among MSM was nine times higher than among non-MSM males in LAC. Enhanced surveillance including comprehensive interviews for risk factors and additional molecular analysis failed to detect an outbreak caused by a common meningococcal strain among LAC MSM. The number of IMD cases among MSM has declined since the beginning of 2014, at which time LAC DPH instituted a vaccine recommendation for this group. Although we do not know a definitive number of vaccine doses administered after the recommendation, the total is estimated at approximately 7,000 doses (unpublished data) and is unlikely to have had significant effect on IMD case incidence. It is possible that public messaging strongly discouraging sharing of oral secretions could have been effective at decreasing spread of *N. meningitidis* among colonized MSM. Nevertheless, this population continues to account for a high proportion of IMD cases. LAC DPH continues to endorse the 2014



meningococcal vaccine recommendation for all HIV-positive MSM and the MSM groups who may be at higher risk for infection, regardless of HIV status. The February 2015 Health Update on meningococcal vaccination in MSM can be viewed on the Los Angeles Health Alert Network webpage: <http://publichealth.lacounty.gov/lahan/>. CDPH also supports the vaccine recommendation for HIV-positive MSM and MSM in risk groups for IMD. [18,19] LAC DPH will continue to query MSM status and pertinent risk factors in order to monitor further increases of IMD among MSM. LAC DPH will also continue to communicate to the public and health care providers through the DPH website and press releases as new information become available.

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INFLUENZA SURVEILLANCE OVERVIEW 2013-2014 SEASON SUMMARY

Wendy Manuel, MPH and Christine Wigen, MD, MPH

BACKGROUND

Influenza (flu) causes significant morbidity and mortality each season. The Los Angeles County of Public Health (LACDPH) Acute Communicable Disease Control Program (ACDC) conducts year-round influenza surveillance assessing levels of disease for our population of over 10 million. The Centers for Disease Control and Prevention (CDC) estimates that each season, 5-20% of the population will get the flu, which translates to 500,000 to 2 million people in Los Angeles County (LAC). Previous studies have shown a difference in mortality burden by age group depending on the dominant circulating strain (1). In addition, strain type correlates with the severity of the season. Since each season is different, surveillance indicators track influenza activity using a variety of methods. This report summarizes influenza surveillance for the 2013-2014 season covering the time period from September 1, 2013-July 26, 2014.

METHODS

Due to the high proportion of the population that will get influenza each season, individual cases are not reportable (with the exception of new/novel strains of influenza which are reportable to ACDC immediately). Alternatively, influenza activity in the community is measured using weekly influenza test data reported from eight sentinel laboratories in LAC; a subset of these also report data for other respiratory viruses such as respiratory syncytial virus (RSV), rhinovirus/enterovirus, parainfluenza, human metapneumovirus, and coronavirus. Using these data, percent positive rates for influenza (and types A and B) and other respiratory viruses can be calculated. Strain type information is not included in these reports; however, a high volume regional reference laboratory reports individual cases with subtype information allowing LACDPH to determine the dominant subtype(s) in circulation.

In addition to aggregate rates of influenza in LAC, all influenza-associated deaths (IADs) are reportable within seven days of identification. Reports are submitted year round from the following sources: hospitals and healthcare providers, the LAC Coroner Office, and LACDPH Office of Health Assessment and Epidemiology death certificate analysis. A confirmed influenza death is defined by a positive laboratory test, compatible symptoms, and clear progression from illness to death. Acceptable laboratory confirmation tests include rapid antigen testing, polymerase chain reaction (PCR), direct-fluorescent antibody staining, or viral culture. Reporting of intensive care unit (ICU) cases of influenza is not required in LAC; however, hospitals may report these cases on a voluntary basis. The case definition of an ICU influenza case is hospitalization in the ICU for at least 24 hours and a positive laboratory test.

All respiratory outbreaks of influenza-like-illness (ILI) defined as fever of $\geq 100^{\circ}$ F and cough and/or sore throat are reportable to ACDC and are investigated by LACDPH Community Health Services within one business day. The definition of an outbreak differs by setting type.

- (1) Health care institutions (e.g., skilled nursing facilities): Two or more cases of ILI within a 72 hour period;
- (2) Non-healthcare institutions (e.g., prisons or university dormitories): Two or more cases of ILI within a 48-72 hour period; and
- (3) Congregate settings (e.g., schools): At least 10% of average daily attendance absent with ILI sustained over a three-day period, or five or more cases of ILI in an epidemiologically linked group (one classroom or sports team) sustained over 72 hours.

ACDC's Automated Disease Surveillance Section monitors initial self-reported symptoms from patients presenting to participating emergency departments (EDs) throughout LAC. These symptoms are



categorized into different clinical syndromes according to specific code words. The syndrome of ILI includes symptoms such as: fever, congestion, sneezing, sore throat, runny nose, and cough. The proportion of ILI ED visits for all ages and by age group is analyzed weekly, year-round. The ILI visits to EDs are also analyzed by zip code of residence and statistical algorithms are used to identify areas of the county that have significantly increased levels of ILI.

RESULTS

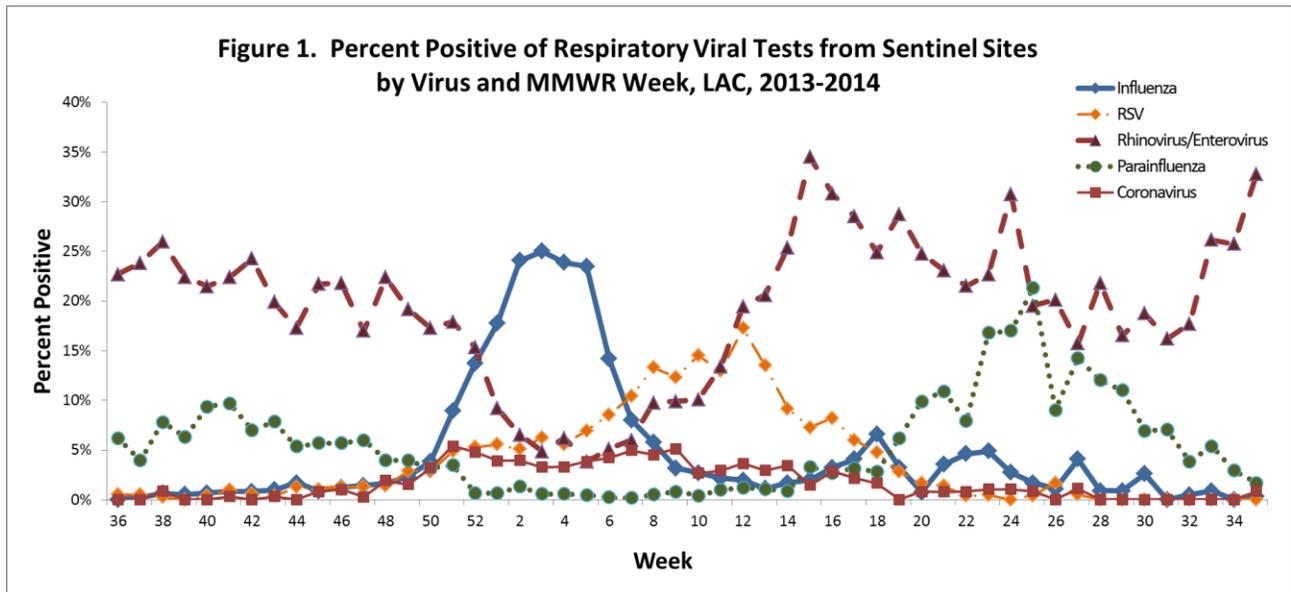
Sentinel Laboratory Data

Type A pandemic 2009 H1N1 (pH1N1) dominated the 2013-2014 influenza season, resulting in moderately severe activity. Sentinel site data shows influenza activity peaked in January and remained high through the beginning of February (Figure 1 and Table 1). While other respiratory virus activity was low during the influenza season, respiratory syncytial virus (RSV) and rhinovirus/enterovirus quickly rose as influenza started decreasing.

Table 1. LAC 2013-2014 Influenza Season Summary		
	Peak Week 4 1/19/14-1/25/14	2013-14 Season 9/1/13-7/26/14
Positive Flu Tests/Total Tests [†] (Percent Positive Flu Tests)	681/2,853 (23.9%)	3,953/41,032 (9.6%)
Percent Flu A/B	97/3	92/8
Community Respiratory Outbreaks	2	17
Influenza confirmed outbreaks ^{††}	0	2
Pediatric Flu Deaths	0	4
Adult Flu Deaths, confirmed	22	101
Total Flu Deaths	22	105

[†]Sentinel laboratories (9 participating)

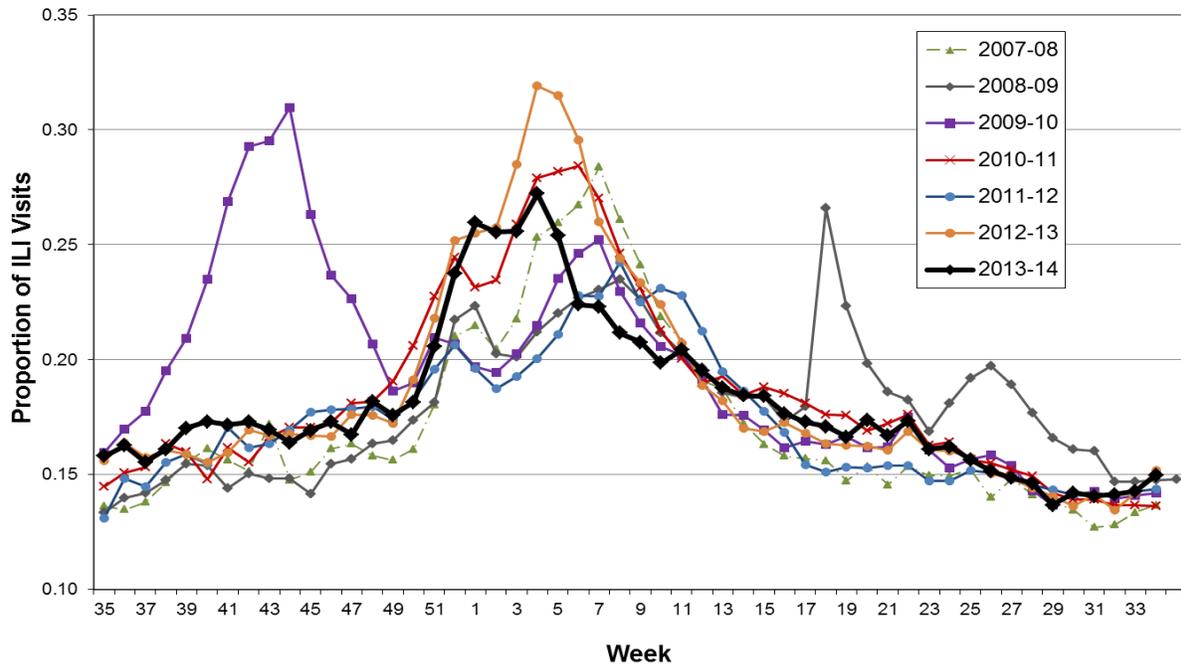
^{††}Associated with at least one positive influenza laboratory test





Syndromic ILI Data

Figure 2. Proportion of Respiratory Illness Emergency Department Visits in LAC, by MMWR Week, 2007-2014



Overall influenza activity reached peak levels during the last week of January where the highest proportion of visits to emergency departments for influenza-like-illness (ILI) was reported, the greatest number of flu tests from sentinel sites were performed, and the greatest number of influenza-associated deaths occurred (Table 1 and Figure 2).

