Acute Communicable Disease Control Program

Annual Morbidity and Special Studies Report 2017

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LOS ANGELES COUNTY HEALTH AGENCY
COUNTY OF LOS ANGELES Public Health
www.publichealth.lacounty.gov/acd/index.htm

Acute Communicable Disease Control — 2017

The **Acute Communicable Disease Control Program (ACDC)** serves a fundamental role in disease control and prevention in Los Angeles County (LAC) leading surveillance, investigation, and outbreak response for over 60 reportable communicable diseases. **In 2017, ACDC managed and confirmed over 4,000 reports of communicable diseases**, many of which required further investigation and response. ACDC's findings are often instrumental in the development of guidance and policy recommendations and inform prevention efforts for communicable diseases locally and nationally.

ACDC staff also serve as local experts in these diseases, providing vital advice and instruction for medical and community partners. Additionally, ACDC is the designated public health program responder for emerging infectious diseases such as Zika virus, Ebola, pandemic influenza, antimicrobial resistant organisms, and bioterrorism agents (e.g., smallpox, anthrax, and botulism). ACDC regularly partners with local hospitals, healthcare and skilled nursing facilities to assist with infection control and outbreak response. ACDC physicians are available and on-call everyday (24/7) to ensure the health and safety of our communities.

Table 1.
ACDC-Managed
Communicable Disease Reports for
Selected Pathogens: LAC, 2017

Disease	No. of Cases
Gastrointestinal Disease	
Salmonella	1,107
E. coli*	309
Shigella	732
Hepatitis A	87
Vectorborne Diseases**	
West Nile Virus	268
Dengue	16
Malaria	38
Typhus, Flea-Borne	67
Bloodborne Diseases	
Hepatitis B, Acute	32
Respiratory Disease	
Influenza Deaths***	278
Legionellosis	165
Coccidioidomycosis	1,001
Neuroinvasive Disease	
Viral Meningitis	283
Meningococcal Infections	10

* Shiga toxin producing
** Only West Nile virus spreads locally
*** 2017-2018 season

The following are some highlights from ACDC's activities and accomplishments occurring during 2017.

Health Information Systems

To enhance local surveillance for reportable diseases, ACDC manages an electronic laboratory-based (ELR) reporting system, receiving reports from participating laboratories not only for ACDC but also other LAC Department of Public Health (DPH) programs including TB, HIV/STD, and Vaccine Preventable Diseases. **In 2017, ACDC alone received over 150,000 laboratory reports through this system**. ACDC's case surveillance system, visual confidential morbidity reporting (vCMR), serves as the enterprise surveillance and case management system for LAC DPH and has become a national model employed by other health agencies.

Hepatitis A Outbreak

In 2017, LAC DPH responded to an outbreak of hepatitis A virus primarily among persons experiencing homelessness or with illicit drug use. This outbreak occurred in the context of several other large outbreaks in California and nationally. The largest California outbreak occurred in San Diego County resulting in 582 confirmed cases when the outbreak was eventually closed. Given LAC's proximity to San Diego County, ACDC closely monitored the spread of this disease and LAC DPH conducted comprehensive vaccination, hygiene and sanitation, and educational outreach campaign. Ultimately, only 17 outbreak-associated cases were identified in LAC. It is unclear why the outbreak remained contained locally, especially despite having a larger population of persons experiencing homelessness and a lower number of vaccines distributed compared with San Diego. However, LAC DPH's early and extensive outreach likely contributed to disease containment.

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2017

Foodborne Diseases

A majority of ACDC's responsibilities are foodborne-related accounting for hundreds of cases and investigations annually (Table 1). Foodborne outbreak investigations usually are initiated by a Foodborne Illness Report (FBIR); 2,348 FBIRs were received in 2017, a 14.2% increase from 2016. ACDC frequently partners with state and federal agencies to investigate foodborne disease situations. In 2017 staff assisted with 1 listeria, 63 Salmonella and 5 shiga toxin-producing E. *coli* cluster investigations. These required expanded efforts including specialized interviews, product tracebacks, and additional laboratory testing.

West Nile Virus

West Nile Virus (WNV) continues to inflict a substantial public health burden in our county (Table 2). Over the previous six years, LAC has experienced yearly outbreaks of WNV infections, averaging 213 cases, and comprising about 10% of the national burden. **In 2017 a record number of WNV fatalities (27) were documented**, the most since the virus emerged in LAC in 2004.

Table 2. West Nile Virus Infections, Hospitalizations, and Deaths*
LAC, 2004–2017

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Infections	309	43	16	43	170	25	4	63	174	165	218	300	153	268
Hospitalizations	179	30	5	31	125	15	3	49	133	122	180	262	131	224
Deaths	13	0	0	5	6	1	0	4	6	9	7	24	6	27

* Excludes reports from Long Beach and Pasadena.

Despite the significant health risks, mosquito-borne disease knowledge, perceived risk, and preventative behaviors are low among residents in LAC. In response in September 2017, LAC DPH enacted an unprecedented weeklong county-wide boots-on-the-ground outreach campaign (titled: It's Not Just a Bite!) to distribute educational materials, increase awareness and knowledge, and promote preventive actions. This campaign was the largest door-to-door campaign ever implemented by LAC DPH to fight a communicable disease and will serve as a valuable model for enacting other large-scale health campaigns.

Healthcare Outreach Unit

ACDC's Healthcare Outreach Unit (HOU) continues to be a national leader in combating antimicrobial resistance and preventing and responding to healthcare-associated infections. Because antimicrobial resistance is an increasing global concern, projects to address this issue are an ACDC priority. 2017 was the first year that the HOU assembled a regional antibiogram. This was accomplished by issuing a local Health Officer Order in January requiring all local acute care hospitals and skilled nursing facilities report carbapenem-resistant Enterobacteriaceae (CRE) infections as well as to report a facility-specific annual antibiogram to LAC DPH. The regional antibiogram has become a vital tool for assessing and preventing antibiotic resistance infections and detecting trends in LAC.

Because inappropriate antibiotic use is the primary contributor to antibiotic resistance, a core outreach goal is improving testing and prescribing practices. During 2017, HOU staff partnered with the state to improve laboratory testing methods for CRE. One year after the campaign, nearly half (47%) of participating laboratories successfully updated their testing methods. In 2017 the HOU also initiated the Targeting Appropriate Prescribing in Outpatient settings (TAP OUT) project to assist outpatient clinics to implement an antimicrobial stewardship. Outpatient clinics are of particular concern since a large portion of antibiotics prescribed in these settings are unnecessary and therefore contribute to antibiotic resistance. The HOU recruited several clinics, representing over 200 providers, to participate. Using prescriptions for upper respiratory infections as a measure, participants showed a significant 51% decrease in inappropriate prescriptions as a result of this project.

Additional activities are detailed in ACDC's 2017 Annual Morbidity and Special Studies Report.

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PURPOSE

The Los Angeles County (LAC) Department of Public Health (DPH) Acute Communicable Disease Control (ACDC) Program's Annual Morbidity Report serves to:

1. summarize annual morbidities for select reportable acute communicable diseases occurring in LAC;
2. identify patterns of disease;
3. identify changes and limitations in the surveillance data and systems; and
4. provide a resource for the public as well as for medical, public health, and other healthcare authorities at county, state, and national levels.

Information about our program is available on the ACDC website and past Annual Morbidity Reports and Special Studies are archived online.

This report does not include information on tuberculosis, sexually transmitted infections, or HIV and AIDS. Information regarding these diseases is available from their respective department programs: Tuberculosis Control Program and the Division of HIV and STD Programs. Select vaccine preventable disease are also included in this report as we work closely with the Vaccine Preventable Disease Control Program within LAC DPH.

LAC DEMOGRAPHIC DATA

The Los Angeles County population estimates used in this report were generated by LAC Urban Research and Hedderson Demographic Services, a contractual agent to the LAC Internal Services Department (ISD). Using city estimates from the California Department of Finance (DOF) Demographic Research Unit, Population estimates for July 1, 2017 were estimated by applying 7 years of birth, mortality, and migration rates to the July 1, 2010 census data. The input datasets included U.S. Census Bureau decennial census enumerations and annual population estimates, CA DOF city and county estimates, and administrative records from LAC on registered voters, housing units, births and deaths.

The Centers for Disease Control and Prevention (CDC) Final 2017 Summary of Nationally Notifiable Infectious Diseases published in the Morbidity and Mortality Weekly Report (MMWR) provided the national counts of reportable diseases and formed the basis for calculated national rates included in this report.

While part of LAC, the cities of Long Beach and Pasadena are separate reporting health jurisdictions, as recognized by the California Department of Public Health (CDPH). As such, these two cities maintain their own disease reporting systems. LAC DPH morbidity data excludes disease episodes occurring among residents of Long Beach and Pasadena and subtracts their populations from LAC population data. We note exceptions to this rule in the text when they occur.

DATA SOURCES

In LAC, there are more than 80 diseases and conditions that are required to be reported as mandated by the Title 17, California Code of Regulations (CCR) Section 2500. Of these, more than 40 also are nationally notifiable and reported to the CDC (**Table A**). In addition, LAC DPH has the authority to assign local reporting requirements to address the unique needs and surveillance projects of our jurisdiction. In 2017, five diseases/conditions were added to our locally reportable list:

- Carbapenem-resistant *Enterobacteriaceae* (CRE), including *Klebsiella sp., E. coli,* and *Enterobacter sp.*, in acute care hospitals or skilled nursing facilities;
- Influenza deaths of all ages; confirmed cases only (CDCP and CDC only require reporting of pediatric deaths);
- Acute flaccid myelitis;
- Invasive group A streptococcal infection, including streptococcal toxic shock syndrome and necrotizing fasciitis; and
- Atypical or crusted cases of scabies.

Because local and national reporting standards change regularly, it is prudent to periodically confirm the requirements. Additional reporting information is described on ACDC's disease reporting web page.

Data on the occurrence of communicable diseases in LAC is obtained through passive and sometimes active surveillance. The CCR Section 2500 requires those knowing of a case or suspected case of a communicable disease report it to the local health department. Laboratories have separate requirements for reporting certain communicable diseases as detailed by CCR Section 2505. The time required to report varies by disease and condition and ranges from reporting immediately by telephone to reporting within 7 calendar days by electronic transmission, or by telephone or mail. The CCR also requires immediate reporting by telephone for any outbreak or unusual incidence of infectious disease that may not be listed in Section 2500.

DATA DESCRIPTION AND LIMITATIONS

Data in this report utilizes the following data descriptions; however, the report should be interpreted with caution given the limitations.

1. Underreporting. The proportion of cases that are not reported is not well quantified and the amount of underreporting varies by disease. When noted, case definitions or surveillance system changes can also play a factor in underreporting.

2. Reliability of rates. All vital statistics rates, including morbidity rates, are subject to random variation. This variation is inversely related to the number of events (observations, cases) used to calculate the rate. The less frequent the event, the less stable its occurrence from observation to observation. Thus, diseases with only a few cases reported per year may have highly unstable rates. The observation and enumeration of these "rare events" is beset with uncertainty. The observation of zero events is particularly unreliable when based on passive surveillance systems. To account for these instabilities, all rates in the ACDC Annual Morbidity Report based on five or fewer events have been suppressed. Rates based on fewer than 20 events are considered unstable and should be interpreted with caution

as it is almost impossible to distinguish random fluctuation from true changes in the underlying risk of disease. Thus, comparisons over time or between communities that are based on unstable rates can lead to spurious conclusions about differences in risk which may or may not be valid.

3. Case definitions. To standardize surveillance, ACDC uses CDC's Council of State and Territorial Epidemiologists (CSTE) case definition for infectious diseases under public surveillance, with some exceptions as noted in the text of the individual diseases. Because some diseases include a laboratory test result as part of the case definition, cases reported without a laboratory result may only be probable and not confirmed cases. Consequently, determining a direct link between a communicable disease and a death or an outbreak is not always feasible.

4. Onset date versus report date. The discrepancy between onset date and report date might result in slight differences in the number of cases and rates of disease for the year in subsequent annual reports. However, any such disparities are likely to be small.

5. Population estimates. Estimates of the LAC population are subject to limitations. Furthermore, the population of LAC is in constant flux. Though not accounted for in census data, visitors and other non-residents are likely to have an impact on disease occurrences.

6. Place of acquisition of infections. Some cases of diseases reported in LAC may have been acquired outside of the county. Accordingly, some disease rates may not accurately reflect the location where an infection was acquired since data in this report are based on the home address of the case.

7. Health Districts and Service Planning Areas. To better serve the population, LAC is divided into eight Service Planning Areas (SPAs) for the purposes of healthcare planning and provision of health services. Some SPAs are further divided into health districts (HDs) as shown by **Map 1** at the end of this section.

RACE/ETHNICITY CATEGORIES

The Census Bureau defines race as a person's self-identification with one or more social groups. An individual can report as White, Black or African American, Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, or some other race. Survey respondents may report multiple races. Ethnicity determines whether a person is of Hispanic origin or not. For this reason, ethnicity is broken out in two categories, Hispanic or Latino and Not Hispanic or Latino. Hispanics may report as any race. The 2017 ACDC Annual Morbidity Report modified previous race/ethnicity categories to standardized with the Census Bureau as follows:

- **Hispanic/Latino** – persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.
- **Asian** – persons person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.

- **American Indian or Alaskan Native** – persons having origins in any of the original peoples of North and South America (including Central America) and who maintains tribal affiliation or community attachment. Previously included in the "Other" category.
- **Black** – persons having origins in any of the black racial groups of Africa.
- **Native Hawaiian or Other Pacific Islander** – having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands. Previously this category was included in the category of Asian.
- **White** – A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.
- **Other** – persons that do not list themselves according to any of the above categories or those that note multiple race/ethnicity categories.
- **Unknown** – persons where race/ethnicity is unknown.

Because population data is not available for unknown, other, or multiple race categories, rate calculations for these groups are not possible.

Table A. Reportable Communicable Diseases
LAC, California, US*

Diseases	LAC	California	US
Amebiasis	X	X	
Anaplasmosis	X	X	X
Anthrax, human or animal	X	X	X
Babesiosis	X	X	X
Botulism: infant, foodborne, or wound	X	X	X
Brucellosis, animal; except infections due to *Brucella canis*	X	X	X
Brucellosis, human	X	X	X
Campylobacteriosis	X	X	X
Carbapenem-Resistant *Enterobacteriaceae* (CRE), including *Klebsiella sp., E. coli,* and *Enterobacter sp.*, in acute care hospitals or skilled nursing facilities ★ ±	X	–	–
Chancroid	X	X	–
Chickenpox (Varicella), only hospitalizations, deaths, and outbreaks	X	X	–
Chikungunya Virus Infection	X	X	X
Chlamydia trachomatis infection, including lymphogranuloma venereum (LGV)	X	X	–
Cholera	X	X	X
Ciguatera Fish Poisoning	X	X	–
Coccidioidomycosis	X	X	–
Creutzfeldt-Jakob Disease (CJD) and other Transmissible Spongiform Encephalopathies (TSE)	X	X	–
Cryptosporidiosis	X	X	–
Cyclosporiasis	X	X	–
Cysticercosis or Taeniasis	X	X	–

Dengue Virus Infection	X	X	X
Diphtheria	X	X	–
Domoic Acid (Amnesic Shellfish) Poisoning	X	X	–
Ehrlichiosis	X	X	X
Encephalitis, specify etiology: viral, bacterial, fungal or parasitic	X	X	–
Escherichia coli, shiga toxin producing (STEC) including *E. coli* O157	X	X	–
Flavivirus infection of undetermined species	X	X	–
Foodborne Disease	X	X	–
Foodborne Outbreak	X	X	–
Giardiasis	X	X	X
Gonococcal Infection	X	X	–
Haemophilus influenzae, invasive disease only, all serotypes, < 5 years of age	X	X	–
Hantavirus Infection	X	X	X
Hemolytic Uremic Syndrome	X	X	X
Hepatitis A, acute infection	X	X	–
Hepatitis B, specify acute or chronic	X	X	–
Hepatitis C, specify acute or chronic	X	X	–
Hepatitis D (Delta), specify acute or chronic	X	X	–
Hepatitis E, acute infection	X	X	–
Human Immunodeficiency Virus infection, stage 3 (AIDS) (§2641.30-2643.20)	X	X	–
Human Immunodeficiency Virus (HIV), acute infection (§2641.30-2643.20)	X	X	–
Influenza deaths, confirmed cases only, all ages ★■	X	–	–
Influenza, novel strains, human	X	X	–
Legionellosis	X	X	X
Leprosy (Hansen's Disease)	X	X	X
Leptospirosis	X	X	X
Listeriosis	X	X	X
Lyme Disease	X	X	X
Malaria	X	X	X
Measles (Rubeola)	X	X	–
Meningitis, specify etiology: viral, bacterial, fungal, or parasitic	X	X	–
Meningococcal Infection	X	X	–
Mumps	X	X	–
Myelitis, acute flaccid ★	X	–	–
Novel virus infection with pandemic potential	X	X	–
Outbreaks of Foodborne Disease	X	X	X
Outbreaks of Waterborne Disease	X	X	X
Paralytic Shellfish Poisoning	X	X	–

Pertussis (Whooping Cough)	X	X	–
Plague, human or animal	X	X	X§
Poliovirus Infection	X	X	–
Psittacosis	X	X	X
Q Fever	X	X	X
Rabies, human or animal	X	X	X
Relapsing Fever	X	X	–
Respiratory Syncytial Virus, deaths less than 5 years only	X	X	–
Rickettsial Diseases (non-Rocky Mountain Spotted Fever) including Typhus	X	X	–
Rocky Mountain Spotted Fever	X	X	–
Rubella (German Measles)	X	X	–
Rubella Syndrome, Congenital	X	X	–
Salmonellosis, other than Typhoid Fever	X	X	X
Scombroid Fish Poisoning	X	X	–
Shiga Toxin-Producing *E. coli* (STEC)	X	X	X
Shigellosis	X	X	X
Smallpox (Variola)	X	X	–
Streptococcal Infection, outbreaks any type	X	X	–
Streptococcal Infection, individual case in a food handler or dairy worker	X	X	–
Streptococcal Infection, Invasive Group A ★	X	–	–
Streptococcus pneumoniae, invasive★	X	–	–
Syphilis	X	X	–
Tetanus	X	X	–
Trichinosis	X	X	X
Tuberculosis	X	X	–
Tularemia, animal	X	X	X
Tularemia, human	X	X	X
Typhoid Fever, cases and carriers	X	X	X¥
Vibrio Infection	X	X	X
Viral Hemorrhagic Fevers, human or animal	X	X	–
West Nile Virus (WNV) Infection	X	X	X
Yellow Fever	X	X	X
Yersiniosis	X	X	–
Zika Virus Infection	X	X	X

*Reporting requirement as of January 2019. In LAC, reports are made to LAC DPH which forwards state reports to CDPH which nationally reportable diseases to the CDC. Because these requirements change regularly, view the LAC DPH webpage for the most recent listing.
★ Mandated by and reportable to LAC DPH. Any unusual disease and any suspected outbreak of disease is immediately reportable by phone.
± Report electronically via the National Healthcare Safety Network (www.cdc.gov/nhsn/index.html) or the ACDC CRE case report form.
■ Pediatric deaths are reportable to CDPH and CDC.
§ Only human cases are nationally reportable.
¥ Only cases are nationally reportable.