Table 2. Demographic Characteristics of Influenza Fatalities, LAC, 2013-2014				
		N	% of Cases	% of LAC*
Age (years)	0-5	1	0.9	6.4
	6-17	3	2.8	23.2
	18-40	13	12.4	33.4
	41-64	59	56.2	31.5
	65+	30	28.5	11.9
Gender	Male	67	63.8	49.3
	Female	38	36.2	50.7
Race	Hispanic	48	45.7	48.3
	White Non-Hispanic	41	39.0	27.2
	Black	9	8.6	9.2
	Asian/Pacific Islander	7	6.7	14.6

*2013 US Census Data



ICU Cases and Fatalities

Thirty ICU hospitalized influenza cases were reported in LAC, and 22 of those were in persons younger than 65 years old. During the 2013-2014 influenza season, the highest numbers of IADs were reported since the 2009 pandemic. A total of 105 IADs were confirmed in LAC with the 18-64 years age group accounting for the majority (68.5%) of those (Table 2). The age of IADs ranged from 0-89 years with a median of 56 years. Both age groups 41-64 and 65+ years old were overrepresented among IADs compared to the population distribution of LAC. The top three underlying medical conditions associated with adult IADs were hypertension, being overweight or obese and heart disease. During this season, one influenza-associated death of a pregnant woman was reported.

Vaccination Status

Influenza vaccination status was unknown for the majority of IADs with the exception of the pediatric age group (Table 3). Only 7% of 18-64 years old IADs reported receiving a flu vaccination and 31% definitely did not get a vaccine for that season. Adult IADs 65 years and older reported a higher vaccination rate of 30% with only 13% reporting no vaccine. Of the two pediatric IADs who did not receive a flu vaccine, one was too young (<6 months) and the other was immunocompromised.

Figure 3. Geographic Distribution of Community Respiratory Outbreaks By SPA, LAC, 2013-2014

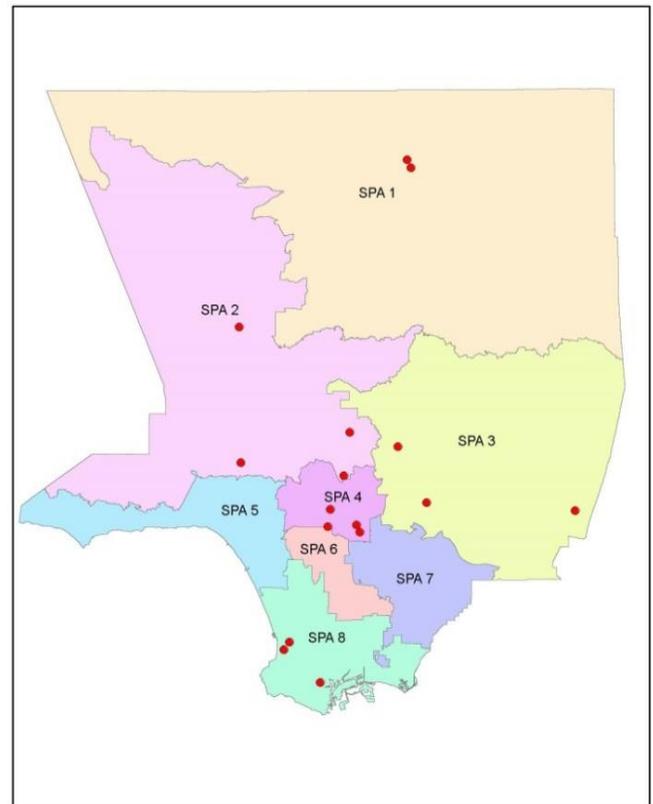


Table 3. Influenza Vaccination Status in Fatal Cases, LAC, 2013-2014

Age group (years)	Yes N(%)	No N(%)	Unk N(%)	Total
0-17	2 (50)	2 (50)	0	4
18-64	5 (7)	22 (31)	44 (62)	71
65+	9 (30)	4 (13)	17 (57)	30
Total	16 (15)	28 (27)	61 (58)	105

Outbreaks

Seventeen community respiratory disease outbreaks were confirmed with only two of those attributed to influenza confirmed by laboratory testing. The remaining fifteen respiratory disease outbreaks had no known etiology due to lack of specimen testing and subsequent laboratory confirmation of a specific pathogen. Consistent with previous seasons, the majority of outbreaks occurred in schools or assisted living residences and were evenly distributed throughout the county (Figure 3).

DISCUSSION/CONCLUSION

During the 2013-14 influenza season, pH1N1 caused the most morbidity and mortality since its initial emergence, despite circulating as a seasonal strain and being included in the vaccine each season since the pandemic. The disproportionate effect on younger adults is similar to what was seen during the 2009



pandemic when pH1N1 first appeared (2). During this past H1N1 dominant season, the 18-64 year old age group, which accounts for over 60% of the population in LAC, experienced a greater than expected proportion of IAD. In addition, the majority of reported ICU hospitalized influenza cases in LAC were in those younger than 65 years old. The majority of respiratory disease outbreaks were of unknown etiology due to the lack of laboratory data. Specimen collection during outbreak situations is challenging because the outbreak is sometimes over before DPH nurses can collect specimens and individuals or parents of children involved in outbreaks may decline specimen collection. All outbreaks occurred during flu season, therefore it is likely that a greater proportion were actually caused by influenza virus but lacked proper testing.

National data from the CDC report similar outcomes; pH1N1 predominated in the US overall along with an increase in influenza B activity later in the season. Overall activity peaked in late December, whereas activity in LAC peaked in the last week of January/first week of February, highlighting the benefit of local surveillance as national data do not always reflect community level conditions.

Vaccination data for the pediatric influenza associated deaths reinforces the importance of vaccinations for all close contacts of children who cannot be protected by vaccination because of young age or immunosuppression. Effective implementation of this “cocoon” strategy may have prevented transmission and the subsequent deaths.

LIMITATIONS

Since individual cases of influenza are not monitored, the surveillance systems in place are only representative of flu activity in LAC and are not inclusive. Despite requirements mandating reporting of influenza deaths and outbreaks, underreporting occurs, resulting in an underestimate of the mortality and morbidity associated with documented influenza. Moreover, influenza is rarely identified specifically through laboratory testing preceding death so the total of IADs significantly underestimates the total burden of influenza mortality. Studies estimating influenza-associated deaths based on seasonal differences in cardiac and respiratory deaths suggest that an average of about 30,000 excess deaths annually. In addition, a testing bias may exist for those <65 years old if younger individuals are more likely to be tested for influenza in hospitalized and fatal cases, whereas illness in older adults may be attributed to community acquired pneumonia and vigorous testing is less likely to be performed. Further studies are needed to explore this possible bias. Although there are limitations of assessing the true disease burden, the surveillance data are useful in comparing seasons as well as aiding in identifying new risk factors for severe influenza outcomes.

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RESOURCES

[Seasonal Influenza: Flu Basics](#) | [Seasonal Influenza \(Flu\)](#) | CDC





MONITORING WEST AFRICAN TRAVELERS FOR EBOLA VIRUS DISEASE IN LOS ANGELES COUNTY: A THREE-MONTH REVIEW

Alison Itano, MS, Curtis Croker, MPH, Michael Tormey, MPH, Moon Kim, MD, MPH

In September 2014, the diagnosis of a West African traveler with Ebola Virus Disease (EVD) in Dallas, Texas, and subsequent transmission to two of the traveler's healthcare workers, led to the implementation of a nationwide surveillance system to monitor all recent travelers from EVD-affected West African countries while in the United States (U.S.). The Ebola outbreak in West Africa had been going on for six months prior, but the U.S. case in a traveler and subsequent nosocomial transmission heightened concern leading to a recommendation for surveillance. In mid-October 2014, the Centers for Disease Control and Prevention (CDC) announced new restrictions on where travelers from Ebola affected countries (Guinea, Liberia, and Sierra Leone) could enter the U.S. and on the need for prospective monitoring. On October 21, the Los Angeles County Department of Public Health (LACDPH) was notified of their first traveler under this new system. A successful local collaboration between LACDPH Programs resulted in a symptom monitoring system for travelers from EVD affected countries. Additionally, the system allowed for real-time updates to be distributed to key staff. This document is a summary of the first three months of traveler monitoring in LAC.

METHODS

To assess traveler risk and to implement daily symptom monitoring, LACDPH developed an EVD Exposure Risk Assessment Form and the EVD Daily Symptom Monitoring Log based on guidance material from the CDC. Using CDC definitions, the risk of a traveler's EVD exposure was divided into four categories: No identifiable risk, Low, Some, and High risk (1). Information on new travelers came to LACDPH via the California Department of Public Health (CDPH) after screening by U.S. Customs and Border Protection and CDC. Upon notification, LACDPH personnel visited the traveler and completed an assessment form, evaluating their activities while in the affected country. Department personnel then started daily monitoring for fever ($\geq 99.5^{\circ}$ F) and other symptoms for 21 days (EVD incubation period) after the last exposure with an EVD patient or in an affected country. While fever is a hallmark symptom, the other symptoms associated with EVD are: severe headache, abdominal pain, diarrhea, vomiting, muscle pain, weakness or fatigue and unexplained hemorrhage (bleeding or bruising). During the monitoring period, a Public Health Nurse (PHN) contacted "Low" risk travelers by phone each day while "Some" risk travelers had a daily face-to-face interaction – either in-person or by video link. See the "Interim U.S. Guidance for Monitoring and Movement of Persons with Potential Ebola Virus Exposure" for more information (2). Any travelers reporting the above symptoms were assessed by subject matter experts in LACDPH and, if warranted, the traveler was transported for medical evaluation at a LAC-designated Ebola treatment facility to rule out an Ebola diagnosis. The initial paper-based protocol was merged into an electronic surveillance system which centralized the data and allowed for data queries. Data variables from this system were analyzed utilizing Microsoft Access and SAS[®]. For this report, only travelers monitored from October 21, 2014 to January 21, 2015 are included in the analysis.

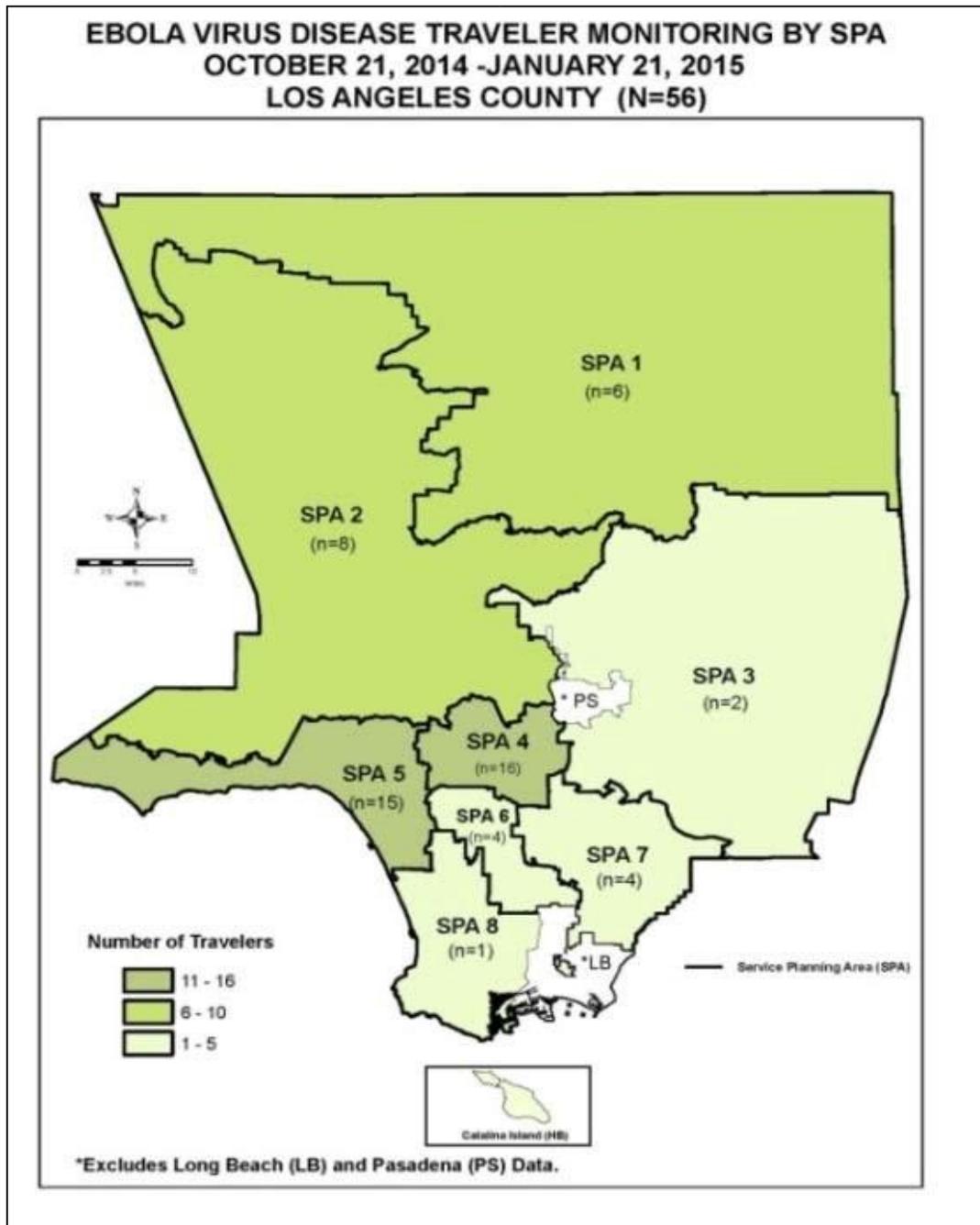
RESULTS

Sixty-three (63) travelers were reported to LACDPH which ultimately led to 56 individuals being monitored during the 3-month period. Seven individuals did not meet criteria for monitoring: three were in an affected area greater than 21 days prior and four had no evidence of arriving in Los Angeles. The monitored travelers were mostly male (63%) and had an average age of 39 years with a range from 2 to 65 years. Three of the travelers were less than five years old and one woman was pregnant. For these two groups, LACDPH pre-arranged availability of specialized care with a LAC-designated Ebola treatment facility pediatric intensive care, pediatric, or obstetric unit so staff would be available if they needed care.

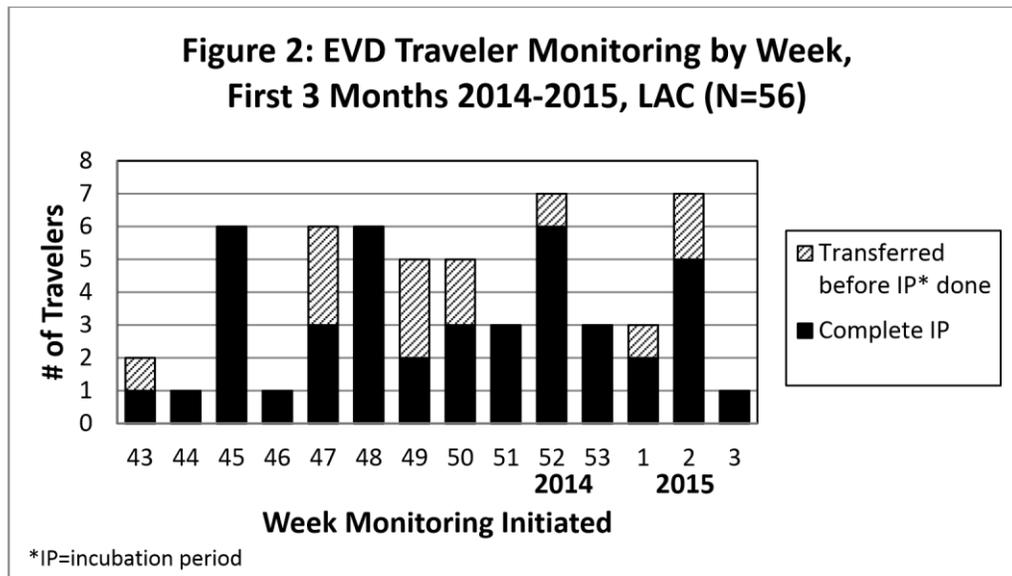


Persons traveling to LAC from Ebola affected countries resided throughout the County, however, Service Planning Areas (SPA) 4 and 5 monitored the most travelers, 29% and 27%, respectively (Figure 1).

Figure 1



LACDPH initiated monitoring for the first traveler on October 21, 2014. Travelers were added consistently through the study period (Figure 2). On average, four travelers arrived in LAC each week (range 1 to 7). Forty-three travelers (77%) completed their monitoring in LAC while the remaining 13 transferred out of the County before 21 days elapsed: either leaving the U.S. (7%) or transferring to another jurisdiction within the U.S. (16%). Overall, the average number of monitoring days per traveler was 16 (range 1 to 21 days).

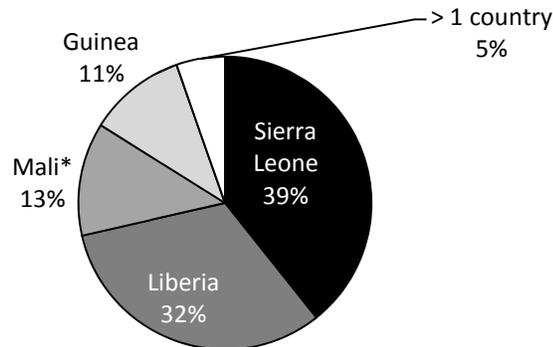


Ninety-five percent of the travelers were classified as having a “Low” risk exposure to EVD. Three healthcare workers with EVD patient exposure (direct contact with appropriate personal protective equipment) were classified as “Some” risk. Of the “Some” risk individuals, two were only monitored one day each before being transferred to another state and the third was monitored until the end of their incubation period.

Travelers predominately came from Sierra Leone (39%) and Liberia (32%) (Figure 3). Travelers also came from Mali, Guinea, or had been in multiple affected countries. Note that Mali was added to the affected country list for only a portion (51 days) of the three-month study period. The majority of the travelers were U.S. residents (64%); others were permanent residents of Sierra Leone (14%), Liberia (9%), or dual residents of the U.S. and Guinea (2%). As shown in Figure 4, 32% of the travelers indicated business as their reason for travel, 23% had permanent residence in the affected area, 18% cited Ebola response/humanitarian, 14% visiting family or vacation, 9% provided more than one reason, and for 4% the reason was not listed. During the three-month period, two travelers were monitored twice and counted twice; their occupation required repeated travel between the U.S. and the affected areas in West Africa.

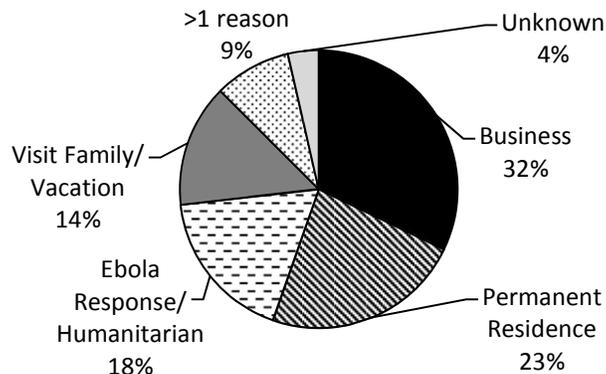


**Figure 3: EVD Travelers
Countries Visited**



* Travelers from Mali were monitored for a limited time (11/17/14 to 1/6/15).

**Figure 4: EVD Travelers
Reason for Travel**



Through three months of monitoring, none of the travelers developed EVD. Nine travelers (16%) reported having EVD-like symptoms and were closely followed by LACDPH. Of the 24 occurrences where **any** daily symptoms were noted, 57% reported severe headache, 22% weakness/fatigue, 13% vomiting, 9% diarrhea, 8% fever ($\geq 99.5^{\circ}$ F), 4% muscle pain, 4% abdominal pain, and 4% unexplained bleeding. The majority of daily symptom occurrences (67%) were reported by two individuals. Only one traveler reported fever (99.9 and 101.6° F) for two days. Most of the symptomatic travelers (77%) resolved their illness within two days. The median number of symptom-days per traveler was one with a range from 1 to 10 days.

There was one traveler requiring medical evaluation by a LAC-designated Ebola treatment facility. An adult male sporadically complained of fever, headache, and weakness/fatigue in 10 out of the 21 days of monitoring. He tested negative for Ebola but positive for malaria.

CONCLUSION

Building on existing surveillance systems, LACDPH Programs were able to quickly and efficiently implement an enhanced surveillance system with specific variables associated with our Ebola surveillance. As demonstrated, LADPH was able to detect symptomatic travelers and respond to those



who needed medical evaluation. EVD case management protocols and data systems were created to manage the travelers, control the flow of information, and rapidly communicate findings to key LACDPH staff in real-time. Consistent communication between LACDPH, our State and CDC partners was essential in adapting to a dynamic and potentially volatile situation with far-reaching public health implications. This experience provided valuable lessons which better prepares the Department to address potential emerging disease threats in the future.

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ASEPTIC MENINGITIS OUTBREAK ASSOCIATED WITH ECHOVIRUS 30 AMONG HIGH SCHOOL FOOTBALL PLAYERS LOS ANGELES COUNTY, CALIFORNIA 2014

Curtis Croker, MPH; Kathleen Keough, BS; Van Ngo, MPH;
Amy Marutani, MPH; and Rachel Civen, MD, MPH

BACKGROUND

On August 4, 2014 the Acute Communicable Disease Control Program (ACDC) of the Los Angeles County (LAC) Department of Public Health (DPH) received a report of three aseptic meningitis cases among football players from a high school. ACDC staff conducted an investigation to determine the extent of the outbreak, identify potential exposures, and ensure that control measures were implemented to prevent any additional cases.