Table B. LAC* Population by Year 2012–2017

Year	Population	% Change
2012	9,296,158	–
2013	9,404,275	1.2
2014	9,452,968	0.5
2015	9,571,766	1.3
2016	9,599,001	0.3
2017	9,643,563	0.5

*Does not include cities of Pasadena and Long Beach.

Table C. LAC* Population by Age-Group 2017

Age (Years)	Population	%
<1	102,807	1.1
1–4	449,644	4.7
5–14	1,210,271	12.6
15–34	2,807,715	29.1
35–44	1,327,453	13.8
45–54	1,334,245	13.8
55-64	1,172,115	12.2
65+	1,239,313	12.9
Total	**9,643,563**	**100.0**

*Does not include cities of Pasadena and Long Beach.

Table D. LAC* Population by Sex 2017

Sex	Population	%
Male	4,758,794	49.4
Female	4,884,769	50.7
Total	9,643,563	100.0

*Does not include cities of Pasadena and Long Beach.

Table E. LAC* Population by Race/Ethnicity 2017

Race/Ethnicity**	Population	%
Hispanic	4,749,951	49.3
White	2,677,762	27.8
Asian	1,390,621	14.4
Black	789,325	8.2
Pacific Isl.	19,089	0.2
Am. Indian	168,815	0.2
Total	**9,643,563**	**100.0**

*Does not include cities of Pasadena and Long Beach.
**Does not include categories of Other and Unknown.

Table F. LAC* Population by Health District and SPA 2017

Health District	Population
SPA 1	392,465
Antelope Valley	392,465
SPA 2	2,258,664
East Valley	468,225
Glendale	347,650
San Fernando	528,309
West Valley	914,480
SPA 3	1,655,006
Alhambra	351,624
El Monte	438,806
Foothill	314,165
Pomona	550,411
SPA 4	1,188,412
Central	357,669
Hollywood Wilshire	511,119
Northeast	319,624
SPA 5	671,830
West	671,830
SPA 6	1,068,550
Compton	288,471
South	200,199
Southeast	183,714
Southwest	396,166
SPA 7	1,314,749
Bellflower	355,127
East Los Angeles	202,839
San Antonio	430,408
Whittier	326,375
SPA 8	1,093,887
Inglewood	421,578
Harbor	210,376
Torrance	461,933
TOTAL	**9,643,563**

Map 1. Health Districts by Service Planning Area (SPA)
Los Angeles County, 2017

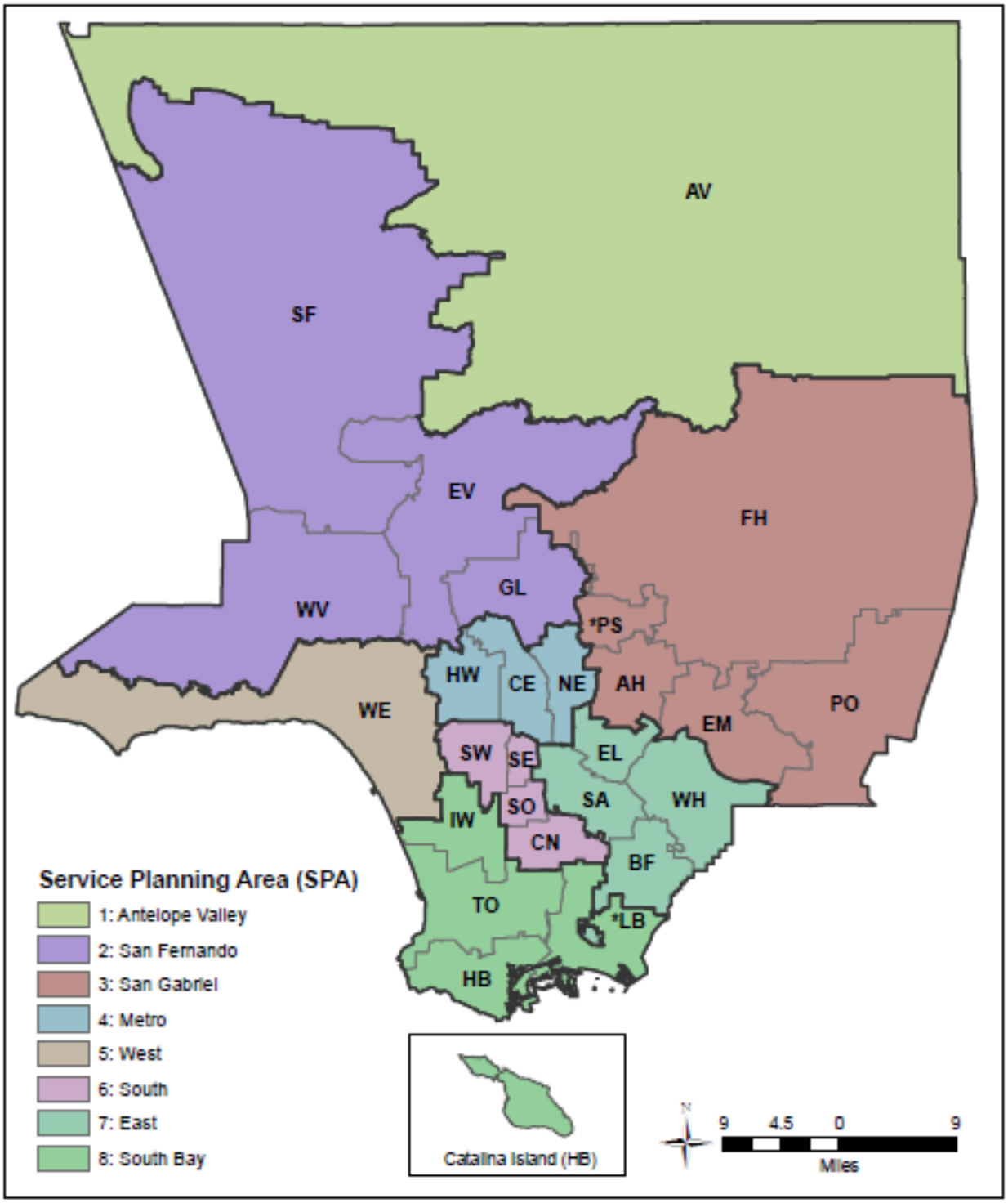


Table G. List of Acronyms			
95%CI	95 Percent Confidence Interval	**HCV**	Hepatitis C Virus
ACDC	Acute Communicable Disease Control	**HD**	Health District
AIDS	Acquired Immunodeficiency Syndrome	**Hib**	*Haemophilus influenzae*, type b
ALT	Alanine Aminotransferase	**HIV**	Human Immunodeficiency Virus
AR	Attack Rate	**IFA**	Immunofluorescent Antibody
CA	California	**IgG**	Immunoglobulin G
CDC	Centers for Disease Control and Prevention	**IgM**	Immunoglobulin M
CDPH	California Department of Public Health	**LAC**	Los Angeles County
CHS	Community Health Services	**MMR**	Mumps-Measles-Rubella vaccine
CMR	Confidential Morbidity Report	**MMWR**	Morbidity and Mortality Weekly Report
CSF	Cerebral Spinal Fluid	**MSM**	Men who have sex with men
CSTE	Council of State and Territorial Epidemiologists	**N/A**	Not Available
DPH	Department of Public Health	**OR**	Odds Ratio
DTaP	Diphtheria-Tetanus-Acellular-Pertussis	**PCP**	*Pneumocystis carinii pneumonia*
DTP	Diphtheria-Tetanus-Pertussis Vaccine	**PCR**	Polymerase Chain Reaction
EHS	Environmental Health Services	**PFGE**	Pulsed Field Gel Electrophoresis
EIA	Enzyme Immunoassay	**PHBPP**	Perinatal Hepatitis B Prevention Program
GI	Gastrointestinal	**RNA**	Ribonucleic Acid
GE	Gastroenteritis	**RR**	Rate Ratio or Relative Risk
HAART	Highly Active Antiretroviral Therapy	**SNF**	Skilled Nursing Facility
HAV	Hepatitis A Virus	**sp.**	Species
HBIG	Hepatitis B Immunoglobulin	**SPA**	Service Planning Area
HBsAg	Hepatitis B surface antigen	**US**	United States
HBV	Hepatitis B virus	**vCMR**	Visual Confidential Morbidity Report

LAC Health Districts					
AH	Alhambra	**FH**	Foothill	**SE**	Southeast
AV	Antelope Valley	**GL**	Glendale	**SF**	San Fernando
BF	Bellflower	**HB**	Harbor	**SO**	South
CE	Central	**HW**	Hollywood/Wilshire	**SW**	Southwest
CN	Compton	**IW**	Inglewood	**TO**	Torrance
EL	East Los Angeles	**NE**	Northeast	**WE**	West
EV	East Valley	**PO**	Pomona	**WV**	West Valley
EM	El Monte	**SA**	San Antonio	**WH**	Whittier

Tables of Notifiable Diseases

Table H. Reported Cases of Selected Notifiable Diseases and Conditions by Year of Onset
LAC, 2012–2017

Diseases and Conditions	Year of Onset 2012	2013	2014	2015	2016	2017†	Previous 5-Yr. Avg.	5-Yr. 95% Upper Limit*
Amebiasis	99	57	64	62	70	57	70	100
Botulism	4	4	1	2	6	2	3	7
Brucellosis	4	10	7	8	6	11†	7	11
Campylobacteriosis	1,546	1,703	1,506	1,623	1,564	1,807†	1,588	1,723
Coccidioidomycosis	327	362	426	613	809	1001†	507	861
Cryptosporidosis	44	48	78	56	98	148†	65	105
Cysticercosis	11	1	9	12	6	6	8	16
Dengue‡	2	2	32	30	46	16	22	57
E. coli, Shiga Toxin-Producing	97	102	90	175	282	309†	149	293
Encephalitis	75	79	92	136	69	129	90	137
Giardiasis	294	392	346	379	452	372	373	475
Hansen's Disease	3	1	3	0	1	3	2	4
Hepatitis A, Acute	47	60	42	33	66	87†	50	73
Hepatitis B, Acute Non-Perinatal	38	55	42	50	42	32	45	58
Hepatitis C, Acute	7	5	5	2	5	8	5	8
Legionellosis	111	85	140	171	245	165	150	259
Listeriosis, Nonperinatal	26	23	27	34	33	25	29	37
Listeriosis, Perinatal	7	4	5	3	4	5	5	7
Lyme Disease	1	11	5	4	1	1	4	12
Malaria‡	19	16	21	27	24	38†	21	29
Meningitis, Viral	303	355	400	367	183	283	322	471
Meningococcal Infections	12	17	11	12	20	10	14	21
Pneumococcal Disease, Invasive§	504	525	460	468	503	512	492	540
Q-Fever	3	2	1	5	2	3	3	5
Salmonellosis	1,041	1,010	1,141	1,144	1,047	1,107	1,077	1,185
Shigellosis	306	227	350	508	584	732†	395	653
Streptococcus, Group A Invasive	168	195	222	227	353	419†	233	358
Typhoid Fever, Case	6	17	15	14	11	8	13	20
Typhoid Fever, Carrier	0	0	0	0	2	1	0	2
Typhus Fever, Flea-Borne	50	68	44	54	47	67	53	69
Vibriosis	29	26	52	43	33	53	37	55
West Nile Virus Infections	174	165	218	300	153	268	202	307

* The normal distribution assumption may not apply to some rare diseases
† 2017 data with number of cases over or equal to the 5-year 95% upper limit.
‡ Not locally acquired. All infections occurred during travel outside LAC.
§ Onset by specimen collection date.

Table I. Annual Incidence Rates* of Selected Notifiable Diseases and Conditions by Year of Onset LAC, 2012–2017

	Annual Incidence Rate*					
Diseases and Conditions	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Amebiasis	1.06	0.61	0.68	0.65	0.73	0.59
Botulism	–	–	–	–	0.06	–
Brucellosis	–	0.11	0.07	0.08	0.06	0.11
Campylobacteriosis	16.63	18.11	15.93	16.96	16.29	18.74
Coccidioidomycosis	3.52	3.85	4.51	6.40	8.43	10.38
Cryptosporidosis	0.47	0.51	0.83	0.59	1.02	1.53
Cysticercosis	0.12	–	0.10	0.13	0.06	0.06
Dengue†	–	–	0.34	0.31	0.48	0.17
E. coli, Shiga Toxin-Producing	1.04	1.08	0.95	1.83	2.94	3.20
Encephalitis	0.81	0.84	0.97	1.42	0.72	1.34
Giardiasis	3.16	4.17	3.66	3.96	4.71	3.86
Hansen's Disease	–	–	–	–	–	–
Hepatitis A, Acute	0.51	0.64	0.44	0.34	0.69	0.90
Hepatitis B, Acute Non-Perinatal	0.41	0.58	0.44	0.52	0.44	0.33
Hepatitis C, Acute	0.08	–	–	–	–	0.08
Legionellosis	1.19	0.90	1.48	1.79	2.55	1.71
Listeriosis, Nonperinatal	0.28	0.24	0.29	0.36	0.34	0.26
Listeriosis, Perinatal‡	5.71	–	–	–	–	–
Lyme Disease	–	0.12	–	–	–	–
Malaria†	0.20	0.17	0.22	0.28	0.25	0.39
Measles	–	0.03	0.14	0.29	0.19	0.03
Meningitis, Viral	3.26	3.77	4.23	3.83	1.91	2.93
Meningococcal Infections	0.13	0.18	0.12	0.13	0.21	0.10
Mumps	–	0.10	0.11	0.15	0.19	0.88
Pertussis	–	3.15	16.48	8.97	2.26	4.94
Pneumococcal Disease, Invasive‡	5.42	5.58	4.87	4.89	5.24	5.31
Q-Fever	–	–	–	–	–	–
Salmonellosis	11.20	10.74	12.07	11.95	10.91	11.48
Shigellosis	3.29	2.41	3.70	5.31	6.08	7.59
Streptococcus, Group A Invasive	1.81	2.07	2.35	2.37	3.68	4.34
Typhoid Fever, Case	0.06	0.18	0.16	0.15	0.11	0.08
Typhoid Fever, Carrier	–	–	–	–	–	–
Typhus Fever, Flea-Borne	0.54	0.72	0.47	0.56	0.49	0.69
Vibriosis	0.31	0.28	0.55	0.45	0.34	0.55
West Nile Virus Infections	1.87	1.75	2.31	3.13	1.59	2.78

* Cases per 100,000. Rates based on less than 19 cases or events are considered unreliable. Data are suppressed for 5 or fewer cases.

† Not locally acquired. All infections occurred during travel outside LAC.

‡ Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15–44 years.

Table J. Five-Year Average of Select Notifiable Diseases and Conditions by Month of Onset LAC, 2013–2017

Diseases and Conditions	Month of Onset												
	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Amebiasis	9.0	3.8	7.0	3.8	6.0	5.6	4.6	3.2	5.4	4.4	3.6	4.4	62.0
Botulism	0	0.2	0.2	0	0.6	0.2	0	0	0.2	0.2	0.4	0.6	2.8
Brucellosis	0	0.6	1.2	0.6	0.2	0.6	0.2	0.2	0.4	0.4	0.4	0	8.4
Campylobacteriosis	47.6	27.4	24.4	29.2	40.8	48.6	59.4	55.8	46.2	44.0	40.6	28.8	1,640.6
Coccidioidomycosis	54.8	44.2	43.4	44.6	41.0	49.4	64.6	51.8	57.0	67.6	62	61.8	642.2
Cryptosporidosis	4.0	4.2	4.0	3.4	4.8	6.6	8.4	10.4	7.8	5.6	4.6	3.4	85.6
Cysticercosis	0.4	0.4	0.2	0.6	0.4	0	0.6	0.6	0.2	0.2	0.2	0.2	6.8
Dengue†	3.2	1.6	1.2	0.8	1.2	1.6	2.8	2.0	2.8	3.6	1.2	2.6	25.2
E. coli, Shiga Toxin-Producing	8.8	9.2	11.4	14.2	14.2	17.4	22.0	27.6	22.2	18.4	12.2	9.4	191.6
Encephalitis	2.2	1.4	1.8	2.6	2.2	2.0	7.6	21.0	35.2	18.4	4.2	1.6	101.0
Giardiasis	34.4	30.2	32.0	32.4	33.2	27.8	33.4	33.6	37.8	30.4	28.2	27.4	388.2
Hansen's Disease *	0	0	0	0	0	0.2	0.2	0.2	0.2	0.2	0	0	1.6
Hepatitis A, Acute	2.8	3.6	4.4	4.8	4.6	5.0	5.6	6.4	6.4	6.8	3.4	3.8	57.6
Hepatitis B, Acute Non-Perinatal	4.2	3.0	2.8	3.8	2.6	4.0	3.6	4.4	3.2	3.6	5.6	3.2	44.2
Hepatitis C, Acute	0.4	0.8	0.2	0.8	0.2	0	0.4	0.6	1.0	0.2	0.2	0.2	5.0
Legionellosis	19.2	12.4	11.8	12.2	11.8	9.2	14.0	15.2	12.6	10.6	11.8	20.4	161.2
Listeriosis, Nonperinatal	1.6	0.8	1.4	2.0	1.2	2.4	3.4	3.0	3.6	2.4	1.4	1.4	28.4
Listeriosis, Perinatal‡	0.2	0.2	0	0.2	0.2	0.2	0.2	0.6	0.6	0.6	0	0.2	4.2
Lyme Disease	0.2	0.2	0.4	0.2	0.6	1.2	1.2	1.4	0	0.4	0.2	0.4	7.0
Malaria*†	1.8	0.8	0.6	1.6	2.0	2.8	3.0	3.8	3.0	1.6	1.8	1.8	25.2
Meningitis, Viral	12.2	12.6	12.4	16.4	18.6	17.8	31.4	45.2	57.2	35.6	20.4	15.8	317.6
Meningococcal Infections	2.2	2.0	1.8	1.6	1.2	1.0	1.4	0.6	1.0	0.2	0.6	0.4	14.0
Pneumococcal Disease, Invasive‡	75.4	71.6	54.2	42.2	38.2	29.2	20.2	16.6	25.0	25.4	30.2	64.2	492.4
Q-Fever	0	0	0	0	0	0	0	0	0	0	0	0	2.6
Salmonellosis	56.6	49.8	66.4	70	91.8	92.8	132	130.2	115.0	94.8	74.8	52.2	1,089.8
Shigellosis	26.8	26.4	23.2	24.6	33.4	34.2	41.6	53.2	56.0	56.4	44.4	38.6	480.2
Streptococcus, Group A Invasive	34.2	23.4	25.8	25.0	28.6	22.6	18.4	12.8	16.0	20.2	21.2	25.8	283.2
Typhoid Fever, Case	1.6	1.0	0.4	0.2	0.8	2.4	1.6	1.0	1.8	0.6	1.0	0.4	13.0
Typhoid Fever, Carrier	0	0	0	0	0.2	0	0	0	0	0.2	0.2	0	0.6
Typhus Fever, Flea-Borne	3.0	2.0	1.6	1.8	6.4	7.6	5.4	8.6	5.6	7.2	3.8	2.8	56.0
Vibriosis	0.4	0.4	1.0	0.4	2.2	3.6	7.4	6.8	4.2	2.6	2.0	1.4	41.4
West Nile Virus Infections	0	0	0.4	0	0	0.6	20.2	64.0	89.6	36.2	9.2	0.6	220.8

* Not applicable.
† Not locally acquired. All infections occurred during travel outside LAC.
‡ Onset by specimen collection date.