METHODS

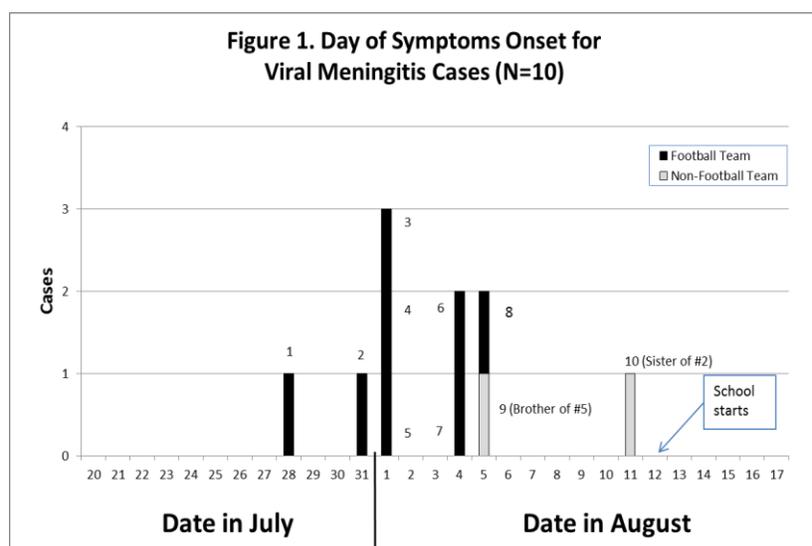
We defined an outbreak-associated aseptic meningitis case as an illness of any team or family member with onset between July 28 and August 11 with: 1) cerebrospinal fluid pleocytosis and negative bacterial culture or 2) an emergency department visit with headache, fever, and stiff neck. To identify additional cases on the team or among family members, letters were mailed by the school to team member's parents to request any ill family members with similar illness be reported. In addition, ACDC interviewed coaches, reviewed team absenteeism records as well as made calls to local hospitals to identify any additional cases.

To determine whether outbreak-associated cases occurred beyond the team and their family members, ACDC initiated active case finding by: 1) coordinating with the Los Angeles Unified School District's (LAUSD) school district's head nurse to survey other local schools, 2) contacting football coaches from schools that had interacted with the football team reporting the outbreak, and 3) reviewing recent cases of viral meningitis already reported to LAC DPH with symptom onsets occurring within one month of the last known outbreak-associated case. ACDC requested medical records for each suspect case. All cerebrospinal fluid (CSF) specimens were sent to the California Department of Public Health (CDPH) Viral and Rickettsial Disease Laboratory for enteroviral typing by PCR methodology.

ACDC conducted a site investigation to identify potential exposures and ensure that proper control measures were in place. ACDC toured the athletic facility and completed interviews with high school administrators, coaches, the LAUSD public health nurse, and janitorial staff. A roster of football players was obtained, detailing each player's position. ACDC continued to monitor for additional cases to ensure that the recommended control measures were effective.

RESULTS

Ten viral meningitis cases due to enterovirus infection occurred during the outbreak; three that were originally reported by the school district nurse and seven that were identified through active case finding (Figure 1). The first case had symptom onset on Monday, July 28, 2014 (#1), followed by a second wave of case





onsets at the end of the first week (#2-5). A third group of case onsets occurred at the beginning of the second week (#6-9), and last case occurred at the end of this week (#10, Friday). The incubation period for enteroviruses typically ranges from three to *ten days*.

Eight cases were football players and two were siblings of football players. Nine cases were male and one female, with ages ranging from 13 to 17 years. All ten patients visited an emergency department and five were hospitalized resulting in 12 total hospital days. No cases were identified in other teams played or other nearby schools. Eight cases tested polymerase chain reaction (PCR)-positive for enterovirus; echovirus 30 was identified in seven cases. One specimen could not be typed due to insufficient quantity.

Seven of eight cases were among junior varsity players (attack rate: 12.3%, 7/57), and one case was in a varsity player. The relative risk of aseptic meningitis was higher among linemen than non-linemen (relative risk = 5.4, $p=0.03$).

Site Visit Observations:

The field restroom was well stocked with soap and paper towels and appeared well maintained at time of inspection. However, one coach commented during the interview that the field restroom was often out of soap during the summer practice when the outbreak began. The restroom that was located in the locker room appeared clean, but the soap dispensers were empty. One coach stated that these locker rooms were closed in the summer months and the football players only used the field restroom. When the janitorial staff was asked about the report of lack of soap in the field restroom, they responded that students often steal the paper towels and soap and break the dispensers, making this restroom sometimes difficult to maintain. Cleaning logs for the field restroom were requested, but were very difficult to interpret; it was not clear how often the field restroom had been inspected or cleaned over the summer months at the beginning of the outbreak.

ACDC staff questioned athletic staff about water distribution to the team players during summer practice. One coach stated that players had consumed water from unlabeled plastic water bottles at the start of the outbreak. The coach was also aware that sharing water bottles during the time of the outbreak was common practice. If bottles were shared by groups playing a particular position, this may explain why linemen were more likely to become a case than non-linemen. These bottles were filled prior to the practice by other students, brought back to the athletics room after practice, and rinsed and refilled in a large sink for the next practice. No soap or disinfectant was used to clean water bottles. The coach stated they had stopped using these water bottles after the initial cases of meningitis occurred and are currently using other means of distributing water to the players.

The coach demonstrated two devices that they were currently using to distribute water to players. One was a metal tube that attaches to a garden hose and shoots water out of several holes so that multiple players can drink at once without mouth contact with the device. The other device consisted of a portable water tank and pump on a dolly that shoots out water for players to drink from a single spout. ACDC advised that both devices appeared sufficient to prevent potential transmission of illnesses as long as the players do not place their mouth on the tubing of the device while drinking. School administrators also reported notifying parents by e-mail of the recent cases of viral meningitis, advising parent that ill players should not come to practice and discouraging water bottles from being shared or passed among football players.

ACDC maintained active surveillance for one month after the last case to ensure that no further transmission occurred. All cases recovered without complications.

DISCUSSION

The environments in which athletes practice provide varied opportunities for the transmission of infectious organisms. A review of recently published outbreaks among competitive sports teams [1] identified Methicillin-resistant *Staphylococcus aureus* and herpes simplex virus skin infections as the most common reported outbreaks, with direct, person-to-person contact reported as the most common form of transmission. Appropriate documentation of such outbreaks is important so that sports medicine staff can recognize outbreaks quickly and take necessary control measures to contain further transmission. This



outbreak of viral meningitis appears to have been limited to only these high school football players and the player's siblings. Fortunately, this outbreak was contained and ended before the start of the school year. This investigation identified various factors that likely contributed to the spread of enterovirus among the football players. These factors include the sharing of improperly cleaned water bottles among players and possible lapses in field restroom maintenance during the outbreak period. How often water bottles are shared among high school sports team players is unknown and should be further explored. Sports team coaches should be educated to strongly discourage this practice among athletes.

The pathogen identified in this outbreak, echovirus-30, comprised 4.5% of all non-polio enterovirus serotypes reported from 2006 through 2008 in the United States [2]. Echovirus-30 has been associated with several community-wide outbreaks of viral meningitis in Europe [3-5]. Other echovirus types such as 5, 9, 16, 24 have also been associated with aseptic meningitis outbreaks in football teams [6]. This appears to be the first documented echovirus-30 aseptic meningitis outbreak in the United States occurring among members of a sports team. A summary of these investigational findings were published in the January 30th, 2015 issue of the *Morbidity and Mortality Weekly Report Notes from the Field* [7].

CONCLUSION

ACDC determined the most likely route of transmission for the virus involved in this outbreak was improperly cleaned water bottles shared among team players during practice. Lapses in field restroom maintenance leading to poor hand hygiene among players may have also contributed to the fecal-oral transmission of the virus on the team. School staff were proactive at implementing effective control measures prior to ACDC intervention. ACDC provided education to the school staff to ensure the proper control measures were in place and completed surveillance to determine the extent of the outbreak. ACDC advised the school administration to discourage shared water bottles among students and ensure that team players have access to clean and well stocked restrooms to avoid future outbreaks.

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HEPATITIS B OUTBREAK AT A SUBACUTE CARE AND SKILLED NURSING FACILITY

Christine Selzer, MPH; Susan Hathaway, PHN, MPH; and Christine Wigen, MD, MPH

BACKGROUND

On March 3, 2014, Acute Communicable Disease Control Program (ACDC) of the Los Angeles County (LAC) Department of Public Health (DPH) was notified of a single resident in the Sub-Acute Unit (SAU) of a skilled nursing facility (SNF, Facility A), who was hospitalized and tested positive for hepatitis B surface antigen (HBsAg) and IgM antibody to hepatitis B core antigen (IgM anti-HBc), consistent with acute hepatitis B infection. On March 7, 2014, the SAU of Facility A reported an additional hospitalized resident with acute hepatitis B. An investigation was begun to determine the source of the outbreak, identify other cases and control potential spread of the disease.

CONTEXT

Facility A has a total of 181 beds, of which 53 are in the SAU, 42 are in the mental health locked unit and 86 are in the open SNF. The SAU has long-term care residents with tracheostomies, gastrostomy tubes, and some on ventilators. There is one full-time physician and one pulmonologist. The total nursing staff of the SAU was reported as 73, including ten registered nurses (RNs), 39 licensed vocational nurses (LVNs), and 24 certified nursing assistants. There are also 29 respiratory therapists employed at the facility. The RNs administer intravenous (IV) infusions and IV medications and the LVNs administer oral medication and injections, fingersticks, blood glucose testing and insulin injections. It was reported that an outside podiatrist came to the facility every six weeks and a dentist visited monthly. Two outside wound care consultants also visited the facility on a weekly basis.

INVESTIGATION

Case Definitions

A case of incident Hepatitis B virus (HBV) infection was defined as any Facility A (SAU or SNF) resident, with or without symptoms of infection, who fell into one of two categories between June 1, 2013 and March 31, 2014¹:

1. Acute infection (positive for both HBsAg and IgM anti-HBc)
2. Resolving acute infection (positive for total hepatitis B core antibody (anti-HBc) and IgM anti-HBc and negative for HBsAg).

A case of chronic HBV infection was defined as any facility resident who tested positive for HBsAg and total anti-HBc and negative for IgM anti-HBc and anti-HBs. Individuals were considered immune if there was serologic evidence of past resolved infection (positive for anti-HBs and total-anti-HBc and negative for IgM anti-HBc and HBsAg) or vaccination [positive for hepatitis B surface antibody (anti-HBs) only]. Susceptible individuals were defined as those residents who tested negative for all markers of HBV infection.

Hepatitis B Case Finding

A total of 9 cases were identified: two chronic cases, four acute cases, and three resolving infections at the time of testing. In addition to the first two cases reported to ACDC that initiated this investigation, a third case was hospitalized on March 12, 2014 and found to have acute HBV.

To find possible sources of the infection and additional reported HBV cases within or outside of LAC, the names of residents who were housed at Facility A between June 1, 2013 and March 31, 2014 were entered in the LAC DPH hepatitis registry and also sent to California Department of Public Health (CDPH). Two previously reported residents were identified: the first was reported to CDPH in 1999; blood tests done in

¹ Time period used to capture any exposed case within the incubation period for acute hepatitis B which is 6 weeks to 6 months. <http://www.cdc.gov/hepatitis/HBV/>



January 2014 indicated the resident was HBsAg positive. A second resident was reported to CDPH in 2012; blood tests done in March 2014 indicated that the resident was HBsAg positive. Both chronic cases still resided at the facility and may have been potential sources of the outbreak.

All SAU and SNF Unit patients underwent hepatitis serology testing and were offered HIV testing in order to detect any additional cases and to determine if the exposure had extended beyond the SAU. 157 residents underwent testing during March and April of 2014. The remaining four cases were found through this process. One acute case (A4) and three resolving cases (R1-3) were identified, including one that was a resident of the SNF (R3). One chronic case had passed away before the time of testing, however, he is included in the total numbers. The serologic status of SNF and SAU residents is displayed in Table 3.

Table 3. HBV Serologic status of SNF and SAU residents

HBV infection status	SAU (n=56) (%)	SNF (n=102) (%)	Total, (N=158) (%)
Susceptible	35 (63)	87 (85)	122 (77)
Immune	13 (23)	14 (14)	27 (17)
Chronic	2 (4)*	0	2 (1)
Acute	4 (7)	0	4 (3)
Resolving	2 (4)	1(1)	3 (2)

*Includes chronic case identified through registry search and not through testing

Case Characterization

ACDC reviewed medical records and room location histories of the nine acute, resolving and chronic cases. Data abstracted included demographic information, past medical history including prior hospitalizations, medical procedures, dates of blood draws, dental and podiatry visits, medications and serology and other laboratory data.

There were two chronic cases, one male and one female, 57 and 62 years old, respectively. There were four acute cases that were aged 50-77 years; three were male and one was female. Lastly, there were three cases who had resolving infections at the time of testing, two males and one female aged 35-73 years. All cases resided in the SAU. One of the resolving cases resided in the SAU until the end of August of 2013, and then was transferred to the open SNF unit (R3). Five of the cases (C1 and C2, A2 and A3, R2) were hospitalized for various reasons during the period of June 2013 through March 2014. Three of the cases were hospitalized for acute hepatitis (A1-3), one of whom died (A2). In February 2014, one chronic case (C1) died of causes unrelated to hepatitis (Table 1).

Table 1. Characteristics of residents identified with chronic, acute and resolving HBV infection

Resident	Age, years	Sex	Month of admission	Serologic status	Detection of infection	Month detected
C1	57	M	6/2013	Chronic	Hepatitis Registry	8/1999
C2	62	F	8/2012	Chronic	Hepatitis Registry, Screening	12/2012
A1	50	M	5/2013	Acute	Elevated LFTs	2/2014
A2	73	M	3/2013	Acute	Elevated LFTs	2/2014
A3	59	F	6/2013	Acute	Jaundice, elevated LFTs	3/2014
A4	77	M	4/2013	Acute	Screening	3/2014
R1	47	F	7/2012	Resolving	Screening	3/2014
R2	35	M	8/2013	Resolving	Screening	3/2014
R3	73	M	12/2012	Resolving	Screening	3/2014



Common procedures between the chronic cases (possible source cases) and the probable outbreak-associated cases were reviewed during the exposure period from June 1, 2013 through March 31, 2014. Both chronic cases, three acute and two resolving cases (n=7) received daily subcutaneous medications (SQ). One chronic, two acute and one resolving case (n=4) had regular fingersticks (either weekly or daily). The same distribution (n=4) had blood drawn during the incubation period and of the six cases that had dental work, two were chronic, one was acute and three were resolving. All nine cases had IV medications administered and all had podiatry visits during their stays. The podiatry procedures were done bedside, at the facility, and seven of the nine cases had appointments on the same day on two separate occasions. On a third occasion, eight of the nine cases had an appointment on the same day. See Table 2 for further clarification of exposures.

Table 2. Exposure by Serologic Status

Resident	Subcutaneous Medication	Fingersticks	Blood Draws	Dental Work	IV medications	Podiatry
C1	X			X	X	X
C2	X	X	X	X	X	X
A1					X	X
A2	X				X	X
A3	X	X	X		X	X
A4	X	X	X	X	X	X
R1	X		X	X	X	X
R2	X			X	X	X
R3		X		X	X	X

During medical record abstractions, room locations were recorded to cross match with already existing information. The room locations for each case were then recorded on the facility map to indicate their location during a specific period of time. Residents moved frequently, and cases were in the same room or in nearby rooms on several occasions. Residents were visited by dental, podiatry and wound care consultants but were seen based on the resident's convenience and availability rather than in order by resident location or rooms. Linking room information to procedure was difficult because documentation of the visits by any consultant was limited.

Facility A Site Visits

Site investigations were conducted throughout the outbreak to gather additional information regarding potential exposures and infection control practices within Facility A.

On March 10, 2014 ACDC staff conducted a first site visit to Facility A and on March 27, 2014, a second site visit was conducted jointly with Health Facilities Inspection Division (HFID). The site visits were conducted to perform chart abstraction of the nine cases, to interview facility administrators and nurses and to observe procedures and cleanliness within the facility.

Overall, the appearance of the facility was neat and clean. Soap dispensers and sharps containers were located in each resident room. Personal protective equipment are available for staff use. A medication room was used for storage and refrigeration of unopened medications. Individual medications, glucometers and single use lancets were stored in locked medication carts located in hallways. Narcotics were double locked. IV medications were prepared individually at an outside pharmacy. PDI® Sani-Cloth® Plus Wipes were used to wipe down the cart before medication preparation. ACDC staff observed the SAU staff perform fingersticks for glucose monitoring and insulin injection. It was noted each individual has their own glucometer. ACDC/HFID observed gastronomy tube (GT) feeding procedures, respiratory therapy procedures, IV medication procedures and housekeeping procedures within the SAU. ACDC also conducted chart reviews. Copies of facility maps, policies, and logs for staff trainings were obtained. The staff received monthly infection control training including blood glucose monitoring using videos. They



received injection safety training every six months and the facility contracts with an infection control consultant.

During the site visits, the following infection control discrepancies were observed by ACDC and HFID investigators.

1. Sharps containers mounted above eye level not allowing for safe visualization.
2. Not allowing five minutes of contact time after using Sani-Cloth® wipes for cart disinfection before medication preparation.
3. Discrepancies in mixing cleaning solutions for housekeeping and mixing of clean and dirty laundry.²

Podiatry and Dental Consultant Observations

On March 28, 2014, ACDC Program staff observed podiatry procedures performed by Podiatrist X and his two assistants at Facility A. A free-standing, mobile cart was used to transport Clorox® wipes, a stainless steel box containing disinfection solution (Metricide™ OPA Plus), toe nippers (three in the box soaking in the solution) and 1-2 other nail nippers in sealed plastic packaging on the cart surface. Nail nippers are supplied by the podiatrist specifically for these procedures and are sanitized and re-used. The nail nippers had a colored mark on the handle which helped to determine how the nippers were cycled through for use when seeing patients. The assistant was responsible for ensuring a clean area and cleaning and returning the nippers to the disinfection solution after each procedure. Each patient visit consisted of nail clipping which took on average about three to five minutes. The mobile cart was taken inside the room to the bedside for every patient.

During observation of Podiatrist X and his assistants, the following infection control breaches were observed by ACDC.

1. Disinfection of podiatric instruments: There was no open date on the Metricide™ OPA Plus solution. There was no date on disinfection boxes indicating when solution had been placed in box. Solution is only viable for 14 days after being placed in disinfection tray. A log was not provided indicating daily testing of disinfection solution. For nail nippers used on patients, a thorough cleaning, rinsing with water and drying was not done prior to soaking in disinfection solution (simply cleaned with a Clorox® wipe). Instruments were not disinfected in the solution for the duration recommended by the manufacturer. Upon removal from the disinfection solution, each nipper was not rinsed and dried before reusing on patients.
2. Environmental cleaning: Clorox® household disinfection wipes were used to wipe down surfaces. Clorox® wipes are not effective against hepatitis B or hepatitis C.³

On April 10, 2014 ACDC Program staff observed dental procedures performed by Dentist X and his assistant at Facility A. Dental procedures were performed by the dentist and a dental assistant at the bedside using a portable cart. All procedures by the dentist and cleaning of the dental system and surrounding areas by the assistant were observed. Environmental surfaces and dental system were cleaned with CaviCide® and allowed the proper duration for disinfection. Waste was disposed of properly and reusable dental instruments were placed in a designated container in the bottom drawer of the portable cart for transport to the office for disinfection. No infection control breaches were observed.

Residents were not seen in any particular order by either the podiatry or dental consultant. Visits were conducted when convenient for the residents.

Interviews of Wound Care Consultants

Telephone interviews were conducted with two wound care consultants who delivered care to residents at Facility A during the exposure period. ACDC staff were unable to observe these consultants providing care

² This discrepancy was identified by HFID was addressed in recommendations separately provided to Facility A and were not provided by ACDC.

³ Chlorox Disinfecting wipes at <http://www.Cloroxprofessional.com/products/Clorox-disinfecting-wipes/efficacy-claims/>



at Facility A. As of April 2, 2014 these consultants were no longer contracted to provide services at the facility.

Wound Doctor A was interviewed on April 14, 2014 and Wound Doctor B was interviewed on April 24, 2014. Both reported they visited the facility once a week and utilized single-use disposable curettes and/or scalpels in the treatment of residents requiring wound care. No instruments requiring sterilization were utilized.

Anonymous Staff Survey

An anonymous survey was distributed to all the SAU staff at Facility A to better characterize their infection control practices and perceptions. Staff were asked about receiving hepatitis B vaccine and various questions relating to infection control safety. Unfortunately, the response rate was low; a total of 20 out of 102 (20%) SAU staff members returned the survey.

Ninety percent of respondents reported receiving hepatitis B vaccine, 44% of which reported receiving three or more doses of the vaccine. Only one person reported observing another staff member perform fingersticks without changing gloves between residents. Otherwise no other breaches were mentioned. All respondents reported feeling that they had received adequate infection control and injection safety training. All respondents were able to identify at least one major aspect of standard precautions.

Review of Infection Control Policies/Procedures and Logs

Policies/procedures, training and maintenance logs were reviewed by ACDC for the podiatrist, dentist and Facility A. While there was current information on autoclave operations, disinfection, and autoclave maintenance logs at the podiatry consultant's office, logs for each run of the autoclave and daily testing of disinfection solution were not available. All infection control policies, procedures and training logs for the dentist and Facility A were current and appropriate.