Table K. Number of Cases of Selected Notifiable Diseases and Conditions by Age Group LAC, 2017

Diseases and Conditions	Age Group <1	1–4	5–14	15–34	35–44	45–54	55–64	65+	Total*
Amebiasis	0	2	2	21	12	8	7	5	57
Botulism	0	0	0	0	2	0	0	0	2
Brucellosis	0	1	0	1	0	3	3	3	11
Campylobacteriosis	30	112	139	550	253	207	212	295	1,807
Coccidioidomycosis	1	2	14	173	149	197	214	251	1,001
Cryptosporidosis	1	8	12	66	26	12	13	10	148
Cysticercosis	0	0	0	0	3	3	0	0	6
Dengue†	0	0	1	8	2	0	3	2	16
E. coli, Shiga Toxin-Producing	8	55	31	93	21	23	29	49	309
Encephalitis	1	1	6	4	3	11	25	78	129
Giardiasis	1	8	20	143	54	52	62	32	372
Hansen's Disease	0	0	0	3	0	0	0	0	3
Hepatitis A, Acute	0	0	1	30	23	14	14	5	87
Hepatitis B, Acute Non-Perinatal	0	0	0	3	8	11	7	3	32
Hepatitis C, Acute	0	0	0	4	0	2	1	1	8
Legionellosis	0	0	0	7	8	23	27	100	165
Listeriosis, Nonperinatal	0	0	1	1	0	4	7	12	25
Listeriosis, Perinatal‡	0	0	0	2	3	0	0	0	5
Lyme Disease	0	0	0	1	0	0	0	0	2
Malaria†	1	1	4	12	8	4	5	3	38
Measles	0	1	0	0	0	0	2	0	3
Meningitis, Viral	45	2	37	62	36	29	42	30	283
Meningococcal Infections	0	0	1	5	2	0	0	2	10
Mumps	0	2	3	40	17	13	9	1	85
Pertussis	55	69	160	143	10	13	7	19	476
Pneumococcal Disease, Invasive‡	5	22	15	37	40	86	92	213	512
Q-Fever	0	0	0	0	1	1	0	1	3
Salmonellosis	55	111	123	254	132	102	134	196	1107
Shigellosis	3	46	69	244	113	121	70	66	732
Streptococcus, Group A Invasive	3	11	19	54	51	74	84	121	419
Typhoid Fever, Case	0	0	0	5	0	1	1	1	8
Typhoid Fever, Carrier	0	0	0	0	1	0	0	0	1
Typhus Fever, Flea-Borne	0	0	7	21	12	12	11	4	67
Vibriosis	0	0	0	17	10	8	5	13	53
West Nile Virus Infections	0	0	4	28	21	41	60	114	268

* Totals include cases with unknown age.
† Not locally acquired. All infections occurred during travel outside LAC.
‡ Age of the mother.

Table L. Incidence Rates* of Selected Notifiable Diseases and Conditions by Age Group LAC, 2017

Diseases and Conditions	Age Group Rates*							
	<1	1–4	5–14	15–34	35–44	45–54	55–64	65+
Amebiasis	–	–	–	0.7	0.9	0.6	0.6	–
Botulism	–	–	–	–	–	–	–	–
Brucellosis	–	–	–	–	–	–	–	–
Campylobacteriosis	29.2	24.9	11.5	19.6	19.1	15.5	18.1	23.8
Coccidioidomycosis	–	–	1.2	6.2	11.2	14.8	18.3	20.3
Cryptosporidosis	–	1.8	1.0	2.4	2.0	0.9	1.1	0.8
Cysticercosis	–	–	–	–	–	–	–	–
Dengue†	–	–	–	–	–	–	–	–
E. coli, Shiga Toxin–Producing	7.8	12.2	2.6	3.3	1.6	1.7	2.5	4.0
Encephalitis	–	–	0.5	–	–	0.8	2.1	6.3
Giardiasis	–	1.8	1.7	5.1	4.1	3.9	5.3	2.6
Hansen's Disease	–	–	–	–	–	–	–	–
Hepatitis A, Acute	–	–	–	1.1	1.7	1.0	1.2	–
Hepatitis B, Acute Non–Perinatal	–	–	–	0.1	0.6	0.8	0.6	–
Hepatitis C, Acute	–	–	–	–	–	–	–	–
Legionellosis	–	–	–	0.2	0.6	1.7	2.3	8.1
Listeriosis, Nonperinatal	–	–	–	–	–	–	0.6	1.0
Listeriosis, Perinatal	–	–	–	–	–	–	–	–
Lyme Disease	–	–	–	–	–	–	–	–
Malaria†	–	–	–	0.4	0.6	–	–	–
Measles	–	0.2	–	–	–	–	0.2	–
Meningitis, Viral	43.8	0.4	3.1	2.2	2.7	2.2	3.6	2.4
Meningococcal Infections	–	–	–	–	–	–	–	–
Mumps	–	0.4	0.1	1.4	1.3	1.0	0.8	0.1
Pertussis	53.5	15.4	13.2	5.1	0.8	1.0	0.6	1.5
Pneumococcal Disease, Invasive	–	4.9	1.2	1.3	3.0	6.4	7.8	17.2
Q–Fever	–	–	–	–	–	–	–	–
Salmonellosis	53.5	24.7	10.2	9.0	9.9	7.6	11.4	15.8
Shigellosis	–	10.2	5.7	8.7	8.5	9.1	6.0	5.3
Streptococcus, Group A Invasive	–	2.4	1.6	1.9	3.8	5.5	7.2	9.8
Typhoid Fever, Case	–	–	–	–	–	–	–	–
Typhoid Fever, Carrier	–	–	–	–	0.1	–	–	–
Typhus Fever, Flea–Borne	–	–	0.6	0.7	0.9	0.9	0.9	–
Vibriosis	–	–	–	0.6	0.8	0.6	–	1.0
West Nile Virus Infections	–	–	–	1.0	1.6	3.1	5.1	9.2

* Cases per 100,000. Rates based on less than 19 cases or events are considered unreliable. Data are suppressed for 5 or fewer cases.

† Not locally acquired. All infections occurred during travel outside LAC.

Table M. Number of Cases of Selected Notifiable Diseases and Conditions by Race/Ethnicity LAC, 2017

	Race/Ethnicity*							
Diseases and Conditions	AI/AN†	Asian	Black	Hispanic	NH/OPI‡	Other	White	Unknown
Amebiasis	0	4	5	23	0	0	24	1
Botulism	0	0	0	0	0	0	2	0
Brucellosis	1	0	0	6	0	0	4	0
Campylobacteriosis	6	98	57	362	2	273	492	517
Coccidioidomycosis	5	100	127	320	8	101	300	40
Cryptosporidosis	0	4	0	37	0	7	38	62
Cysticercosis	0	0	0	6	0	0	0	0
Dengue§	0	0	0	7	0	0	2	7
E. coli, Shiga Toxin-Producing	0	17	13	110	0	4	159	6
Encephalitis	0	9	4	44	0	2	64	6
Giardiasis	0	21	22	104	0	9	203	13
Hansen's Disease	0	1	0	1	1	0	0	0
Hepatitis A, Acute	0	11	3	28	0	0	45	0
Hepatitis B, Acute Non-Perinatal	0	3	5	10	1	0	13	0
Hepatitis C, Acute	0	1	1	2	0	1	3	0
Legionellosis	0	17	29	48	0	0	71	0
Listeriosis, Nonperinatal	0	8	1	8	0	0	8	0
Listeriosis, Perinatal|	0	1	0	3	0	0	1	0
Lyme Disease	0	0	0	0	0	0	1	0
Malaria§	0	0	29	0	0	2	7	0
Measles	0	0	0	0	0	0	3	0
Meningitis, Viral	0	14	11	105	2	23	81	47
Meningococcal Infections	0	2	2	1	0	0	5	0
Mumps	0	5	5	15	0	0	38	22
Pertussis	1	20	19	188	0	3	233	12
Pneumococcal Disease, Invasive	0	35	89	140	2	51	137	57
Q-Fever	0	0	0	1	0	1	1	0
Salmonellosis	0	122	50	539	0	0	396	0
Shigellosis	0	26	57	312	1	4	313	19
Streptococcus, Group A Invasive	3	31	61	115	2	23	140	44
Typhoid Fever, Case	0	5	0	2	0	1	0	0
Typhoid Fever, Carrier	0	0	0	1	0	0	0	0
Typhus Fever, Flea-Borne	0	6	2	34	0	0	25	0
Vibriosis	0	9	4	19	0	6	14	1
West Nile Virus Infections	0	10	6	97	0	8	141	6

* Race/ethnicity categories changed for 2017. See Overview.
† American Indian or Native American.
‡ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian.
§ Not locally acquired. All infections occurred during travel outside LAC.
| Mother's race.

**Table N. Incidence Rates* of Selected Notifiable Diseases and Conditions by Race/Ethnicity†
LAC, 2017**

Diseases and Conditions	Race/Ethnicity† Incidence Rates*					
	AI/AN‡	Asian	Black	Hispanic	NH/OPI§	White
Amebiasis	–	–	–	0.5	–	0.9
Botulism	–	–	–	–	–	–
Brucellosis	–	–	–	0.1	–	–
Campylobacteriosis	35.7	7.0	7.2	7.6	–	18.4
Coccidioidomycosis	–	7.2	16.1	6.7	41.9	11.2
Cryptosporidosis	–	–	–	0.8	–	1.4
Cysticercosis	–	–	–	0.1	–	–
Dengue|	–	–	–	0.1	–	–
E. coli, Shiga Toxin-Producing	–	1.2	1.6	2.3	–	5.9
Encephalitis	–	0.6	–	0.9	–	2.4
Giardiasis	–	1.5	2.8	2.2	–	7.6
Hansen's Disease	–	–	–	–	–	–
Hepatitis A, Acute	–	0.8	–	0.6	–	1.7
Hepatitis B, Acute Non-Perinatal	–	–	–	0.2	–	0.5
Hepatitis C, Acute	–	–	–	–	–	–
Legionellosis	–	1.2	3.7	1.0	–	2.7
Listeriosis, Nonperinatal	–	0.6	–	0.2	–	0.3
Listeriosis, Perinatal	–	–	–	–	–	–
Lyme Disease	–	–	–	–	–	–
Malaria|	–	–	3.7	–	–	0.3
Measles	–	–	–	–	–	0.1
Meningitis, Viral	–	1.0	1.4	2.2		3.0
Meningococcal Infections	–	–	–	–	–	–
Mumps	–	0.4	0.6	0.3	–	1.4
Pertussis	6.0	1.4	2.4	4.0	–	8.7
Pneumococcal Disease, Invasive	–	2.5	11.3	2.9	–	5.1
Q-Fever	–	–	–	–	–	–
Salmonellosis	–	8.8	6.3	11.3	–	14.8
Shigellosis	–	1.9	7.2	6.6	–	11.7
Streptococcus, Group A Invasive	–	2.2	7.7	2.4	–	5.2
Typhoid Fever, Case	–	0.4	–	–	–	–
Typhoid Fever, Carrier	–	–	–	–	–	–
Typhus Fever, Flea-Borne	–	0.4	–	0.7	–	0.9
Vibriosis	–	0.6	–	0.4	–	0.5
West Nile Virus Infections	–	0.7	0.8	2	–	5.3

* Cases per 100,000. Rates based on less than 19 cases or events are considered unreliable. Data are suppressed for 5 or fewer cases.
† Race/ethnicity categories changed for 2017. See Overview.
‡ American Indian or Native American.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian.
| Not locally acquired. All infections occurred during travel outside LAC.

Table O. Number of Cases and Annual Incidence Rates* of Selected Notifiable Diseases and Conditions by Sex LAC, 2017

	Male		Female	
Diseases and Conditions	Cases	Rate*	Cases	Rate*
Amebiasis	46	1.0	11	0.2
Botulism	0	–	1	–
Brucellosis	6	0.1	5	–
Campylobacteriosis	926	19.5	865	17.7
Coccidioidomycosis	634	13.3	367	7.5
Cryptosporidosis	86	1.8	61	1.2
Cysticercosis	5	–	1	–
Dengue	7	0.1	9	0.2
E. coli, Shiga Toxin-Producing	147	3.1	161	3.3
Encephalitis	89	1.9	40	0.8
Giardiasis	283	5.9	87	1.8
Hansen's Disease	2	–	1	–
Hepatitis A, Acute	65	1.4	22	0.5
Hepatitis B, Acute Non-Perinatal	22	0.5	10	0.2
Hepatitis C, Acute	4	–	4	–
Legionellosis	98	2.1	67	1.4
Listeriosis, Nonperinatal	7	0.1	18	0.4
Listeriosis, Perinatal	0	–	5	–
Lyme Disease	0	–	1	–
Malaria‡	26	0.5	12	0.2
Meningitis, Viral	149	3.1	134	2.7
Meningococcal Infections	5	–	5	–
Pneumococcal Disease, Invasive§	296	6.2	213	4.4
Q-Fever	1	–	2	–
Salmonellosis	508	10.7	599	12.3
Shigellosis	488	10.3	244	5
Streptococcus, Group A Invasive	241	5.1	170	3.5
Typhoid Fever, Case	5	–	3	–
Typhoid Fever, Carrier	0	–	1	–
Typhus Fever, Flea-Borne	38	0.8	29	0.6
Vibriosis	25	0.5	28	0.6
West Nile Virus Infections	184	3.9	84	1.7

* Cases per 100,000. Rates based on less than 19 cases or events are considered unreliable. Data are suppressed for 5 or fewer cases.

† Not locally acquired. All infections occurred during travel outside LAC.

Table P-1. Selected Notifiable Diseases and Conditions
SPA 1. Antelope Valley Area
LAC, 2017

Diseases and Conditions	Number of Cases	Rate*
Amebiasis	0	–
Botulism	0	–
Brucellosis	1	–
Campylobacteriosis	89	22.7
Coccidioidomycosis	214	54.5
Cryptosporidosis	1	–
Cysticercosis	1	–
Dengue†	0	–
E. coli, Shiga Toxin-Producing	7	1.8
Encephalitis	3	–
Giardiasis	3	–
Hansen's Disease	0	–
Hepatitis A, Acute	3	–
Hepatitis B, Acute Non-Perinatal	1	–
Hepatitis C, Acute	0	–
Legionellosis	3	–
Listeriosis, Nonperinatal	1	–
Listeriosis, Perinatal‡	0	–
Lyme Disease	0	–
Malaria†	0	–
Measles	0	–
Meningitis, Viral	15	3.8
Meningococcal Infections	0	–
Mumps	1	–
Pertussis	13	3.3
Pneumococcal Disease, Invasive	25	6.4
Q-Fever	0	–
Salmonellosis	29	7.4
Shigellosis	4	–
Streptococcus, Group A Invasive	10	2.5
Typhoid Fever, Case	1	0.3
Typhoid Fever, Carrier	0	–
Typhus Fever, Flea-Borne	1	–
Vibriosis	3	–
West Nile Virus Infections	8	2.0

* Cases per 100,000. Rates based on less than 19 cases or events are considered unreliable. Data are suppressed for 5 or fewer cases.
† Not locally acquired. All infections occurred during travel outside LAC.
‡ Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15–44 years.

Table P-2. Selected Notifiable Diseases and Conditions
SPA 2. San Fernando Valley and Health Districts
LAC, 2017

	Number of Cases					Rate*				
Diseases and Conditions	EV	GL	SF	WV	TOTAL	EV	GL	SF	WV	TOTAL
Amebiasis	6	1	4	4	15	1.3	–	–	–	0.7
Botulism	0	0	0	0	0	–	–	–	–	–
Brucellosis	1	0	1	1	3	–	–	–	–	–
Campylobacteriosis	117	67	113	217	514	25	19.3	21.4	23.7	22.8
Coccidioidomycosis	43	16	122	118	299	9.2	4.6	23.1	12.9	13.2
Cryptosporidosis	9	1	16	10	36	1.9	–	3.0	1.1	1.6
Cysticercosis	1	0	0	2	3	–	–	–	–	–
Dengue†	0	0	0	1	1	–	–	–	–	–
E. coli, Shiga Toxin-Producing	22	5	24	45	96	4.7	–	4.5	4.9	4.3
Encephalitis	10	10	4	13	37	2.1	2.9	–	1.4	1.6
Giardiasis	24	15	19	32	90	5.1	4.3	3.6	3.5	4
Hansen's Disease	1	0	0	1	2	–	–	–	–	–
Hepatitis A, Acute	1	0	0	5	6	–	–	–	–	0.3
Hepatitis B, Acute Non-Perinatal	2	0	4	3	9	–	–	–	–	0.4
Hepatitis C, Acute	0	0	1	1	2	–	–	–	–	–
Legionellosis	8	8	7	16	39	1.7	2.3	1.3	1.7	1.7
Listeriosis, Nonperinatal	1	5	1	3	10	–	–	–	–	0.4
Listeriosis, Perinatal‡	1	1	0	1	3	–	–	–	–	–
Lyme Disease	0	0	1	0	1	–	–	–	–	–
Malaria†	2	0	1	4	7	–	–	–	–	0.3
Measles	0	0	0	0	0	–	–	–	–	–
Meningitis, Viral	12	13	13	27	65	2.6	3.7	2.5	3	2.9
Meningococcal Infections	0	0	0	2	2	–	–	–	–	–
Mumps	–	–	–	–	11	–	–	–	–	0.5
Pertussis	–	–	–	–	211	–	–	–	–	9.3
Pneumococcal Disease, Invasive	20	15	15	34	84	4.3	4.3	2.8	3.7	3.7
Q-Fever	1	0	0	0	1	–	–	–	–	–
Salmonellosis	62	39	84	116	301	13.2	11.2	15.9	12.7	13.3
Shigellosis	37	13	20	57	127	7.9	3.7	3.8	6.2	5.6
Streptococcus, Group A Invasive	20	16	16	45	97	4.3	4.6	3	4.9	4.3
Typhoid Fever, Case	1	0	0	1	2	–	–	–	–	–
Typhoid Fever, Carrier	1	0	0	0	1	–	–	–	–	–
Typhus Fever, Flea-Borne	1	5	0	5	11	–	–	–	–	0.5
Vibriosis	7	4	5	5	21	1.5	–	–	–	0.9
West Nile Virus Infections	22	31	9	31	93	4.7	8.9	1.7	3.4	4.1

* Cases per 100,000. Rates based on less than 19 cases or events are considered unreliable. Data are suppressed for 5 or fewer cases.
† Not locally acquired. All infections occurred during travel outside LAC.
‡ Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15–44 years.

Table P-3. Selected Notifiable Diseases and Conditions
SPA 3. San Gabriel Area and Health Districts
LAC, 2017

	Number of Cases					Rate*				
Diseases and Conditions	**AH**	**EM**	**FH**	**PO**	**TOTAL**	**AH**	**EM**	**FH**	**PO**	**TOTAL**
Amebiasis	0	2	0	0	2	–	–	–	–	–
Botulism	0	0	0	0	0	–	–	–	–	–
Brucellosis	0	1	0	0	1	–	–	–	–	–
Campylobacteriosis	61	60	33	54	208	17.3	13.7	10.5	9.8	12.6
Coccidioidomycosis	20	32	14	36	102	5.7	7.3	4.5	6.5	6.2
Cryptosporidosis	1	1	2	3	7	–	–	–	–	0.4
Cysticercosis	0	0	0	0	0	–	–	–	–	–
Dengue†	0	0	1	0	1	–	–	–	–	–
E. coli, Shiga Toxin-Producing	4	2	9	9	24	–	–	2.9	1.6	1.5
Encephalitis	8	6	6	5	25	2.3	1.4	1.9	–	1.5
Giardiasis	3	7	7	15	32	–	1.6	2.2	2.7	1.9
Hansen's Disease	0	0	1	0	1	–	–	–	–	–
Hepatitis A, Acute	2	1	2	4	9	–	–	–	–	0.5
Hepatitis B, Acute Non-Perinatal	2	0	1	1	4	–	–	–	–	–
Hepatitis C, Acute	1	0	0	0	1	–	–	–	–	–
Legionellosis	2	3	6	14	25	–	–	1.9	2.5	1.5
Listeriosis, Nonperinatal	0	1	0	0	1	–	–	–	–	–
Listeriosis, Perinatal‡	0	0	0	0	0	–	–	–	–	–
Lyme Disease	0	0	0	0	0	–	–	–	–	–
Malaria†	0	1	0	2	3	–	–	–	–	–
Measles	0	0	0	0	2	–	–	–	–	–
Meningitis, Viral	8	18	18	15	59	2.3	4.1	5.7	2.7	3.6
Meningococcal Infections	0	0	0	0	0	–	–	–	–	–
Mumps	–	–	–	–	2	–	–	–	–	–
Pertussis	–	–	–	–	45	–	–	–	–	2.7
Pneumococcal Disease, Invasive	11	18	12	22	63	3.1	4.1	3.8	4	3.8
Q-Fever	0	0	0	0	0	–	–	–	–	–
Salmonellosis	45	39	42	58	184	12.8	8.9	13.4	10.5	11.1
Shigellosis	9	10	5	12	36	2.6	2.3	–	2.2	2.2
Streptococcus, Group A Invasive	4	11	5	18	38	–	2.5	–	3.3	2.3
Typhoid Fever, Case	0	0	0	0	0	–	–	–	–	–
Typhoid Fever, Carrier	0	0	0	0	0	–	–	–	–	–
Typhus Fever, Flea-Borne	6	1	6	3	16	1.7	–	1.9	–	1
Vibriosis	2	3	1	2	8	–	–	–	–	0.5
West Nile Virus Infections	10	10	12	15	47	2.8	2.3	3.8	2.7	2.8

* Cases per 100,000. Rates based on less than 19 cases or events are considered unreliable. Data are suppressed for 5 or fewer cases.
† Not locally acquired. All infections occurred during travel outside LAC.
‡ Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15–44 years.

Table P-4. Selected Notifiable Diseases and Conditions
SPA 4. Metro Area and Health Districts
LAC, 2017

	Number of Cases				Rate*			
Diseases and Conditions	CE	HW	NE	TOTAL	CE	HW	NE	TOTAL
Amebiasis	4	11	4	19	–	2.2	–	1.6
Botulism	0	0	0	0	–	–	–	–
Brucellosis	0	0	0	0	–	–	–	–
Campylobacteriosis	53	134	46	233	14.8	26.2	14.4	19.6
Coccidioidomycosis	39	25	22	86	10.9	4.9	6.9	7.2
Cryptosporidosis	12	18	4	34	3.4	3.5	–	2.9
Cysticercosis	0	0	1	1	–	–	–	–
Dengue†	0	0	1	1	–	–	–	–
E. coli, Shiga Toxin-Producing	9	41	5	55	2.5	8	–	4.6
Encephalitis	7	9	6	22	2	1.8	1.9	1.9
Giardiasis	27	73	7	107	7.5	14.3	2.2	9
Hansen's Disease	0	0	0	0	–	–	–	–
Hepatitis A, Acute	4	25	3	32	–	4.9	–	2.7
Hepatitis B, Acute Non-Perinatal	2	4	1	7	–	–	–	0.6
Hepatitis C, Acute	2	1	0	3	–	–	–	–
Legionellosis	4	10	6	20	–	2.0	1.9	1.7
Listeriosis, Nonperinatal	4	1	2	7	–	–	–	0.6
Listeriosis, Perinatal‡	0	0	0	0	–	–	–	–
Lyme Disease	0	0	0	0	–	–	–	–
Malaria†	2	4	1	7	–	–	–	0.6
Measles	–	–	–	1	–	–	–	–
Meningitis, Viral	13	14	7	34	3.6	2.7	2.2	2.9
Meningococcal Infections	0	1	0	1	–	–	–	–
Mumps	–	–	–	44	–	–	–	3.7
Pertussis	–	–	–	41	–	–	–	3.5
Pneumococcal Disease, Invasive	37	23	11	71	10.3	4.5	3.4	6.0
Q-Fever	0	0	0	0	–	–	–	–
Salmonellosis	33	76	34	143	9.2	14.9	10.6	12
Shigellosis	67	148	24	239	18.7	29	7.5	20.1
Streptococcus, Group A Invasive	31	21	29	81	8.7	4.1	9.1	6.8
Typhoid Fever, Case	0	0	1	1	–	–	0.3	0.1
Typhoid Fever, Carrier	0	0	0	0	–	–	–	–
Typhus Fever, Flea-Borne	5	4	10	19	–	–	3.1	1.6
Vibriosis	1	1	2	4	–	–	–	–
West Nile Virus Infections	20	23	7	50	5.6	4.5	2.2	4.2

* Cases per 100,000. Rates based on less than 19 cases or events are considered unreliable. Data are suppressed for 5 or fewer cases.
† Not locally acquired. All infections occurred during travel outside LAC.
‡ Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15–44 years.

Table P-5. Selected Notifiable Diseases and Conditions
SPA 5. West Area
LAC, 2017

Diseases and Conditions	Number of Cases	Rate*
Amebiasis	8	1.2
Botulism	1	–
Brucellosis	2	–
Campylobacteriosis	262	39
Coccidioidomycosis	36	5.4
Cryptosporidosis	21	3.1
Cysticercosis	1	–
Dengue†	3	–
E. coli, Shiga Toxin-Producing	62	9.2
Encephalitis	4	0.6
Giardiasis	58	8.6
Hansen's Disease	0	–
Hepatitis A, Acute	9	1.3
Hepatitis B, Acute Non-Perinatal	1	0.1
Hepatitis C, Acute	0	–
Legionellosis	20	3
Listeriosis, Nonperinatal	3	0.4
Listeriosis, Perinatal‡	0	–
Lyme Disease	0	–
Malaria†	6	0.9
Measles	0	–
Meningitis, Viral	10	1.5
Meningococcal Infections	2	–
Mumps	14	2.1
Pertussis	40	6.0
Pneumococcal Disease, Invasive	29	4.3
Q-Fever	1	–
Salmonellosis	97	14.4
Shigellosis	116	17.3
Streptococcus, Group A Invasive	18	2.7
Typhoid Fever, Case	0	–
Typhoid Fever, Carrier	0	–
Typhus Fever, Flea-Borne	3	–
Vibriosis	4	–
West Nile Virus Infections	8	1.2

* Cases per 100,000. Rates based on less than 19 cases or events are considered unreliable. Data are suppressed for 5 or fewer cases.
† Not locally acquired. All infections occurred during travel outside LAC.
‡ Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15–44 years.

Table P-6. Selected Notifiable Diseases and Conditions
SPA 6. South Area and Health Districts
LAC, 2017

	Number of Cases					Rate*				
Diseases and Conditions	CN	SO	SE	SW	TOTAL	CN	SO	SE	SW	TOTAL
Amebiasis	1	0	2	3	6	–	–	–	–	0.6
Botulism	0	0	0	0	0	–	–	–	–	–
Brucellosis	0	0	0	0	0	–	–	–	–	–
Campylobacteriosis	39	33	25	37	134	13.5	16.5	13.6	9.3	12.5
Coccidioidomycosis	15	13	9	35	72	5.2	6.5	4.9	8.8	6.7
Cryptosporidosis	10	1	0	4	15	3.5	–	–	–	1.4
Cysticercosis	0	0	0	0	0	–	–	–	–	–
Dengue†	0	0	0	1	1	–	–	–	–	–
E. coli, Shiga Toxin-Producing	4	3	2	8	17	–	–	–	2.0	1.6
Encephalitis	0	3	0	1	4	–	–	–	–	–
Giardiasis	4	3	6	15	28	–	–	3.3	3.8	2.6
Hansen's Disease	0	0	0	0	0	–	–	–	–	–
Hepatitis A, Acute	1	0	1	3	5	–	–	–	–	–
Hepatitis B, Acute Non-Perinatal	2	1	0	1	4	–	–	–	–	–
Hepatitis C, Acute	0	0	0	0	0	–	–	–	–	–
Legionellosis	6	5	2	10	23	–	–	–	2.5	2.2
Listeriosis, Nonperinatal	1	0	0	0	1	–	–	–	–	–
Listeriosis, Perinatal‡	0	1	0	0	1	–	–	–	–	–
Lyme Disease	0	0	0	0	0	–	–	–	–	–
Malaria†	0	1	0	2	3	–	–	–	–	–
Measles	0	0	0	0	0	–	–	–	–	–
Meningitis, Viral	10	6	4	6	26	3.5	3.0	–	1.5	2.4
Meningococcal Infections	0	0	1	1	2	–	–	–	–	–
Mumps	–	–	–	–	5	–	–	–	–	–
Pertussis	–	–	–	–	26	–	–	–	–	2.4
Pneumococcal Disease, Invasive	18	12	15	41	86	6.2	6.0	8.2	10.3	8.0
Q-Fever	0	0	0	0	0	–	–	–	–	–
Salmonellosis	18	22	25	38	103	6.2	11.0	13.6	9.6	9.6
Shigellosis	14	17	17	38	86	4.9	8.5	9.3	9.6	8.0
Streptococcus, Group A Invasive	11	6	6	21	44	3.8	3.0	3.3	5.3	4.1
Typhoid Fever, Case	0	0	0	1	1	–	–	–	–	–
Typhoid Fever, Carrier	0	0	0	0	0	–	–	–	–	–
Typhus Fever, Flea-Borne	5	2	4	1	12	–	–	–	–	1.1
Vibriosis	0	2	1	2	5	–	–	–	–	–
West Nile Virus Infections	1	3	1	6	11	–	–	0.5	1.5	1.0

* Cases per 100,000. Rates based on less than 19 cases or events are considered unreliable. Data are suppressed for 5 or fewer cases.
† Not locally acquired. All infections occurred during travel outside LAC.
‡ Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15–44 years.

Table P-7. Selected Notifiable Diseases and Conditions
SPA 7. East Area and Health Districts
LAC, 2017

	Number of Cases					Rate*				
Diseases and Conditions	BF	EL	SA	WH	TOTAL	BF	EL	SA	WH	TOTAL
Amebiasis	1	1	0	2	4	–	–	–	–	–
Botulism	1	0	0	0	1	–	–	–	–	–
Brucellosis	1	2	1	0	4	–	–	–	–	–
Campylobacteriosis	44	26	54	50	174	12.4	12.8	12.5	15.3	13.2
Coccidioidomycosis	24	11	33	13	81	6.8	5.4	7.7	4.0	6.2
Cryptosporidosis	7	1	4	2	14	2.0	–	–	–	–
Cysticercosis	0	0	0	0	0	–	–	–	–	–
Dengue†	0	0	3	0	3	–	–	–	–	–
E. coli, Shiga Toxin-Producing	4	1	7	2	14	–	–	1.6	–	1.1
Encephalitis	8	1	5	7	21	2.3	–	–	2.1	1.6
Giardiasis	7	5	7	7	26	2.0	–	1.6	2.1	2.0
Hansen's Disease	0	0	0	0	0	–	–	–	–	–
Hepatitis A, Acute	9	1	0	8	18	2.5	–	–	2.5	1.4
Hepatitis B, Acute Non-Perinatal	0	1	1	2	4	–	–	–	–	–
Hepatitis C, Acute	0	0	0	0	0	–	–	–	–	–
Legionellosis	4	1	1	8	14	1.1	0.5	0.2	2.5	1.1
Listeriosis, Nonperinatal	0	0	0	0	0	–	–	–	–	–
Listeriosis, Perinatal‡	0	0	1	0	1	–	–	–	–	–
Lyme Disease	0	0	0	0	0	–	–	–	–	–
Malaria†	1	0	0	0	1	–	–	–	–	–
Measles	0	0	0	0	0	–	–	–	–	–
Meningitis, Viral	12	1	9	11	33	3.4	–	2.1	3.4	2.5
Meningococcal Infections	0	0	2	0	2	–	–	–	–	–
Mumps	–	–	–	–	3	–	–	–	–	–
Pertussis	–	–	–	–	57	–	–	–	–	4.3
Pneumococcal Disease, Invasive	13	8	10	16	47	3.7	3.9	2.3	4.9	3.6
Q-Fever	0	0	0	1	1	–	–	–	–	–
Salmonellosis	36	22	43	32	133	10.1	10.8	10	9.8	10.1
Shigellosis	11	10	22	12	55	3.1	4.9	5.1	3.7	4.2
Streptococcus, Group A Invasive	9	4	8	7	28	2.5	–	1.9	2.1	2.1
Typhoid Fever, Case	1	0	0	0	1	–	–	–	–	–
Typhoid Fever, Carrier	0	0	0	0	0	–	–	–	–	–
Typhus Fever, Flea-Borne	0	0	0	0	0	–	–	–	–	–
Vibriosis	1	1	2	1	5	–	–	–	–	–
West Nile Virus Infections	10	3	6	9	28	2.8	–	1.4	2.8	2.1

* Cases per 100,000. Rates based on less than 19 cases or events are considered unreliable. Data are suppressed for 5 or fewer cases.
† Not locally acquired. All infections occurred during travel outside LAC.
‡ Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15–44 years.

Table P-8. Selected Notifiable Diseases and Conditions
SPA 8. South Bay Area and Health Districts
LAC, 2017

	Number of Cases				Rate*			
Diseases and Conditions	HB	IW	TO	TOTAL	HB	IW	TO	TOTAL
Amebiasis	0	3	0	3	–	–	–	–
Botulism	0	0	0	0	–	–	–	–
Brucellosis	0	0	0	0	–	–	–	–
Campylobacteriosis	36	61	87	184	17.1	14.5	18.8	16.8
Coccidioidomycosis	15	49	27	91	7.1	11.6	5.8	8.3
Cryptosporidosis	3	2	3	8	–	–	–	0.7
Cysticercosis	0	0	0	0	–	–	–	–
Dengue†	4	0	2	6	–	–	–	0.5
E. coli, Shiga Toxin-Producing	7	10	17	34	3.3	2.4	3.7	3.1
Encephalitis	3	3	5	11	–	–	–	1.0
Giardiasis	5	5	16	26	–	–	3.5	2.4
Hansen's Disease	0	0	0	0	–	–	–	–
Hepatitis A, Acute	0	0	3	3	–	–	–	–
Hepatitis B, Acute Non-Perinatal	0	1	0	1	–	–	–	–
Hepatitis C, Acute	0	0	1	1	–	–	–	–
Legionellosis	4	9	8	21	–	2.1	1.7	1.9
Listeriosis, Nonperinatal	0	0	2	2	–	–	–	–
Listeriosis, Perinatal‡	0	0	0	0	–	–	–	–
Lyme Disease	0	0	0	0	–	–	–	–
Malaria†	0	4	6	10	–	–	1.3	0.9
Measles	0	0	0	0	–	–	–	–
Meningitis, Viral	7	16	17	40	3.3	3.8	3.7	3.7
Meningococcal Infections	0	1	0	1	–	–	–	–
Mumps	–	–	–	5	–	–	–	–
Pertussis	–	–	–	43	–	–	–	3.9
Pneumococcal Disease, Invasive	14	30	30	74	6.7	7.1	6.5	6.8
Q-Fever	0	0	0	0	–	–	–	–
Salmonellosis	24	34	55	113	11.4	8.1	11.9	10.3
Shigellosis	17	26	17	60	8.1	6.2	3.7	5.5
Streptococcus, Group A Invasive	10	18	20	48	4.8	4.3	4.3	4.4
Typhoid Fever, Case	0	0	1	1	–	–	–	–
Typhoid Fever, Carrier	0	0	0	0	–	–	–	–
Typhus Fever, Flea-Borne	2	1	2	5	–	–	–	–
Vibriosis	1	1	1	3	–	–	–	–
West Nile Virus Infections	5	4	10	19	–	–	2.2	1.7

* Cases per 100,000. Rates based on less than 19 cases or events are considered unreliable. Data are suppressed for 5 or fewer cases.
† Not locally acquired. All infections occurred during travel outside LAC.
‡ Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15–44 years.

Disease Summaries

AMEBIASIS

SUMMARY DATA	
Number of Cases	57
Annual Incidence*	
LA County	0.59
California†	N/A
United States‡	N/A
Age at Diagnosis	
Mean	39
Median	38
Range	1–77 years

* Cases per 100,000 population.
† Data not available.
‡ Not nationally reportable.

DESCRIPTION

Amebiasis[1] is a disease caused by the parasite *Entamoeba histolytica*. Cysts from this parasite shed in human feces and may contaminate food or drinking water. It also can be transmitted person-to-person through fecal-oral spread. The incubation period for amebiasis is 1–4 weeks. While this disease can affect anyone, it is more common among people who live in tropical areas with poor sanitary conditions. Infected people do not always become sick.

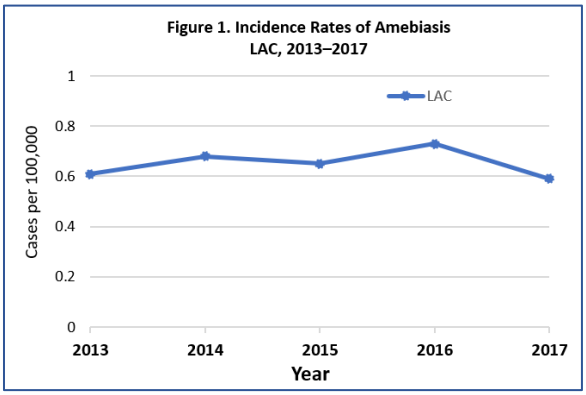
Cases of amebiasis are reportable at the state level. Surveillance is conducted through electronic laboratory reporting—this captures EIA, microscopic, or serologically confirmed amebiasis cases from selected participating hospital and commercial laboratories.

Proper hand hygiene before meals and after using the restroom is a primary method to prevent infection and transmission of amebiasis. Persons who care for diapered and/or incontinent children or adults should ensure that they properly wash their hands. Individuals with diarrheal illness should avoid swimming in recreational waters to prevent transmission of amebiasis and other diseases. Fecal exposure during sexual activity, anal intercourse, and oral-anal sexual practices should also be avoided to prevent transmission of amebiasis. There is no vaccine available to prevent contracting amebiasis.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

- In 2013, the LAC DPH's protocol changed to count only symptomatic persons with suspected gastrointestinal and/or extra-intestinal amebiasis with laboratory evidence of *E. histolytica*. In 2017, LAC DPH continued to count only laboratory confirmed symptomatic infections as confirmed cases of *E. histolytica*.
- This year, the amebiasis disease incidence rate slightly decreased in LAC from 0.73 cases per 100,000 in 2016 to 0.59 cases per 100,000 (**Figure 1**).



- Consistent with previous years, males comprised the majority (80%) of reported cases. The incidence rate of males was five times greater than that of females with 1.0 and 0.2 cases per 100,000, respectively.
- The greatest incidence of amebiasis was in the 35–44-year-old age group (0.9 cases per 100,000) followed by those 15–34 years old (0.7 cases per 100,000) (**Table 1**. Data for **Table 1** is available online.[4]).