Genotyping

Blood samples of eight residents (four acute cases, one chronic case and three resolving infections) were obtained by LAC DPH and sent to the Centers for Disease Prevention and Control (CDC) in Atlanta, GA for genotype testing to determine if the infections were related. A sample from C1 was not collected due to his death prior to collection. The tests revealed that five newly diagnosed hepatitis B cases had identical genotypes, suggesting transmission of the same virus among the cases through a common medical procedure. Hepatitis B genotyping could not be performed for three of the residents because there was no virus remaining in the sample. The hepatitis B genotype test results are listed in Table 4.

Table 4. Hepatitis B Genotype Test Results

Resident	Age, years	Sex	Serologic status	HBV genotype
C1	57	M	Chronic	Unknown
C2	62	F	Chronic	C2
A1	50	M	Acute	C2
A2	73	M	Acute	C2
A3	59	F	Acute	C2
A4	77	M	Acute	C2
R1	47	F	Resolving	Unknown
R2	35	M	Resolving	Unknown
R3	73	M	Resolving	Unknown



Hepatitis B vaccinations were recommended for the 35 susceptible individuals within the SAU, and all were vaccinated. Because there was no evidence of hepatitis B transmission occurring within the SNF, hepatitis B vaccination of those residents was left to the discretion of the facility. Surveillance involving a second round of blood testing after vaccination to check for continued transmission was recommended. Vaccination and testing were done on residents that gave consent. Of the 35 individuals, 18 got a vaccination and subsequent screen, 7 had already been discharged, 4 refused, and 4 expired (not HBV related). No new infections have been detected to date.

LIMITATIONS

Medical records at Facility A were incomplete with missing notes for consultation visits, months of progress notes and medication distribution notes. Multiple exposures were possible for each case and many were overlapping. Consultant visits often occurred by convenience and records of the order in which patients were seen were not kept. This restricted ACDC's ability to determine if a chronic case had a procedure before an outbreak associated case. After consultation with CDC, it was determined that a case-control study would not have been likely to provide further clarity regarding risk factors for infection. ACDC was unable to observe the wound care consultants because they were not available or no longer seeing patients at the facility. Lastly, blood sample genotyping was not complete because one chronic case (C1) died before a sample could be taken. The living chronic case (C2) had the same genotype as the acute cases, but because a blood sample could not be taken from C1, it could not be determined if that was the original case, if it came from C2, or another source. Lastly, the usefulness of the staff survey is limited because of the low response rate, and the responses should be interpreted with caution.

CONCLUSIONS AND RECOMMENDATIONS

Transmission of HBV occurs due to practices involving percutaneous or mucosal contact with blood or other body fluids.⁴ Also, the virus is stable enough to live on certain environmental surfaces for up to seven days unless properly disinfected. During this investigation, four acute, three resolving, and two chronic cases of hepatitis B were identified. Testing at the CDC revealed that five infections (four acute and resolving; one chronic) were linked, implicating transmission of hepatitis B from either one or both of the chronic cases to the acute/resolving cases; spread may have been due to a common medical procedure. Due to the number of overlapping exposures and missing data, it was not possible to implicate a specific procedure associated with the transmission of hepatitis B at Facility A.

Given the extensive literature documenting transmission of hepatitis B in long term care facilities, recommendations to Facility A were made as follows.

- Ensure mounted sharps boxes are lowered to a safe height.
- Ensure that all consulting agencies that provide contract services with Facility A have written infection control policies and procedures that include:
 - prevention of patient exposure to bloodborne pathogens,
 - injection safety to prevent transmission of disease to patients, and
 - disinfection and sterilization of reusable equipment.
- Consider implementation of a hepatitis B vaccination policy to protect at-risk residents who are new to the facility.
- Report to ACDC any resident that has symptoms of hepatitis (i.e., yellowing of the eyes, nausea, vomiting, abdominal pain) in the next six months which may represent a newly acquired hepatitis infection.
- Improve record-keeping of procedures so that exposures can be identified from medical record reviews.

The investigation team recommended to Facility A to consider including in their infection control policies information from the following references:

- Evidence-based infection prevention guidelines for healthcare settings including those for disinfection sterilization, environmental cleaning, and hand hygiene available at:

⁴ "Hepatitis B FAQs for Health Professionals." <http://www.cdc.gov/hepatitis/HBV/HBVfaq.htm#b1>



- <http://www.cdc.gov/hicpac/pubs.html>.
- Injection safety resources available at:
<http://www.cdc.gov/injectionsafety/providers.html>
<http://www.oneandonlycampaign.org/>

Additional recommendations were made to the podiatrist consultant as follows:

- Appropriately disinfect and reprocess used equipment. Nail nippers that are used for wound debridement and any nippers that are contaminated with blood or other bodily fluids should receive cleaning and high level disinfection with a Food and Drug Administration-cleared chemical disinfectant according to both the instrument reprocessing instructions and the disinfectant label instructions before use on subsequent patients. Instruments should not be put in the disinfectant tray and reused without completing each step according to the CDC guidelines.
- Follow instructions for Metricide™ OPA Plus Solution, including using test strips and logging data, along with direction for labeling the open bottle and storage time parameters.
- Any reusable podiatric instruments that are both heat-stable and have the potential to break intact skin during ordinary use (e.g., nippers, forceps, splitters, curettes) should ideally be sterilized using steam, rather than using chemical disinfectants for the terminal reprocessing step. Autoclave maintenance logs and sterilization records should be maintained for proper infection control management.
- Disinfect environmental surfaces with Environmental Protection Agency-registered disinfectants that have been specifically designated for use in healthcare and as indicated on the label. Unused supplies and medications should be maintained in clean areas separate from used supplies and equipment.





MIDDLE EAST RESPIRATORY SYNDROME (MERS) RESPONSE, LOS ANGELES COUNTY DEPARTMENT OF PUBLIC HEALTH

Christine Wigen, MD, MPH and Wendy Manuel, MPH

BACKGROUND

Middle East Respiratory Syndrome (MERS) is a viral respiratory illness caused by a novel coronavirus called the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) that first emerged in the Middle East in September 2012. While the full spectrum of illness is still unknown, cases in the Middle East resulted in severe lower respiratory symptoms along with a high case fatality rate. On March 8, 2013, the Centers for Disease Control and Prevention (CDC) issued a health advisory providing information and guidance to health care professionals detailing that persons returning from the Arabian Peninsula and neighboring countries who developed severe acute lower respiratory illness within ten days of travel should be evaluated for MERS-CoV infection.

In May 2014, two cases of travel-associated imported MERS were discovered in the United States (U.S.). The cases were identified in Indiana and Florida and were unrelated. Both cases were male healthcare providers who lived and worked in Saudi Arabia. Both were hospitalized in the U.S. and recovered with no secondary infections reported. Local transmission of the disease in the U.S. has not been documented and person-to-person transmission is thought to be low (1).

As of January 20, 2015, the World Health Organization reported 955 worldwide laboratory-confirmed cases of MERS, including 351 related deaths (2). All infections have originated in or near the Arabian Peninsula (3). Infection has been found in healthcare workers in the Middle East who have treated MERS patients and lapses in infection control procedures have been documented (4). The source of the virus is still unknown, however, several studies have implicated camels as a likely animal reservoir (5, 6).

METHODS

Beginning in the summer of 2013, the Los Angeles County Department of Public Health (LACDPH) began receiving calls from local emergency departments (ED) that suspected MERS in patients with an international travel history presenting with respiratory symptoms. In response, LACDPH distributed announcements to hospitals, infectious disease and ED physicians, requesting them to monitor and report patients with acute respiratory disease syndrome or pneumonia and recent travel to the Arabian Peninsula. Additional investigation forms and materials were developed based on CDC guidelines to screen for suspected cases of MERS.

At the start of the outbreak in the Middle East, much was unknown about the virus and clinical course of the disease, therefore the case definition for patients under investigation (PUI) continued to change as more epidemiology surrounding cases was discovered. The initial PUI case definition was a person with an acute respiratory infection with pulmonary parenchymal disease and a history of travel from the Arabian Peninsula or neighboring countries within 14 days of onset. Over time the case definition expanded to include those who had been in a healthcare facility in one of the Middle Eastern countries where healthcare-associated cases of MERS had previously been identified. Healthcare providers who encountered patients with suspected MERS-CoV infection called into the Acute Communicable Disease Control Program (ACDC) to discuss clinical symptoms and an ACDC physician would assess whether the patient met the criteria for a PUI. If criteria were met, the healthcare provider was asked to complete a PUI form, collect the recommended specimens for MERS-CoV testing, and was given guidance on infection control recommendations.

In addition to routine MERS calls, the discovery of the two imported U.S. cases from Indiana and Florida required public health agencies across the country to mobilize immediately to limit or prevent local MERS-CoV transmission. The CDC conducted investigations to identify contacts of the two cases which resulted



in a list of travel conveyance contacts, 16 of whom were LAC residents who were passengers on shared flights with the second confirmed case from Florida. LACDPH responded by calling all conveyance contacts to conduct an interview to assess their exposure to the case and if they were experiencing any respiratory symptoms. In addition, passengers were asked for a voluntary serum sample for serologic testing for MERS-CoV infection at the CDC. At least three attempts were made to contact these individuals before classifying them as lost-to-follow-up.

RESULTS

From June 2013 to January 2015, LACDPH has investigated ten suspected cases of MERS (Table 1). All ten suspect cases tested negative for MERS at CDPH or PHL.

Suspected Case#	Age	Gender	Travel History	MERS-CoV rRT-PCR Results
1	65	F	Abu Dhabi (UAE)	Negative
2	19	M	Dubai (UAE), Sudan, Istanbul	Negative
3	59	F	Israel	Negative
4	71	F	Israel	Negative
5	66	F	Saudi Arabia	Negative
6	70	F	Saudi Arabia	Negative
7	84	M	Israel	Negative
8	25	M	Dubai (UAE)	Negative
9	22	F	Iran	Negative
10	20	M	Saudi Arabia	Negative

As part of the contact investigation related to the second imported U.S. case, interviews were obtained for 12 out of the 16 LAC conveyance contacts identified (Table 2). Of those 12, ten consented to serology testing and two declined. All ten tested negative for MERS-CoV antibodies. The remaining four contacts were lost-to-follow-up). None of the contacts interviewed reported any respiratory symptoms.

By Outcome	N
Obtained interview and serology	10
Interview but declined serology	2
Lost to follow up	4
Total	16

In response to the emerging situation in the Middle East, LACDPH proactively developed educational and informative messages to share with healthcare providers to keep them up-to-date on the local situation and



who they should contact if they encountered a patient with suspected MERS-CoV infection. Plans and case report and investigation forms were generated to prepare if a case was identified in LAC. In addition, educational materials for the public and healthcare providers were developed and posted on the LACDPH website (<http://publichealth.lacounty.gov/acd/MERS.htm>).

- LACDPH MERS website
- MERS FAQ sheet
- Guidelines for Healthcare providers and travel alert flyer

DISCUSSION AND CONCLUSION

The Los Angeles International airport is the sixth busiest airport worldwide and third in the U.S. and served 66.7 million passengers in 2013. Thus, LAC needs to be prepared to detect and respond to emerging infectious diseases. While person-to-person transmission of MERS-CoV is thought to be low, LACDPH prepared for a case in a person traveling to or through LAC and to the possibility of local spread. The conveyance contact investigation that resulted from the two imported cases of MERS identified in Indiana and Florida highlighted the ability of an emerging infectious disease to potentially spread quickly across the U.S. During the SARS outbreak, disease rapidly spread across the globe and LACDPH investigated 22 potential cases, ultimately identifying zero cases. Unlike transmission of SARS, MERS-CoV does not spread easily from person-to-person which helped prevent transmission in the U.S.

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RESOURCES

[CDC-MERS-About MERS](#)

[LAX - General Description](#)





NOROVIRUS OUTBREAK WITH AN ASSOCIATED DEATH

Marifi Pulido, PhD, MPH and Roshan Reporter, MD, MPH

BACKGROUND

Infection with norovirus often leads to acute gastroenteritis with the primary symptoms being diarrhea and vomiting. Norovirus has a human reservoir and can be found in the stool or vomitus of infected individuals.¹ Transmission occurs from ingestion of the virus, either by direct person-to-person contact, or via food or fomite contamination. Cooking kills the virus and foodborne outbreaks of norovirus are usually linked to a cold food item or ice. Norovirus outbreaks follow seasonal trends, being more frequent in winter months than in summer.

On Thursday, July 10, 2014, the Los Angeles County Department of Public Health (LAC-DPH) Environmental Health Services (EHS), Wholesale Food and Safety (WFS) received a telephone call from an LAC business (Company A) to report employees experiencing symptoms of diarrhea, vomiting, headaches, and body aches after eating at an office luncheon on Monday, July 7, 2014. The event was catered by an LAC restaurant (Restaurant A). The Acute Communicable Disease Control Program (ACDC) initiated an outbreak investigation to determine the extent of the outbreak, risk factors for the disease, and steps needed to prevent further spread.

METHODS

During the intake interview WFS requested a menu and contact information for all attendees. WFS conducted an inspection of Restaurant A on Friday, July 11, 2014, and a re-inspection on July 14, 2014. ACDC created a standardized illness and food history questionnaire which was used to interview persons eating food from the office luncheon. ACDC requested stool specimens from ill Company A employees and LAC-DPH Community Health Services (CHS) requested stool specimens from Restaurant A employees who had contact with the food delivered to Company A on Monday, July 7. These specimens were tested for norovirus, *Salmonella*, and *Shigella* at the LAC-DPH Public Health Laboratory. In order to find additional cases, ACDC requested the invoices for Restaurant A catering orders delivered Sunday, July 6th through Tuesday, July 8th. The contact persons on the invoices were telephoned to determine if anyone became ill after eating the catered food.

An outbreak-associated case was defined as: 1) a person who ate food from the July 7th luncheon and had a positive laboratory test result for norovirus, or 2) a person who ate food from the July 7th luncheon and became ill with diarrhea and vomiting, or 3) a person who ate food from the July 7th luncheon and became ill with diarrhea or vomiting with at least two of the following symptoms: dizziness, nausea, stomach cramps, fatigue, headache, body aches, chills, or fever. An outbreak-associated control was defined as a person who ate food from the July 7th luncheon but did not become ill.

ACDC entered case and control data in Microsoft® Access®. ACDC calculated frequency and distribution of symptoms among cases. A case-control analysis of food items consumed was also performed. All analyses were conducted using SAS® 9.2 analysis software and Microsoft® Excel®.

RESULTS

Setting

On Monday, July 7th, Company A provided food for 20 employees attending a lunchtime meeting. The lunch was catered by Restaurant A. Food items included soup, fish, chicken, vegetables, three types of salad, cut fruit, various desserts, and iced tea. The leftover food was put in a common area and made available to other Company A employees. Company A provided a list of employees who attended the July 7th meeting, persons who ate leftovers from the meeting, and persons who claimed they were ill but did not attend the



meeting or eat the food. Company A arranged for ACDC staff to interview the employees at the work site on Monday, July 14, 2014. ACDC interviewed 31 Company A employees. Twenty-six ill persons were identified; 17 met the case definition (including one who was not interviewed but had a positive norovirus laboratory test). Ten ill persons did not meet the case definition and were excluded from the analysis. Five controls were identified.

Cases

No Company A employees reported illness with gastroenteritis symptoms prior to July 7th. The average age of cases was 40 years, with ages ranging from 27 to 60 years (Table 1). Cases were both male (59%) and female (41%). Symptoms of cases included fatigue (100%), nausea (94%), body aches (94%), vomiting (75%), headache (75%), and diarrhea (69%) (Table 2). Illness onsets occurred on July 8th and July 9th (Figure 1). The median incubation period was 39 hours (range: 24-51 hours). The median duration of symptoms was 48 hours (range: 9 to 96 hours). Three of the four stool samples submitted by cases tested positive for norovirus. Two of the cases with positive laboratory results experienced milder symptoms (i.e., no diarrhea or vomiting). One employee died after leaving work early July 9th. His specific symptoms and the food items he consumed could not be ascertained. At the request of ACDC, the coroner tested the decedent's stool; it was positive for norovirus. However, the death certificate only listed a heart condition as the cause of death. No other cases sought medical care.

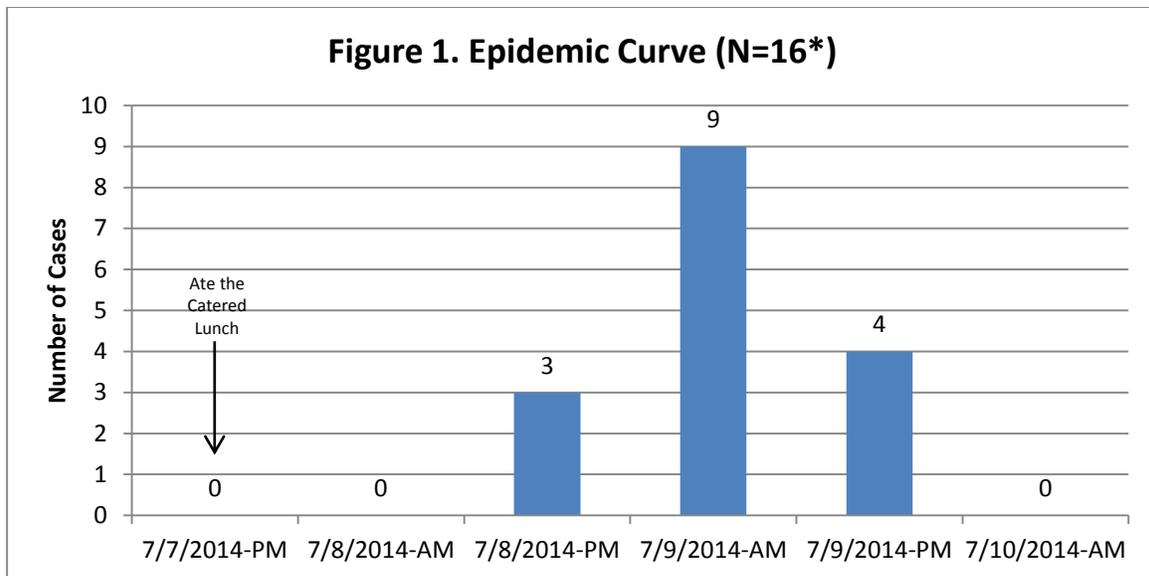
	n	Percent
Male	10	59%
Female	7	41%
Age Group		
1-4	0	0%
5-19	0	0%
20-49	14	82%
50+	3	18%
Median age (years)	40	range: 27 to 60

Symptom	n	Percent
Diarrhea	11	69%
Bloody Diarrhea	0	0%
Abdominal cramps	11	69%
Nausea	15	94%
Fatigue	16	100%
Chills	11	69%
Body Aches	15	94%
Headache	12	75%
Fever	3	19%
Fever > 102°F	0	0%
Dizziness	9	56%
Vomiting	12	75%
Median Duration= 48 hours (range: 9 to 96)		
Median Incubation= 39 hours (range: 24 to 51 hours)		

*Symptom information on the deceased case was not available

Food Analysis

The results of the analysis of food items eaten by Company A employees are shown in Table 3. Thirteen of the 16 cases (81%) recalled eating the Garlic Lime Chicken, which was significantly associated with becoming ill (odds ratio=17.33, confidence interval: 1.39-216.60, p=0.025). This dish is marinated in several spices, grilled, and sliced. The chicken is presented on a bed of lettuce. No other food item was significantly associated with becoming ill.



*Onset date and time on the deceased case was not available

Restaurant A

Inspection

Restaurant A is a family-owned, gourmet restaurant, open daily from 8 AM to 7 or 8 PM. All food was prepared at the restaurant. Restaurant A employees were also responsible for the set-up at Company A. The inspection by WFS revealed mostly minor violations. The only major violation observed was the improper cooling of a potentially hazardous food item. During the re-inspection on July 14, 2014 all violations had been corrected.

Employees

Restaurant A had 53 employees. Fifteen of these employees had contact with the Company A food and were interviewed by ACDC staff via telephone. The remaining 38 employees were asked to complete the questionnaires on their own. Completed forms were emailed to ACDC by the Restaurant A owner. There was an 82% response rate. All 46 employees completing questionnaires denied symptoms of gastrointestinal illness in themselves and in family members during the previous month. All 15 Restaurant A employees who prepared the Company A catered food submitted stool samples for testing; two tested positive for norovirus. These two employees were also responsible for preparing the Garlic Lime Chicken (implicated food item).

Additional food orders

To determine whether other illnesses had occurred in LAC in relation to Restaurant A, persons who ordered food to be delivered from July 6th to July 8th were contacted by ACDC. There were 16 orders; ACDC was able to speak with seven parties. Two indicated that people became ill after consuming food from Restaurant A. One party reported three ill out of ten or 12 and the other party reported two ill out of 50. Neither party ordered the Garlic Lime Chicken or any other hot dish; only dessert, cheese, and vegetable platters were purchased from Restaurant A. Attempts to contact the ill individuals were unsuccessful. Therefore, it cannot be determined whether these illnesses were due to norovirus and/or associated with eating food from Restaurant A or were illnesses occurring in the community and not related to the restaurant.