[1] www.publichealth.lacounty.gov/acd/Diseases/Amebiasis.htm
[2] www.cdph.ca.gov/Programs/CID/DCDC/Pages/Amebiasis.aspx
[3] www.cdc.gov/parasites/amebiasis/index.html
[4] www.publichealth.lacounty.gov/acd/docs/2017Tables/Amebiasis.xlsx

- Comparing race/ethnicity, the greatest incidence of amebiasis occurred among Whites (0.9 cases per 100,000) (**Table 1**).
- The highest amebiasis incidence rates were documented within SPA 4 (1.6 cases per 100,000) and SPA 5 had the second highest incidence of cases (1.2 cases per 100,000). The high levels in these two SPAs have been consistent over the past five years and may be attributable to a higher number of men who have sex with men in both of those areas (**Figure 2**).
- The number of cases peaked in January, which was inconsistent with the previous five-year average (**Figure 3**).

Figure 2. Incidence Rate of Amebiasis by SPA
LAC, 2013–2017

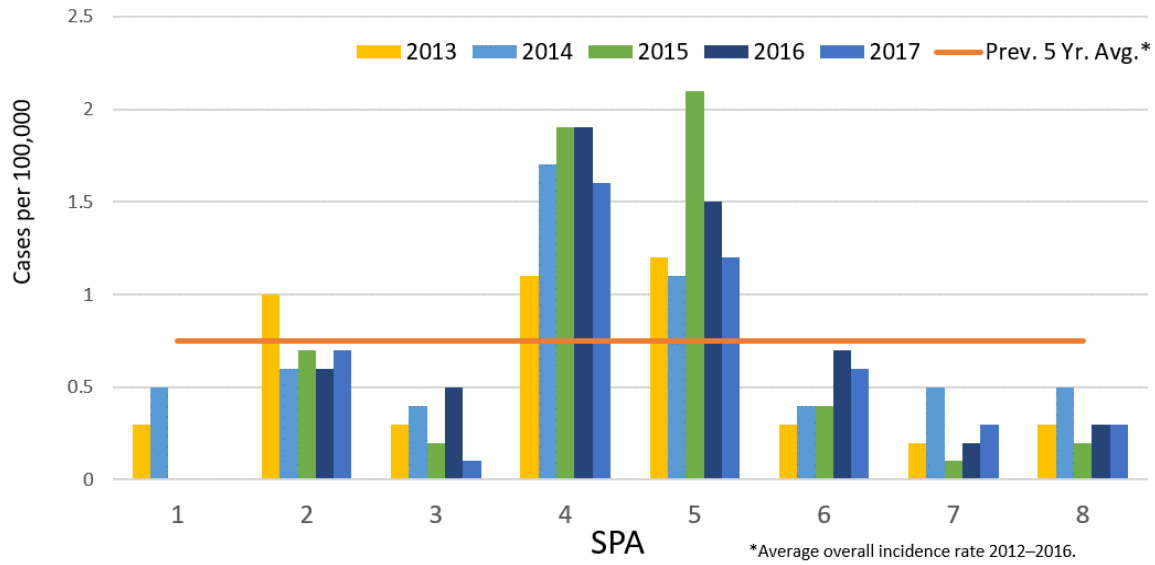


Figure 3. Reported Amebiasis Cases by Month of Onset
LAC, 2017 (N=57)

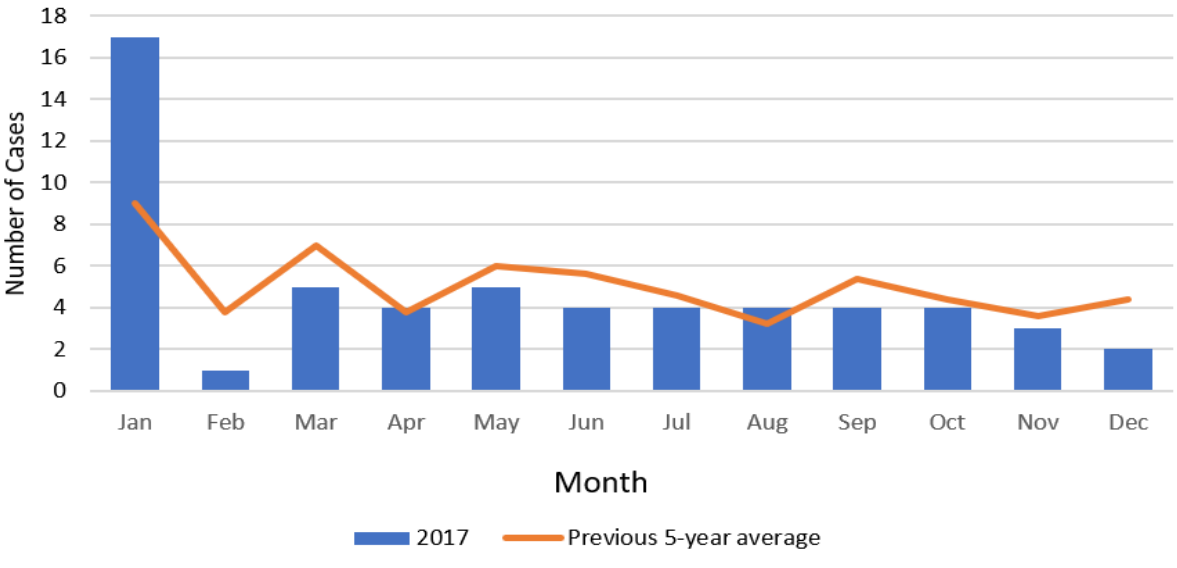
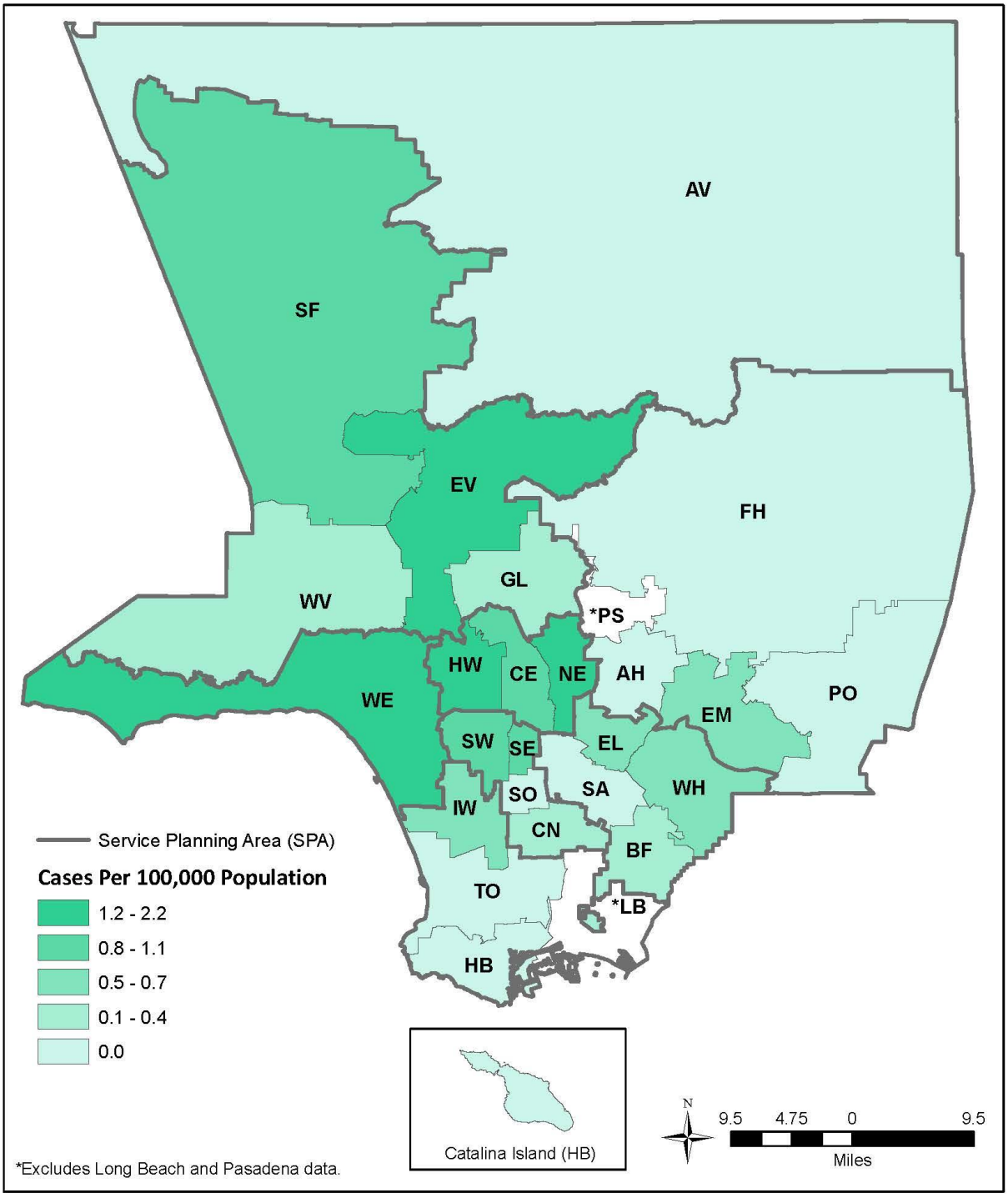


Table 1. Reported Amebiasis Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**57**	**100.0**	**0.61**	**64**	**100.0**	**0.68**	**62**	**100.0**	**0.65**	**70**	**100.0**	**0.73**	**57**	**100.0**	**0.59**
Age Group															
<1	0	–	–	2	3.1	–	0	–	–	0	–	–	0	–	–
1–4	0	–	–	1	1.6	–	2	3.2	–	1	1.4	–	2	3.5	–
5–14	0	–	–	3	4.7	–	4	6.5	–	3	4.3	–	2	3.5	–
15–34	18	31.6	0.6	19	29.7	0.7	20	32.3	0.7	21	30.0	0.7	21	36.8	0.7
35–44	13	22.8	1	17	26.6	1.3	10	16.1	0.8	15	21.4	1.1	12	21.6	0.9
45–54	21	36.8	1.6	12	18.8	0.9	10	16.1	0.8	11	15.7	0.8	8	14.0	0.6
55–64	3	5.3	–	4	6.3	–	12	19.4	1.1	11	15.7	1.0	7	12.3	0.6
65+	2	3.5	–	6	9.4	0.5	4	6.5	–	8	11.4	0.7	5	8.8	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Asian	3	5.3	–	5	7.8	–	4	6.5	–	4	5.7	–	4	7.0	–
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Black	2	3.5	–	7	10.9	0.9	4	6.5	–	3	4.3	–	5	8.8	–
Hispanic	17	29.8	0.4	26	40.6	0.6	16	25.8	0.3	23	32.9	0.5	23	40.4	0.5
White	34	59.6	1.3	23	35.9	0.9	37	59.7	1.4	36	51.4	1.3	24	42.1	0.9
AI/AN‖	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Other	0	–	–	0	–	–	0	–	–	1	1.4	–	0	–	–
Unknown	1	1.8	–	3	4.7	–	1	1.6	–	3	4.3	–	1	1.8	–
SPA															
1	1	1.8	–	2	3.1	–	0	–	–	0	–	–	0	–	–
2	21	36.8	1	13	20.3	0.6	16	25.8	0.7	14	20.0	0.6	15	26.3	0.7
3	5	8.8	–	7	10.9	0.4	3	4.8	–	9	12.9	0.5	2	3.5	–
4	13	22.8	1.1	19	29.7	1.7	22	35.5	1.9	23	32.9	1.9	19	33.3	1.6
5	8	14.0	1.2	7	10.9	1.1	14	22.6	2.1	10	14.3	1.5	8	14.0	1.2
6	3	5.3	–	4	6.3	–	4	6.5	–	8	11.4	0.7	6	10.5	0.6
7	3	5.3	–	7	10.9	0.5	1	1.6	–	3	4.3	–	4	7.0	–
8	3	5.3	–	5	7.8	–	2	3.2	–	3	4.3	–	3	5.3	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
‖ American Indian or Alaskan Native.

Map 1. Amebiasis
Rates by Health District, Los Angeles County, 2017*



CAMPYLOBACTERIOSIS

SUMMARY DATA	
Number of Cases	1,807
Annual Incidence*	
LA County	18.7
California†	20.5
United States‡	16.8
Age at Diagnosis	
Mean	39.0
Median	37.0
Range	0–97 years+

* Cases per 100,000 population.
† CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017
\+ "0" refers to any age between birth and 1 year old , not including 1 year old

DESCRIPTION

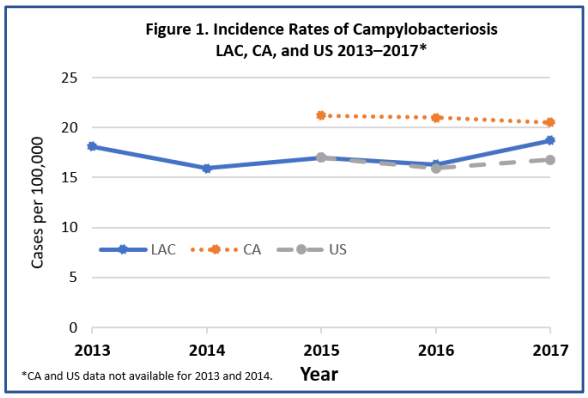
Campylobacteriosis[1] is a bacterial disease caused by several species of gram-negative bacilli including *Campylobacter jejuni, C. upsaliensis, C. coli,* and *C. fetus*. It is transmitted through ingestion of organisms in undercooked poultry or other meat, contaminated food, water, or raw milk or through contact with infected animals. The incubation period is 2–5 days. Common symptoms include watery or bloody diarrhea, fever, abdominal cramps, myalgia, and nausea. Sequelae include Guillain-Barré syndrome and Reiter syndrome, both of which are rare.

To reduce the likelihood of contracting campylobacteriosis, food derived from animal sources, particularly poultry, should be thoroughly cooked. Cross contamination may be avoided by ensuring utensils, counter tops, cutting boards, and sponges are cleaned or do not touch raw poultry or meat or their juices. Hands should be thoroughly washed before, during, and after food preparation. It is important to wash hands and avoid cross contamination of infant foods, bottles, and eating utensils. It is recommended to consume only pasteurized milk, milk products, or juices. In addition, it is important to wash hands after contact with animals or their environments.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

- There was a 15% increase in the incidence of campylobacteriosis from the previous year and a 3.5% increase from 2013 (**Figure 1** and **Table 1**. Data for **Table 1** is available online.[4]).



- SPA 5 had the highest rate (39.0 per 100,000), consistent with previous years (**Figure 2**).
- The highest rates were among children aged <1-year-old (29.2 per 100,000) followed by persons aged 1–4 years old (24.9 per 100,000) (**Figure 3**).
- There were two campylobacteriosis outbreaks in 2017; one from contaminated guacamole served at a restaurant and the second from a chicken liver dish served at a restaurant. See Foodborne Outbreaks report for more detail.
- Routine interviewing of campylobacteriosis cases was discontinued in 2010. However, surveillance of reported cases has allowed monitoring for possible clusters and examining of submitted foodborne illness reports that include a diagnosis of campylobacteriosis.

[1]www.publichealth.lacounty.gov/acd/Diseases/Campy.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Campylobacteriosis.aspx
[3]www.cdc.gov/campylobacter/index.html.
[4]www.publichealth.lacounty.gov/acd/docs/2017Tables/Campy.xlsx

Figure 2. Incidence Rate of Campylobacteriosis by SPA
LAC, 2013–2017

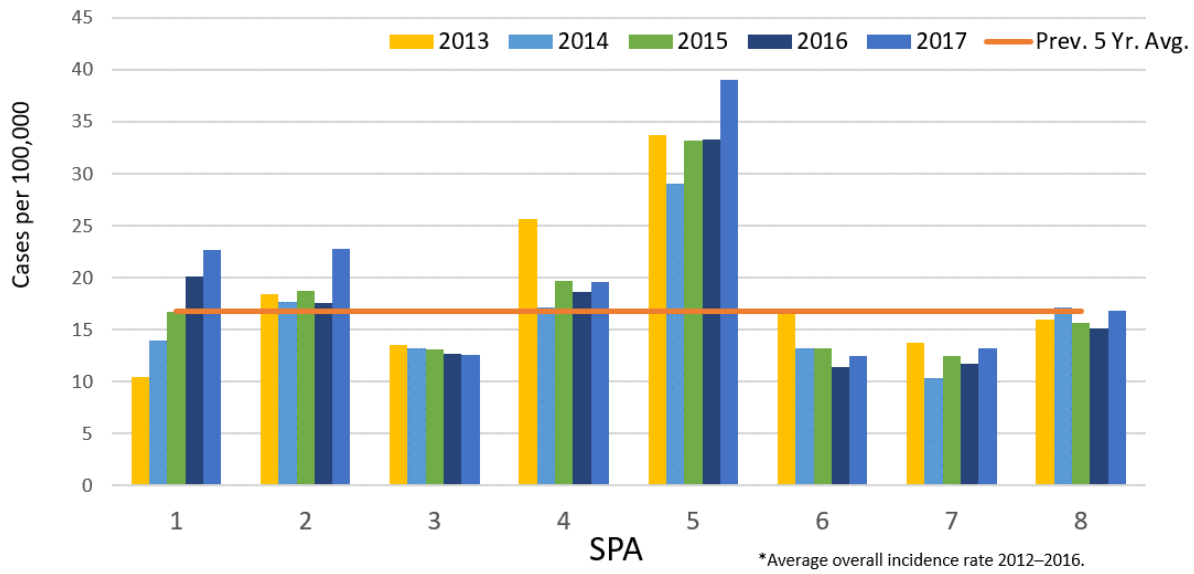


Figure 3. Incidence Rate of Campylobacteriosis by Age Group*
LAC, 2013–2017

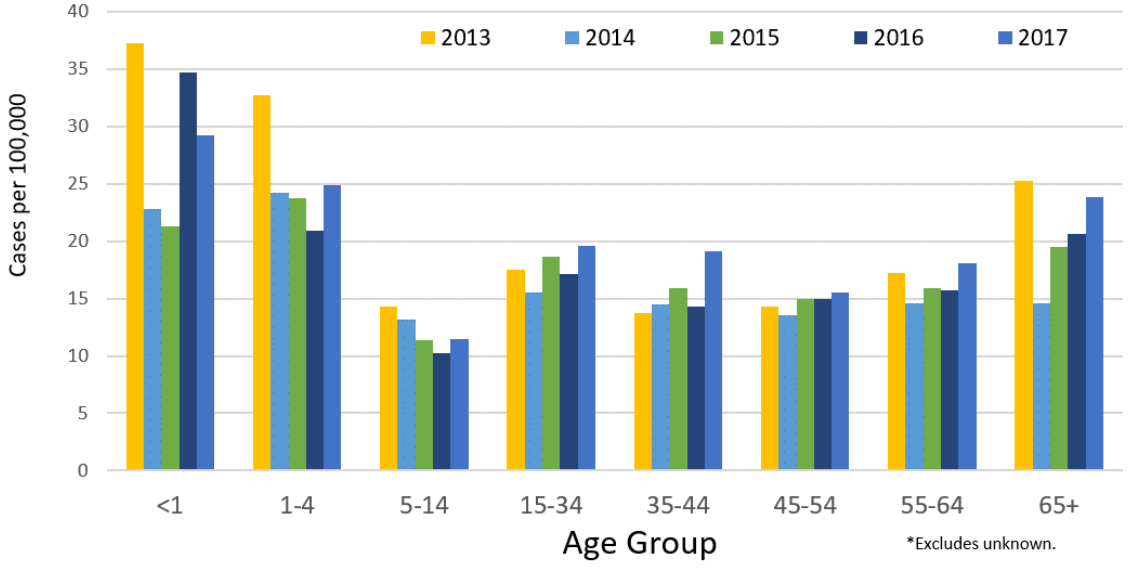
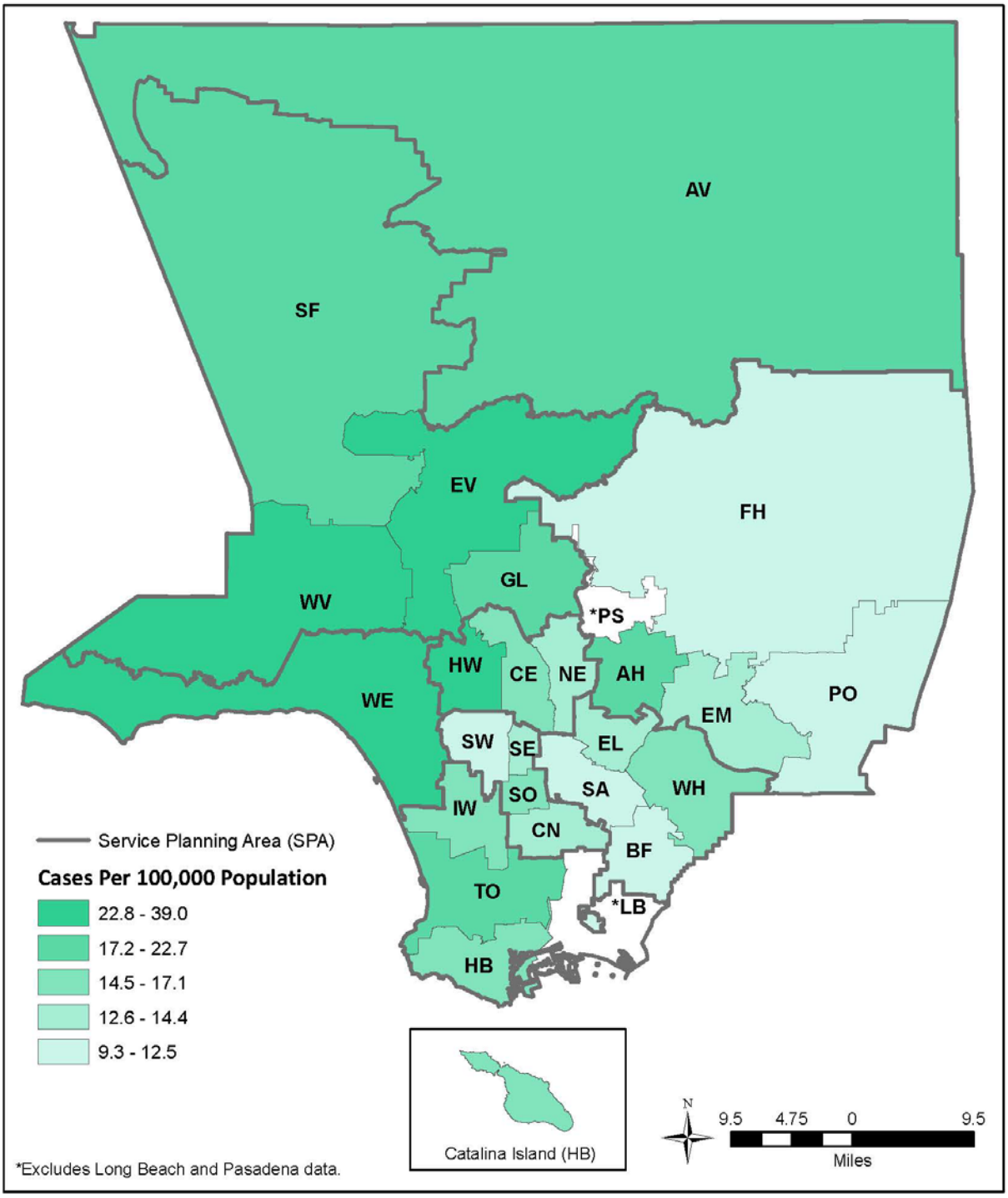


Table 1. Reported Campylobacteriosis Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**1,703**	**100.0**	**18.11**	**1,506**	**100.0**	**15.93**	**1,623**	**100.0**	**16.96**	**1,564**	**100.0**	**16.29**	**1,807**	**100.0**	**18.74**
Age Group															
<1	45	2.6	37.2	27	1.8	22.8	23	1.4	21.3	36	2.3	34.7	30	1.6	29.2
1–4	159	9.3	32.7	118	7.8	24.2	115	7.1	23.7	98	6.2	20.9	112	6.1	24.9
5–14	173	10.2	14.3	159	10.6	13.2	138	8.5	11.4	123	7.8	10.2	139	7.6	11.5
15–34	495	29.1	17.5	437	29.0	15.5	525	32.4	18.6	481	30.7	17.1	550	30.43	19.6
35–44	182	10.7	13.7	192	12.8	14.5	210	12.9	15.9	188	12.0	14.3	253	14.0	19.1
45–54	185	10.9	14.3	175	11.6	13.5	197	12.1	15.0	198	12.6	15.0	207	12.2	15.5
55–64	177	10.4	17.2	155	10.3	14.6	176	10.8	15.9	178	11.3	15.7	212	11.7	18.1
65+	281	16.5	25.3	239	15.9	14.6	233	14.4	19.5	253	16.1	20.6	295	16.3	23.8
Unknown	6	0.4	–	4	0.3	–	6	0.4	0.3	9	0.5	–	9	0.4	–
Race/Ethnicity‡															
Asian	46	2.7	3.4	61	4.1	4.4	43	2.7	3.1	70	4.4	5.0	98	5.4	7.0
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	2	0.11	–
Black	46	2.7	5.9	39	2.6	5.0	25	1.5	3.2	40	2.5	5.1	57	3.15	7.2
Hispanic	167	9.8	3.6	219	14.5	4.8	210	12.9	4.5	259	16.5	5.5	362	20.0	7.6
White	386	22.7	14.5	272	18.1	10.2	264	16.4	9.8	294	18.7	11.0	492	27.2	18.4
AI/AN|	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	6	0.3	35.7
Other	32	1.9	–	25	1.7	–	39	2.4	–	76	4.8	–	273	15.1	–
Unknown	1,026	60.3	–	888	59.0	–	1042	64.2	–	825	52.7	–	517	28.6	–
SPA															
1	41	2.4	10.5	55	3.7	14.0	66	4.1	16.7	79	5.0	20.1	89	4.9	22.7
2	401	23.6	18.4	388	25.8	17.7	416	25.6	18.7	395	25.2	17.6	514	28.4	22.8
3	220	12.9	13.5	217	14.4	13.2	217	13.4	13.1	209	13.3	12.7	208	11.5	12.6
4	292	17.2	25.6	198	13.2	17.2	230	14.2	19.7	220	14.0	18.6	233	12.8	19.6
5	218	12.8	33.7	189	12.6	29.0	219	13.5	33.2	221	14.1	33.3	262	14.4	39
6	175	10.3	17.0	136	9.0	13.2	138	8.5	13.2	122	7.8	11.4	134	7.4	12.5
7	180	10.6	13.7	137	9.1	10.4	165	10.2	12.5	153	9.7	11.7	174	9.6	13.2
8	172	10.1	16.0	185	12.3	17.1	172	10.6	15.7	165	10.5	15.1	184	10.1	16.8
Unknown	4	0.2	–	1	0.1	–	0	–	–	0	–	–	9	0.4	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
| American Indian or Alaskan Native.

Map 2. Campylobacteriosis
Rates by Health District, Los Angeles County, 2017*



COCCIDIOIDOMYCOSIS

SUMMARY DATA	
Number of Cases	1,001
Annual Incidence*	
LA County	10.4
California†	14.4
United States†	10.9
Age at Diagnosis	
Mean	52
Median	53
Range	0–100 years+

* Cases per 100,000 population.
† CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017
\+ "0" refers to any age between birth and 1 year old , not including 1 year old

DESCRIPTION

Coccidioidomycosis[1] (also called Valley Fever) is a fungal disease transmitted through the inhalation of *Coccidioides immitis* spores that are carried in dust. Environmental conditions that can increase the occurrence of coccidioidomycosis include: arid to semi-arid regions, dust storms, hot summers, warm winters, and sandy alkaline soil. This fungus is endemic in southwestern US (including Southern California) and parts of Mexico and South America.

Most infected people exhibit no symptoms or have mild respiratory illness, but a few individuals develop severe illness such as pneumonia, meningitis, or dissemination of the fungus to other parts of the body. Among the wide range of clinical presentations, only the most severe cases are usually diagnosed and reported to public health. Some races/ethnicities and others are at higher risk for severe disease (Blacks, Filipinos, pregnant women, those 5 years old and younger, the elderly, and immunocompromised).

Currently, there is no safe and effective vaccine or drug to prevent coccidioidomycosis. Prevention lies mainly in dust avoidance and control (e.g., planting grass in dusty areas, putting oil on roadways, wetting down soil, air conditioning homes, wearing masks or respirators). In addition, those at high risk for severe disease should avoid travel to endemic areas when conditions are most dangerous for exposure.

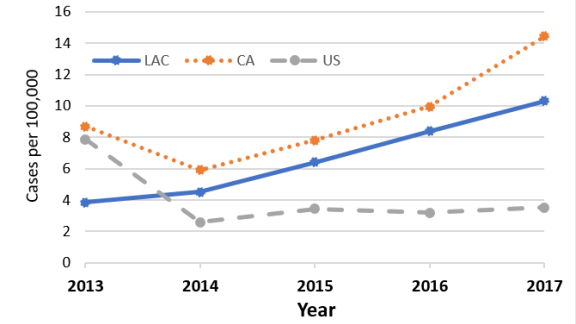
Recovery from the disease confers lifelong immunity to reinfection, highlighting the importance of developing a vaccine for prevention of symptomatic or serious forms of the disease. Increasing exposure and risk associated with construction, a growing naïve population in endemic areas, and antifungal treatments that have side effects and are not uniformly effective validate the need for prevention efforts.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

- The incidence rate of coccidioidomycosis cases increased to 10.38 cases per 100,000 people (**Figure 1**). This may be attributable to an increase in reporting due to more efficient electronic reporting systems and better awareness among providers and the community through education efforts including the annual conferences ACDC conducted in the Antelope Valley (SPA 1). Outreach materials are available on the ACDC coccidioidomycosis website.[1]

Figure 1. Incidence Rates of Coccidioidomycosis LAC, CA, and US 2013–2017



- Most reported cases were among those >65 years old with an incidence rate of 20.3 cases per 100,000 followed by those 55–64 years old (18.3 incidence cases per 100,000) (**Table 1.** Data for **Table 1** is available online.[4]).

[1] www.publichealth.lacounty.gov/acd/Diseases/Cocci.htm
[2] www.cdph.ca.gov/Programs/CID/DCDC/Pages/Coccidioidomycosis.aspx
[3] www.cdc.gov/fungal/diseases/coccidioidomycosis/
[4] www.publichealth.lacounty.gov/acd/docs/2017Tables/Cocci.xlsx

- Males represented 63.3% (13.3 cases per 100,000); females 36.7% (7.5 cases per 100,000)
- Incidence rates were the highest among Blacks at 16.1 per 100,000, which almost tripled from 5.3 per 100,000 since 2014. The incidence rate for NH/OPI at 41.9 per 100,000 (n=8) and for AI/AN at 29.7 per 100,000 (n=5) are also high; however, this rate is considered unreliable based on less than 19 cases. (**Table 1**).
- SPA 1 has consistently reported the highest incidence rate of 54.5 per 100,000, which slightly increased from last year's rate of 53.8 per 100,000 (**Figure 2**).
- In the past, seasonal trends have varied with recent peaks during the summer season. In 2017, higher numbers of cases occurred in the fall. (**Figure 3**).

Figure 2. Incidence Rate of Coccidioidomycosis by SPA
LAC, 2013–2017

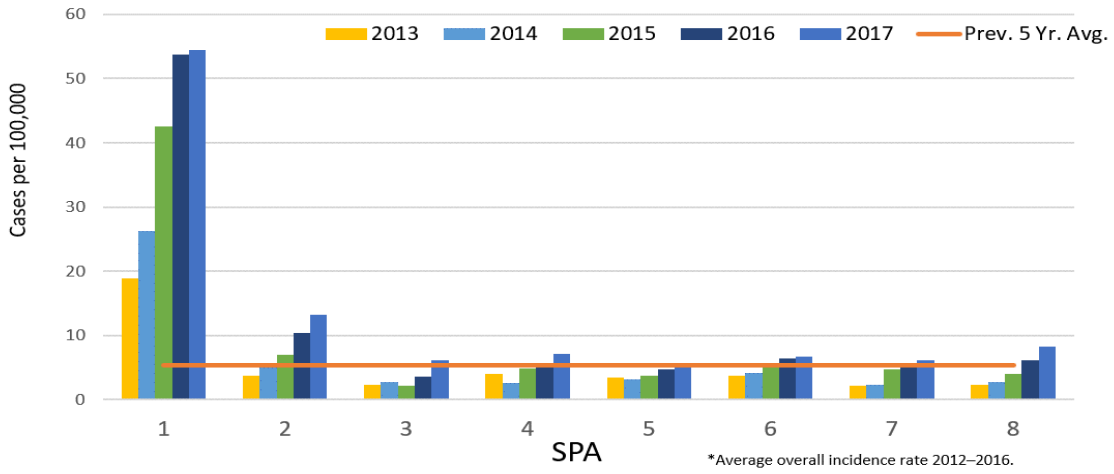


Figure 3. Reported Coccidioidomycosis Cases by Month of Onset
LAC, 2017 (N=1,001)

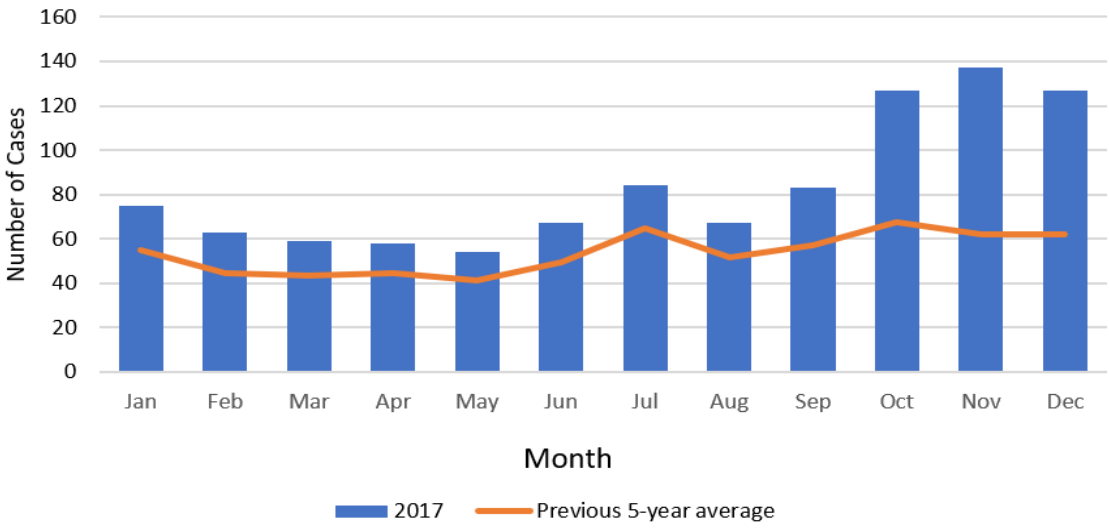
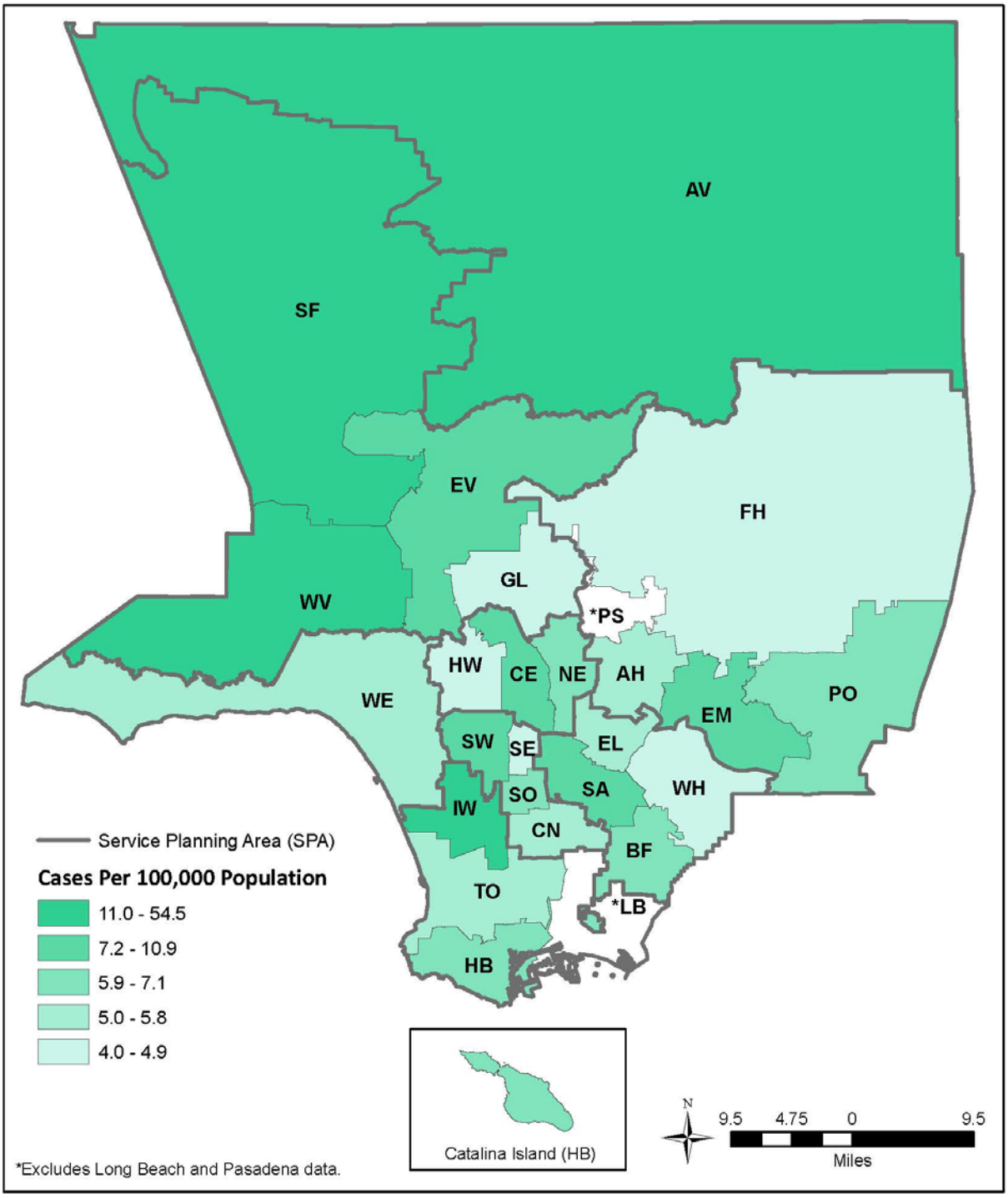