Table 3. Food Items Eaten

Food Item	Cases (N=16*)			Controls (N=5)			Attack Rate	p-value
	Percent	n	N	Percent	n	N		
chicken noodle soup	13%	2	16	0%	0	5	100%	1.000
poached salmon	56%	9	16	60%	3	5	75%	1.000
grilled garlic lime chicken**	81%	13	16	20%	1	5	93%	0.025
sauteed broccolini with lemon zest	56%	9	16	60%	3	5	75%	1.000
farro salad	50%	8	16	60%	3	5	73%	1.000
quinoa salad	63%	10	16	40%	2	5	83%	0.611
baby spinach and arugula salad	44%	7	16	20%	1	5	88%	0.607
cheese	13%	2	16	40%	2	5	50%	0.228
fruit platter***	19%	3	16	80%	4	5	43%	0.025
lemon bar	6%	1	16	40%	2	5	33%	0.128
brownies	6%	1	16	0%	0	5	100%	1.000
magic bar	6%	1	16	0%	0	5	100%	1.000
mini chocolate chip cookie	6%	1	16	20%	1	5	50%	0.429
mini oatmeal cookie	13%	2	16	0%	0	5	100%	1.000
mini chocolate dreams	0%	0	16	20%	1	5	0%	0.238
sugared pecan balls	0%	0	16	0%	0	5	0%	N/A
gluten-free cookies	0%	0	16	0%	0	5	0%	N/A
iced tea	13%	2	16	20%	1	5	67%	1.000

*Food history on the deceased case was not available

**Odds Ratio=17.33; Confidence Interval: 1.39-216.60

***Odds Ratio=0.06; Confidence Interval: 0.005-0.72

DISCUSSION

The symptoms and duration of illness reported by cases were consistent with norovirus infection. This outbreak was confirmed by positive norovirus laboratory results in both Restaurant A and Company A employees. The incubation times of cases were consistent with a point source exposure, with exposure occurring around the time cases reported eating food from the Company A meeting. The Centers for Disease Control & Prevention (CDC) reports that the incubation period for norovirus-associated gastroenteritis in humans is usually between 24 and 48 hours (median in outbreaks, 33 to 36 hours).¹ The median incubation period for this outbreak was 39 hours.

Norovirus outbreaks are usually associated with uncooked or ready-to-eat foods such as salads and cold salsa. In this outbreak, the illness appears to have been spread by Restaurant A employees.² Company A employees who ate the Garlic Lime Chicken had an increased odds (OR= 17.33) of becoming ill compared to Company A employees who did not eat the Garlic Lime Chicken. Although the Garlic Lime Chicken was cooked, there are a couple of steps in the preparation-to-plate process where contamination could have occurred. First, contamination could have occurred when the chicken was sliced if the Restaurant A employee used his hand to hold the chicken in place while slicing. Second, the lettuce for the lettuce bed could have been contaminated when placed on the platter. Because the lettuce is never heated or cooked, any virus on it could survive and subsequently be ingested by Company A employees. Although inspection of Restaurant A found a major violation of improper cooling of a potentially hazardous food item, this would not have caused a norovirus outbreak.



The coroner concluded that the Company A employee who expired on July 9, 2014 died due to a heart condition. It is possible that infection with norovirus exacerbated the heart problem, leading to an untimely death.

LIMITATIONS

The case-control analysis may have been limited by recall bias of what foods were consumed by persons involved. However, if the mistaken recall was the same in both cases and controls (i.e., non-differential) the association observed in this investigation may be an underestimation of the true association. Although the small number of controls in the analysis might be viewed as a limitation, the primary concern with small sample sizes is a lack of precision in estimating the magnitude of an association. A lack of precision can also result in a loss of Power, which is the odds of observing a true association. This does not appear to be a problem in this investigation.

PREVENTION

WFS distributed information about the control of norovirus to the Restaurant A head chef, including brochures and fact sheets with specific recommendations for all Restaurant A employees. Information included was about frequent, vigorous hand-washing, proper sanitation in all customer areas, and exclusion of infected persons from handling food until they are symptom-free for 48 hours.³ WFS also provided guidance to Company A on how to perform a deep cleaning of the potentially contaminated areas (e.g., conference/meeting room, restrooms, etc.). Information on norovirus was also distributed to Company A employees.

CONCLUSIONS

This was a point-source norovirus outbreak that occurred among Company A employees eating food from a lunch meeting catered by Restaurant A. In addition to the symptoms and durations reported by cases being consistent with norovirus infection, the etiology for this outbreak was laboratory confirmed. The outbreak most likely originated with two ill food preparers and was spread by contaminated food. Effective prevention methods controlled the outbreak; there were no further complaints of illness received for this restaurant and the outbreak was only able to be documented in Company A employees.

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SUMMARY OF EBOLA VIRUS DISEASE HOSPITAL PREPAREDNESS OUTREACH, AUGUST – DECEMBER 2014

Patricia Marquez, MPH

BACKGROUND

The current Ebola Virus Disease (EVD) outbreak was first reported in Guinea in March of 2014, and later spread to surrounding West African countries (1). By early September, heightened awareness of the outbreak spread in the United States (U.S.), as the Centers for Disease Control and Prevention (CDC) reported high numbers of cases and deaths in Guinea, Sierra Leone, and Liberia (2). The first U.S. case of EVD was reported in Dallas, Texas, in a traveler from Liberia (3). This case, who subsequently died, infected two healthcare workers at the hospital where he was being treated. Both healthcare workers recovered from their illness; however, their infection highlighted the need for coordinated infection control efforts to ensure suspect cases were immediately identified, appropriately isolated, and healthcare workers were protected.

Beginning in August 2014, the Los Angeles County Department of Public Health's (LAC DPH) Health Officer requested the Acute Communicable Disease Control Program (ACDC) to begin outreach to hospitals in anticipation of the worsening of the outbreak, as well as an increase in the number of healthcare workers traveling to EVD affected countries on medical missions and returning to the U.S. The objectives of outreach were to assess current levels of preparedness for EVD in LAC hospitals, and provide guidance in areas that were identified as lacking. The following report describes the outreach efforts by ACDC to LAC acute care hospitals.

METHODS

LAC DPH shares important public health information with health care professionals in Los Angeles County through its Health Alert Network (LAHAN). In this manner, updates on screening and testing of suspect EVD patients, as well as reporting requirements were disseminated to key hospital personnel including hospital infection preventionists (IPs), Emergency Department (ED) directors and infection control committee chairs.

On August 28, 2014, a survey was sent via email to hospital IPs to assess which hospitals would voluntarily accept a suspect EVD patient identified in LAC. Multiple conference calls between ACDC, public health laboratory, and hospital IPs were held to answer questions and address concerns regarding preparedness of hospitals. In addition to activities above, letters from the Health Officer were sent to hospital IPs and Chief Executive Officers (CEOs) to encourage preparedness efforts and collaboration with LAC DPH.

Individual hospital outreach began in September 2014. Two groups of hospitals were prioritized: 1) larger facilities with proximity to airports and 2) larger, tertiary-care hospitals with EDs. Outreach consisted of emails, phone calls, and visits to IPs by ACDC Healthcare Outreach Unit (HOU) liaison public health nurses, ACDC epidemiologists and Community Health Services (CHS) staff. The goal was to review EVD preparedness policies and plans, conduct a walk-through of the ED, and participate in a preparedness drill, all with the goal to provide feedback and ensure optimal preparedness among these hospitals. ACDC created a preparedness evaluation checklist and observation tool to ensure that all visits were assessed consistently among staff. Due to the expected large volume of calls from hospitals and other healthcare settings requesting guidance from LAC DPH, an Ebola call log was created to track the main reasons for calls as well as resolutions of those calls.

RESULTS

Letters from the Health Officer to hospital CEOs urging them to make EVD preparedness a priority and encouraging them to collaborate with ACDC in preparedness efforts were sent on October 6th and



November 4th. A total of 82 calls were received at ACDC regarding EVD infection control guidance from healthcare facilities; 68 (83%) calls from hospitals, 14 from outpatient care settings. From these calls ACDC put together EVD guidance for outpatient settings, which was then adapted by CDPH and other jurisdictions.

Between August 28 and September 19, 2015, a total of 45 hospitals responded to the email survey sent in August; 14 hospitals (31%) indicated they would voluntarily accept the first EVD patient in LAC. From September through December, all 71 hospitals with EDs were contacted at least once via email and phone. Of 71 hospitals with EDs, LAC DPH conducted outreach (through site visits, drill participation, and policy review) to 51 (70%) of these hospitals. A breakdown of each category is below (Table 1). A total of 43 hospitals have completed drills. ACDC and CHS staff participated in 31 drills; 12 were completed without LAC DPH participation. During peak EVD outreach six hospitals were assessed per week, with an average of 2-3 staff on each visit. Eight (15%) hospitals were visited twice; all others were visited once.

Table 1. LAC DPH Hospital ED Outreach Activities
for Ebola Preparedness, 2014

Hospital Activity	Number of hospitals completing activity
ED visit/walk-through	46
EVD policy review	37
EVD drill participation	31

The levels of preparedness among hospitals that have been visited vary. The two hospitals in LAC that are CDC designated EVD treatment facilities as well as some of the larger hospitals are the most prepared to identify and isolate a patient, and protect their staff. This includes appropriate personal protective equipment (PPE) training of staff, staff comfort level with PPE, and support by administrators in their facility. These facilities have the resources to provide PPE training not only to ED staff but volunteer inpatient staff as well. In addition, the layout of these hospitals is ideal for the designation of an isolation room that is set apart from the activity of the rest of the ED. One of the challenges was hospitals' inability to meet California-Occupational Safety and Health Administration (Cal-OSHA) standards for powered air purifying respirators (PAPRs); some facilities only had a brand of PAPR where the hoods were not compliant with Cal-OSHA standards.

Mid-size and smaller community hospitals face larger obstacles to preparedness, mainly, a lack of resources to properly and efficiently train their staff in PPE donning and doffing. Some facilities could only train staff one or two at a time during their ED shift, and only when they are not at full capacity. This affected their ability to conduct preparedness exercises since not all staff were trained. Also, many of the facilities are older and the physical layout of their EDs may make it difficult to select an appropriate room to effectively isolate a suspect EVD patient. Some isolation rooms do not have easy access to proper areas for donning and doffing PPE, or are in a location that is in direct pathway of traffic as patients are admitted from ED to inpatient areas.

DISCUSSION

One of the biggest challenges hospitals faced in their preparedness efforts was the changing PPE recommendations, both from CDC as well as Cal-OSHA. These changes made it difficult for hospitals to meet preparedness standards, since equipment would be purchased, staff would be trained, and when changes were made they needed to start over again. Changing PPE requirements and recommendations were cited as a common reason for refusing public health's assistance or attendance at trainings and drills. Some stated they did not want to conduct drills until staff were fully trained and comfortable so as not to lower their confidence with negative feedback. Several facilities cited their administration's reluctance to have public health observe and participate in drill activities. Many smaller hospitals stated they did not want LAC DPH to attend any drills or trainings until they were "ready." ACDC staff reminded these hospitals that we were there as a resource for preparedness and not punitive; however their refusal remained.



A positive finding is that all hospitals contacted, regardless of preparedness level, knew to isolate a suspect EVD patient and immediately contact ACDC. Existing relationships between liaison PHNs and hospital IPs were a key part of the successful outreach to 70% of hospitals with EDs in a relatively short amount of time. During follow-up meetings and roundtable discussions, hospitals expressed gratitude to the program for being a consistent resource at a time when recommendations and information were evolving rapidly. They stated the letters to CEOs urging them to support infection control efforts were helpful to expand their preparedness efforts.

CONCLUSION

EVD preparedness efforts in LAC were a reminder to all hospitals that they should be able to quickly identify and isolate a patient suspected who has a highly communicable disease. While no EVD cases occurred in LAC, exercises with hospitals served to strengthened relationships with public health and enhance future preparedness efforts.

REFERENCES

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