Table 1. Reported Coccidioidomycosis Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**362**	**100.0**	**3.85**	**426**	**100.0**	**4.51**	**613**	**100.0**	**6.40**	**809**	**100.0**	**8.43**	**1,001**	**100.0**	**10.38**
Age Group															
<1	1	0.3	–	0	–	–	0	–	–	0	–	–	1	0.1	–
1–4	0	–	–	1	0.2	–	4	0.7	–	1	0.1	–	2	0.2	–
5–14	6	1.7	0.5	4	0.9	–	7	1.1	0.6	12	1.5	1.0	14	1.4	1.2
15–34	67	18.5	2.4	68	16.0	2.4	96	15.7	3.4	120	14.8	4.3	173	17.2	6.2
35–44	55	15.2	4.1	61	14.3	4.6	98	16.0	7.4	124	15.3	9.4	149	14.9	11.2
45–54	86	23.8	6.7	91	21.4	7.0	127	20.7	9.6	167	20.6	12.6	197	19.7	14.8
55–64	73	20.2	7.1	93	21.8	8.8	109	17.8	9.9	182	22.5	16.1	214	21.4	18.3
65+	74	20.4	6.7	108	25.4	9.5	172	28.1	14.4	203	25.0	16.5	251	25.1	20.3
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Asian	30	8.3	2.2	33	7.7	2.4	47	7.7	3.4	85	10.5	6.1	100	9.1	7.2
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	8	0.8	41.9
Black	50	13.8	6.4	42	9.9	5.3	111	18.1	14.1	112	13.8	14.3	127	12.7	16.1
Hispanic	104	28.7	2.3	139	32.6	3.0	201	32.8	4.3	265	32.8	5.6	320	32.0	6.7
White	132	36.5	5.0	175	40.8	6.6	217	35.4	8.1	288	35.4	10.8	300	30.0	11.2
AI/AN‖	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	5	0.5	–
Other	5	1.4	–	3	0.7	–	13	2.1	–	28	2.1	–	101	10.1	–
Unknown	41	11.3	–	34	8.0	–	24	3.9	–	31	3.9	–	40	4.0	–
SPA															
1	74	20.4	18.9	103	24.2	26.2	169	27.6	42.6	211	26.0	53.8	214	21.4	54.5
2	83	22.9	3.8	125	29.3	5.7	157	25.6	7.0	232	28.7	10.4	299	29.8	13.2
3	38	10.5	2.3	44	10.3	2.7	36	5.9	2.2	60	7.4	3.6	102	10.2	6.2
4	46	12.7	4.0	30	7.0	2.6	57	9.3	4.9	59	7.3	5.0	86	8.5	7.2
5	22	6.1	3.4	21	4.9	3.2	25	4.1	3.8	31	3.8	4.7	36	3.6	5.4
6	38	10.5	3.7	42	9.9	4.1	57	9.3	5.4	70	8.7	6.5	72	7.2	6.7
7	29	8.0	2.2	30	7.0	2.3	64	10.4	4.8	73	9.0	5.6	81	8.1	6.2
8	25	6.9	2.3	29	6.8	2.7	44	7.2	4.0	67	8.3	6.1	91	9.1	8.3
Unknown	7	1.9	–	2	0.5	–	4	0.7	–	4	0.5	–	0	–	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
‖ American Indian or Alaskan Native.

Map 3. Coccidioidomycosis
Rates by Health District, Los Angeles County, 2017*



CRYPTOSPORIDIOSIS

SUMMARY DATA	
Number of Cases	148
Annual Incidence*	
LA County	1.5
California†	0.5
United States†	3.5
Age at Diagnosis	
Mean	34
Median	33
Range	0–84 years+

* Cases per 100,000 population.
† CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017
\+ "0" refers to any age between birth and 1 year old, not including 1 year old

DESCRIPTION

Cryptosporidiosis[1] is a diarrheal disease caused by the microscopic parasite *Cryptosporidium*. Both the parasite and disease are commonly known as "Crypto." There are many species of *Cryptosporidium* that infect animals, some of which also infect humans. The parasite is protected by an outer shell that allows it to survive outside the body for long periods of time and makes it very tolerant to chlorine disinfection.

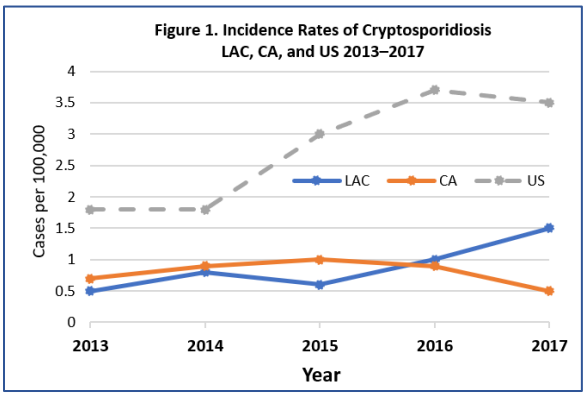
Those who have a weakened immune system may experience prolonged illness. Immunocompromised individuals (e.g., HIV/AIDS, cancer, and transplant patients), young children, and pregnant women are at risk for more severe illness.

While this parasite can be spread in several different ways, water (drinking and recreational water) is the most common way to spread the parasite. *Cryptosporidium* is a leading cause of waterborne disease among humans in the US.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

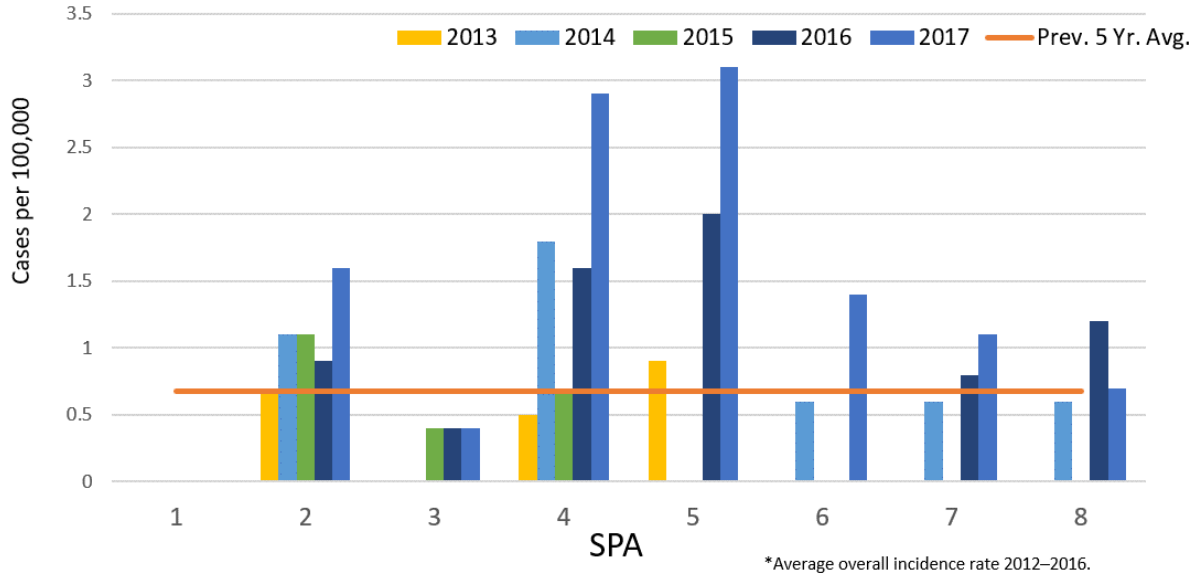
- The incidence rate of cryptosporidiosis cases in LAC in 2017 was 1.53 cases per 100,000 people. This is an increase over previous years (**Figure 1**), which might be due to adoption of electronic laboratory reporting and new testing methods enacted among local pathology labs.



- The incidence rate among men (1.8 cases per 100,000) was higher than that among women (1.3 cases per 100,000).
- The greatest incidence of cryptosporidiosis was in persons 15–34 years old (2.4 cases per 100,000) followed by those 35–44 years old (2.0 cases per 100,000) (**Table 1.** Data for **Table 1** is available online.[4]).
- Information on race and risk factors are incomplete since routine interviews of cryptosporidiosis cases were discontinued as of October 2015. However, surveillance monitors for clusters and review of cryptosporidiosis with positive laboratory reports.
- SPA 5 had the highest incidence rate with 3.1 cases per 100,000. The second highest incidence rate was seen in SPA 4, with 2.9 cases per 100,000 (**Figure 2**).
- There was no clear peak of cryptosporidiosis incidence in 2017. However, most cases occurred during the hot summer months of July, August, September, and October, which is consistent with risk factors such as exposure to recreational water, hiking, and travel (**Figure 3**).

[1]www.publichealth.lacounty.gov/acd/Diseases/Crypto.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Cryptosporidiosis.aspx
[3]www.cdc.gov/parasites/crypto/index.html
[4]publichealth.lacounty.gov/acd/docs/2017Tables/Crypto.xlsx

Figure 2. Incidence Rate of Cryptosporidiosis by SPA
LAC, 2013–2017



*Average overall incidence rate 2012–2016.

Figure 3. Reported Cryptosporidiosis Cases by Month of Onset
LAC, 2017 (N=148)

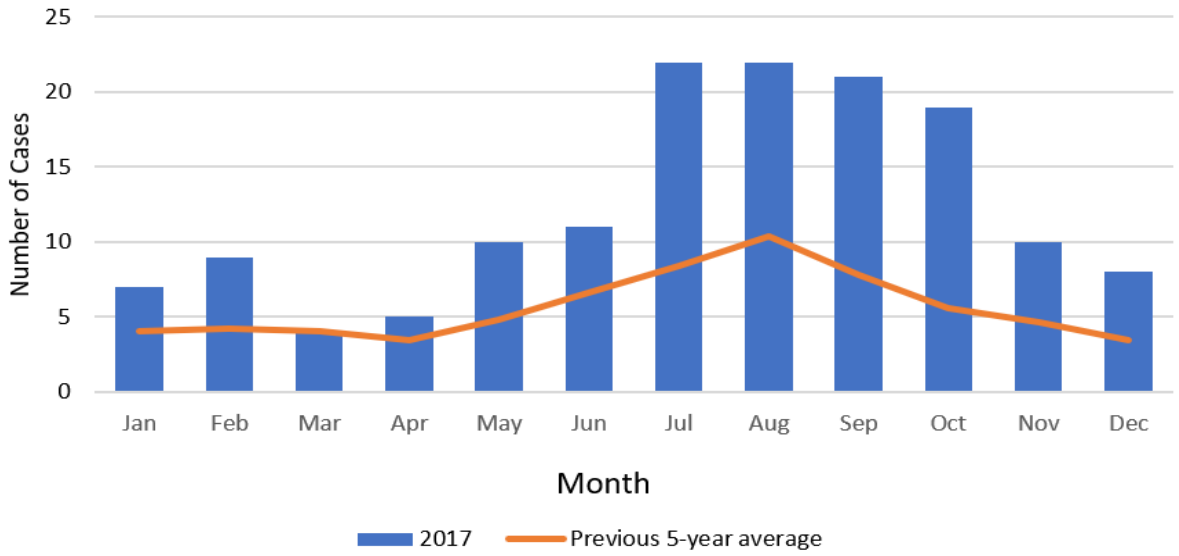
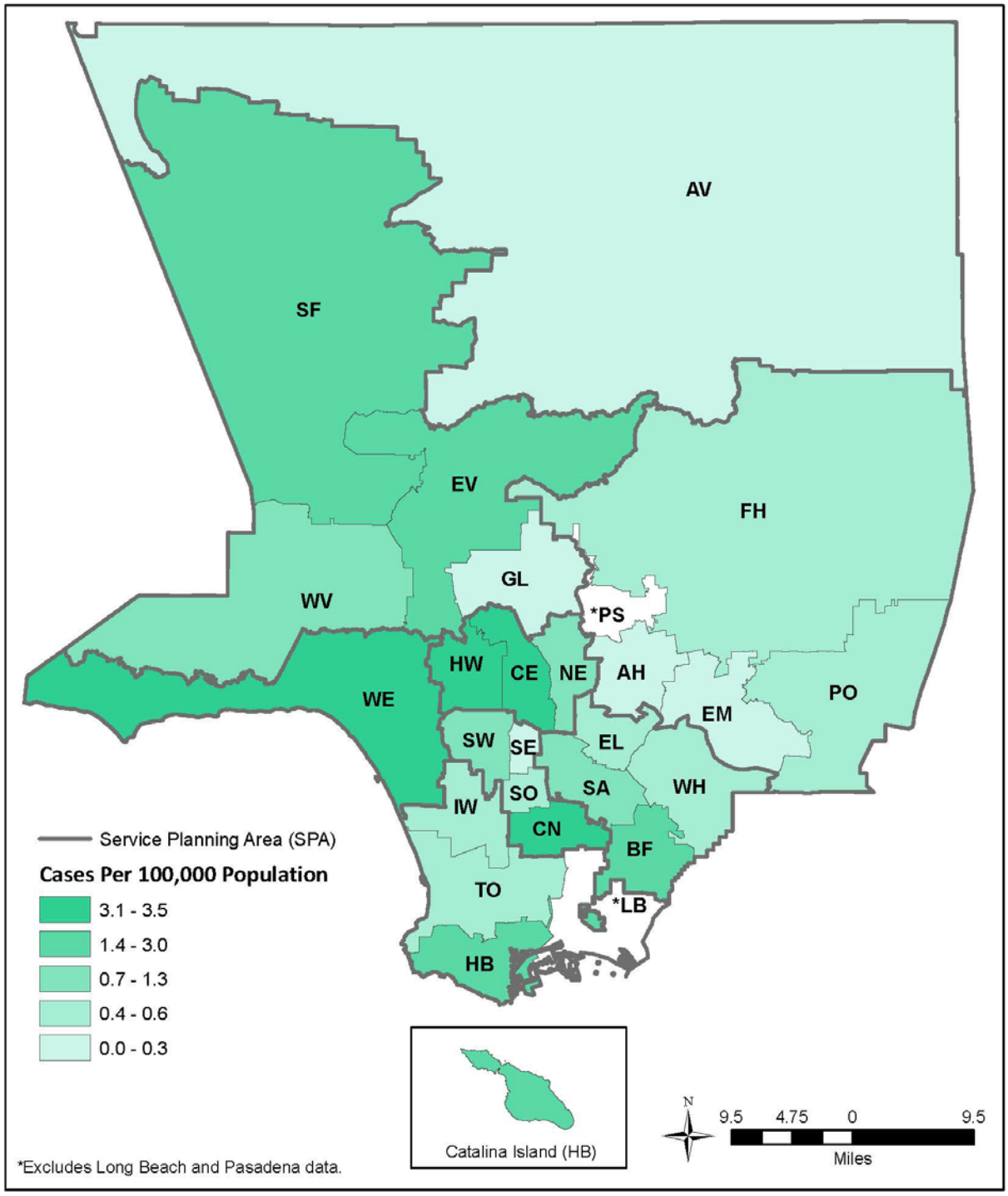


Table 1. Reported Cryptosporidiosis Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**48**	**100.0**	**0.51**	**78**	**100.0**	**0.83**	**56**	**100.0**	**0.59**	**98**	**100.0**	**1.02**	**148**	**100.0**	**1.53**
Age Group															
<1	0	–	–	0	–	–	0	–	–	0	–	–	1	0.7	–
1–4	1	2.1	–	2	2.6	–	2	3.6	–	8	8.2	1.7	8	5.4	1.8
5–14	2	4.2	–	5	6.4	–	5	8.9	–	10	10.2	0.8	12	8.1	1.0
15–34	16	33.3	0.6	29	37.2	1.0	25	44.6	0.9	34	34.7	1.2	66	44.6	2.4
35–44	8	16.7	0.6	17	21.8	1.3	9	16.1	0.7	13	13.3	1.0	26	17.6	2.0
45–54	14	29.2	1.1	15	19.2	1.2	6	10.7	0.5	20	20.4	1.5	12	8.1	0.9
55–64	2	4.2	–	5	6.4	–	6	10.7	0.5	7	7.14	0.6	13	8.8	1.1
65+	5	10.4	–	4	5.1	–	3	5.4	–	5	5.1	–	10	6.8	0.8
Unknown	0	–	–	1	1.3	–	0	–	–	1	1.0	–	0	–	–
Race/Ethnicity‡															
Asian	2	4.2	–	5	6.4	–	4	7.1	–	3	3.1	–	4	2.7	–
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Black	12	25.0	1.5	12	15.4	1.5	2	3.6	–	5	5.1	–	0	–	–
Hispanic	7	14.6	0.2	22	28.2	0.5	16	28.6	0.3	13	13.3	0.3	37	25.0	0.8
White	24	50.0	0.9	34	43.7	1.3	21	37.5	0.8	25	25.5	0.9	38	25.7	1.4
AI/AN|	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Other	2	4.2	–	2	2.6	–	0	–	–	3	3.1	–	7	4.7	–
Unknown	1	2.1	–	3	3.8	–	13	23.2	–	49	50.0	–	62	41.9	–
SPA															
1	4	8.3	–	3	3.8	–	0	–	–	3	3.1	–	1	0.7	–
2	15	31.3	0.7	23	29.5	1.1	24	42.9	1.1	20	20.4	0.9	36	24.3	1.6
3	4	8.3	–	5	6.4	–	7	12.5	0.4	6	6.1	0.4	7	4.7	0.4
4	6	12.5	0.5	21	26.9	1.8	8	14.3	0.7	19	19.4	1.6	34	23.0	2.9
5	6	12.5	0.9	4	5.1	–	4	7.1	–	13	13.3	2.0	21	14.2	3.1
6	5	10.4	–	6	7.7	0.6	5	8.9	–	5	5.1	–	15	10.1	1.4
7	3	6.3	–	8	10.2	0.6	3	5.4	–	11	11.2	0.8	14	9.5	1.1
8	5	10.4	–	7	9.0	0.6	3	5.4	–	13	13.3	1.2	8	5.4	0.7
Unknown	0	–	–	1	1.3	–	2	3.6	–	8	8.2	–	12	8.1	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
| American Indian or Alaskan Native.

Map 4. Cryptosporidiosis
Rates by Health District, Los Angeles County, 2017*



ENCEPHALITIS

SUMMARY DATA	
Number of Cases	129
Annual Incidence*	
LA County	1.3
California†	N/A
United States‡	N/A
Age at Diagnosis	
Mean	64
Median	68
Range	0–96 years+

* Cases per 100,000 population.
† Data not available.
‡ Not nationally reportable.
+ "0" refers to any age between birth and 1 year old, not including 1 year old

DESCRIPTION

Encephalitis[1], or meningoencephalitis, is a disease that includes inflammation of parts of the brain, spinal cord, and meninges. This disease can be caused by infection from a number of different agents such as viral, parasitic, fungal, rickettsial, bacterial, and chemical. This disease can result in symptoms such as headache, stiff neck, fever, and altered mental status.

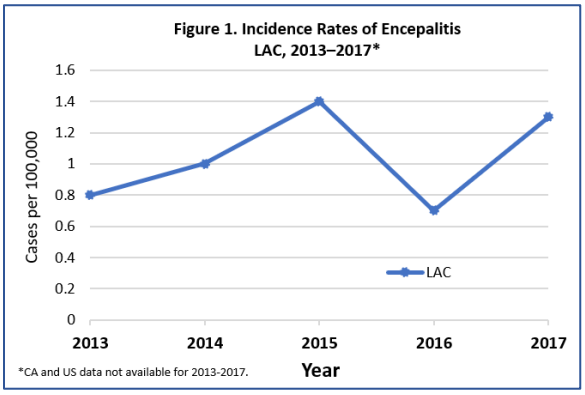
Arboviral, or mosquito-borne, encephalitis can be prevented by personal protection and mosquito control. Arboviruses are viruses that are maintained in nature through transmission between susceptible vertebrate hosts via blood feeding arthropods such as mosquitoes, ticks, and certain mites and gnats. Arboviruses have a global distribution. There are five main types of encephalitis in the US: West Nile virus (WNV), eastern equine encephalitis (EEE), western equine encephalitis (WEE), St. Louis encephalitis (SLE), and La Crosse (LAC) encephalitis. All of these diseases are transmitted by mosquitoes.

Healthcare providers and diagnostic laboratories in LAC are required to report all suspected encephalitis cases including primary and post-infectious encephalitis to LAC DPH. This surveillance excludes individuals with underlying Human Immunodeficiency Virus (HIV) infection. Reporters are required to identify the cause as either viral, bacterial, fungal, or parasitic. Encephalitis cases are categorized as unspecified if no pathogen is identified in the cerebrospinal fluid or blood and there is no evidence of a bacterial, viral, or fungal etiology. For the purpose of surveillance, LAC DPH requires a case to have clinically compatible illness. LAC DPH conducts passive surveillance of encephalitis cases.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

- This year, the encephalitis disease incidence rate decreased in LAC from 0.72 cases per 100,000 in 2016 to 1.34 cases per 100,000 (**Figure 1**).



- The greatest incidence of encephalitis was among the 65+ age group (6.3 cases per 100,000) followed by those 55–64-years old (2.1 cases per 100,000) (**Table 1**. Data for **Table 1** is available online.[4]).
- Comparing race/ethnicity, the greatest incidence of encephalitis occurred among Whites (2.4 cases per 100,000) (**Table 1**).
- The highest encephalitis incidence rates were documented within SPA 4 (1.9 per 100,000) and SPAs 2 and 7 had the second highest incidences of cases (1.6 per 100,000) (**Figure 2**).

[1]www.publichealth.lacounty.gov/acd/Diseases/Encephalitis.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/SLE.aspx
[3]www.cdc.gov/sle/
[4]publichealth.lacounty.gov/acd/docs/2017Tables/Encephalitis.xlsx

Figure 2. Incidence Rate of Encephalitis by SPA
LAC, 2013–2017

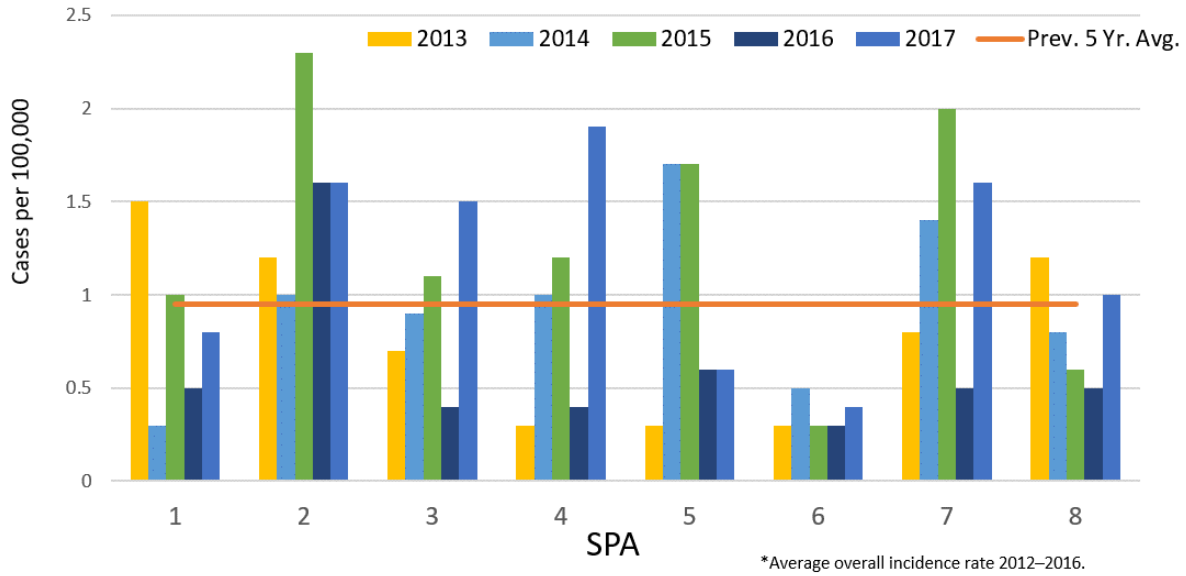
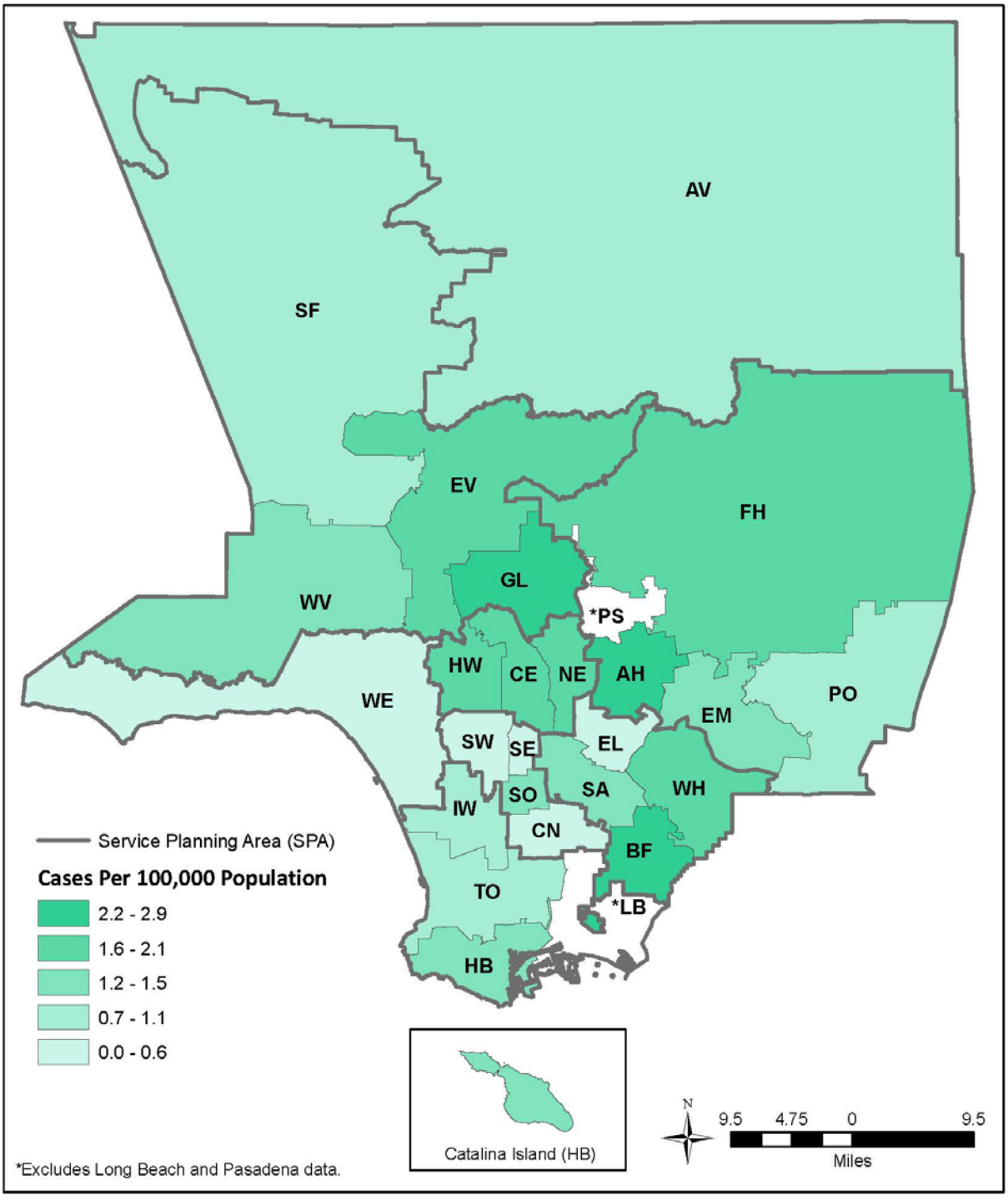


Table 1. Reported Encephalitis Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**79**	**100.0**	**0.84**	**92**	**100.0**	**0.97**	**136**	**100.0**	**1.42**	**69**	**100.0**	**0.72**	**129**	**100.0**	**1.34**
Age Group															
<1	1	1.3	–	1	1.1	–	0	–	–	–	–	–	1	0.8	–
1–4	4	5.1	–	2	2.2	–	1	0.7	–	–	–	–	1	0.8	–
5–14	7	8.9	0.6	4	4.3	–	7	5.1	0.6	–	–	–	6	4.7	0.5
15–34	6	7.6	0.2	5	5.4	–	5	3.7	–	5	7.2	–	4	3.1	–
35–44	1	1.3	–	3	3.3	–	6	4.4	0.5	3	4.3	–	3	2.3	–
45–54	13	16.5	1.0	10	10.9	0.8	16	11.8	1.2	6	8.7	0.5	11	8.5	0.8
55–64	19	24.1	1.9	23	25.0	2.2	14	10.3	1.3	8	11.6	0.7	25	19.4	2.1
65+	28	25.3	2.5	44	47.8	3.9	87	64.0	7.3	47	68.1	3.8	78	60.4	6.3
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Asian	6	7.6	0.4	8	8.7	0.6	4	2.9	–	3	4.3	–	9	7.0	0.6
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Black	2	2.5	–	3	3.3	–	3	2.2	–	3	4.3	–	4	3.1	–
Hispanic	20	25.3	0.4	24	26.1	0.5	51	37.5	1.1	19	27.5	0.4	44	34.1	0.9
White	36	45.6	1.4	40	43.5	1.5	62	45.6	2.3	33	47.8	1.2	64	49.6	2.4
AI/AN|	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Other	3	3.8	–	0	–	–	1	0.7	–	1	1.4	–	2	1.6	–
Unknown	12	15.2	–	17	18.5	–	15	11.0	–	10	14.5	–	6	4.6	–
SPA															
1	6	7.6	1.5	1	1.1	–	4	2.9	–	2	2.9	–	3	2.3	–
2	27	34.2	1.2	21	22.8	1.0	52	38.2	2.3	36	52.2	1.6	37	28.7	1.6
3	11	13.9	0.7	14	15.2	0.9	19	14.0	1.1	6	8.7	0.4	25	19.4	1.5
4	3	3.8	–	12	13.0	1.0	14	10.3	1.2	5	7.2	–	22	17.1	1.9
5	2	2.5	–	11	12.0	1.7	11	8.1	1.7	4	5.8	–	4	3.1	–
6	3	3.8	–	5	5.4	–	3	2.2	–	3	4.3	–	4	3.1	–
7	11	13.9	0.8	18	19.6	1.4	26	19.1	2.0	6	8.7	0.5	21	16.3	1.6
8	13	16.5	1.2	9	9.8	0.8	7	5.1	0.6	5	7.3	–	11	8.5	1
Unknown	3	3.8	–	1	1.1	–	0	–	–	2	2.9	–	2	1.5	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
| American Indian or Alaskan Native.

Map 5. Encephalitis
Rates by Health District, Los Angeles County, 2017*



SHIGA TOXIN-PRODUCING *ESCHERICHIA COLI* (STEC)

SUMMARY DATA	
Number of Cases	309
Annual Incidence*	
LA County	3.2
California†, **	0.8
United States†, **	2.7
Age at Diagnosis	
Mean	33
Median	28
Range	0–97 years+

* Cases per 100,000 population.
† CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017
** Includes *E. coli* O157:H7, Shiga toxin-positive, serogroup non-O157, and Shiga toxin-positive, not sero-grouped
\+ "0" refers to any age between birth and 1 year old, not including 1 year old

DESCRIPTION

Shiga toxin-producing *Escherichia coli* (*E. coli*) (STEC)[5] is a disease caused by a Gram-negative bacillus. This bacillus is a specific serotype of STEC and the most common serotype in the US. Symptoms of Shiga toxins are abdominal cramps and watery diarrhea, often developing into bloody diarrhea. Hemolytic uremic syndrome (HUS) is a clinical diagnosis and may or may not be associated with STEC. Children younger than five years old are at highest risk for HUS.

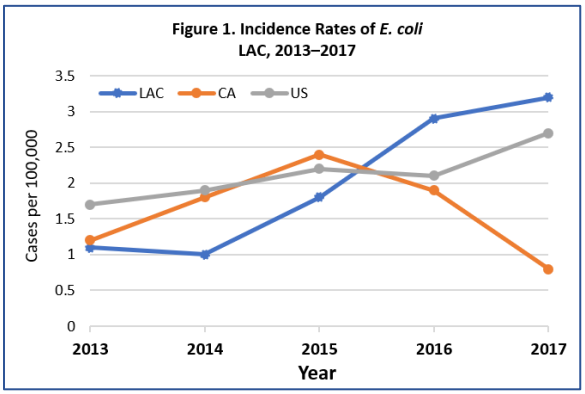
E. coli are bacteria that live in the intestines of people and animals. Most *E. coli* are harmless and do not cause illness. STEC make toxins that can cause severe illness. STEC is commonly heard about in the news in association with foodborne outbreaks. The most commonly recognized STEC strain is *E. coli* O157:H7. Other STEC strains are commonly referred to as non-O157 STEC and may also cause foodborne illnesses. Illnesses have been linked to consumption of food or drinks contaminated by animal feces including undercooked ground beef, unpasteurized apple juice/cider, raw milk, produce, and flour, and recreational exposure to contaminated water. Person-to-person contact in families and childcare centers due to poor personal hygiene and inadequate hand washing can cause further transmission.

Most *E. coli* are harmless and are actually an important part of a healthy human intestinal tract. However, some can cause illness. People with weak immune systems are at great risk for severe illness from STEC. Prevention includes proper hand hygiene, avoiding cross-contaminating in food preparation areas, avoiding raw unpasteurized products, and avoiding swallowing water when swimming or playing in recreational water.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC

2017 TRENDS AND HIGHLIGHTS

- This year, the STEC disease incidence rate decreased in LAC from 2.94 cases per 100,000 in 2016 to 3.20 cases per 100,000 (**Figure 1**).



- The greatest incidence of STEC was among the 1-4 age group (12.2 cases per 100,000) followed by those <1-years old (7.8 cases per 100,000) (**Table 1**. Data for **Table 1** is available online.[3]).
- The highest STEC incidence rates were documented within SPA 5 (9.2 per 100,000) and SPA 4 had the second highest incidence of cases (4.6 per 100,000) (**Figure 2**).
- The number of cases peaked in August (**Figure 3**).

[4]publichealth.lacounty.gov/acd/docs/2017Tables/E%20coli.xlsx

[5]www.publichealth.lacounty.gov/acd/Diseases/eColi.htm
[6]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Shiga-toxin-producing-Escherichia-coli.aspx
[7]www.cdc.gov/ecoli/index.html

Figure 2. Incidence Rate of *Escherichia coli*–Shiga Toxin-Producing (STEC) by SPA
LAC, 2013–2017

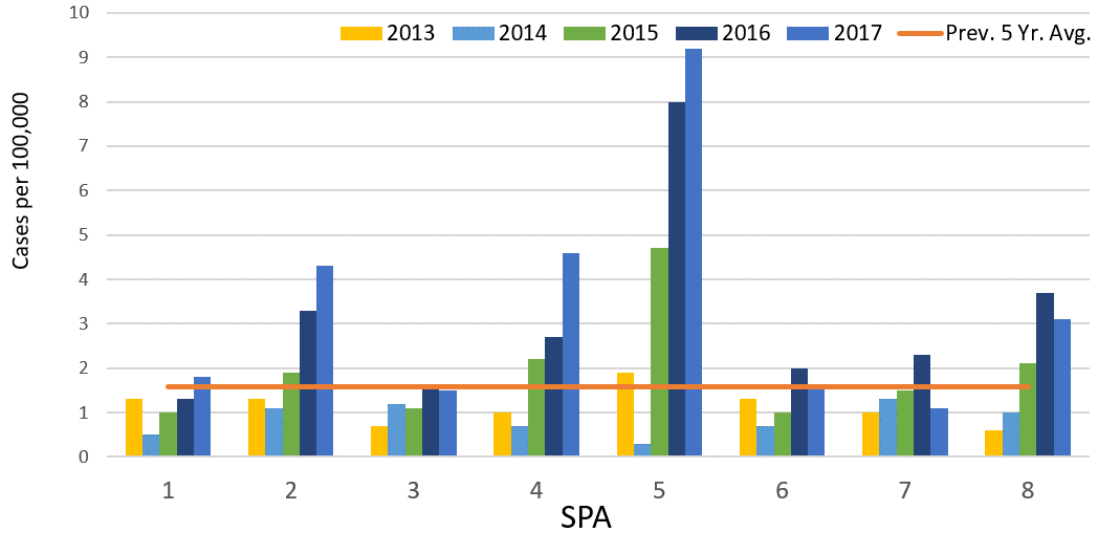


Figure 3. Reported Shiga Toxin-Producing *E. coli* Cases by Month of Onset
LAC, 2017 (N=309)

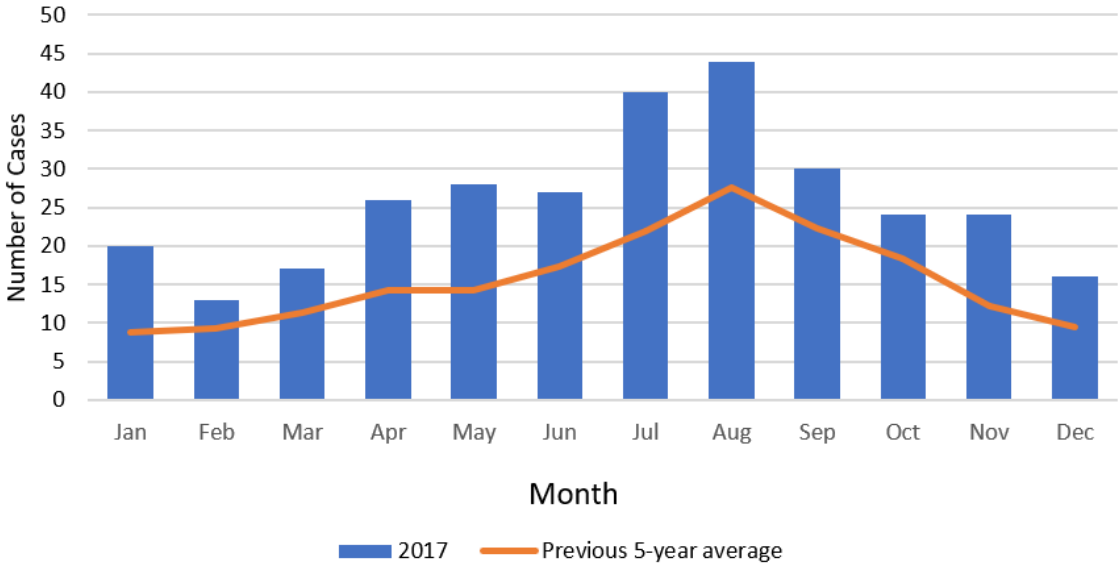
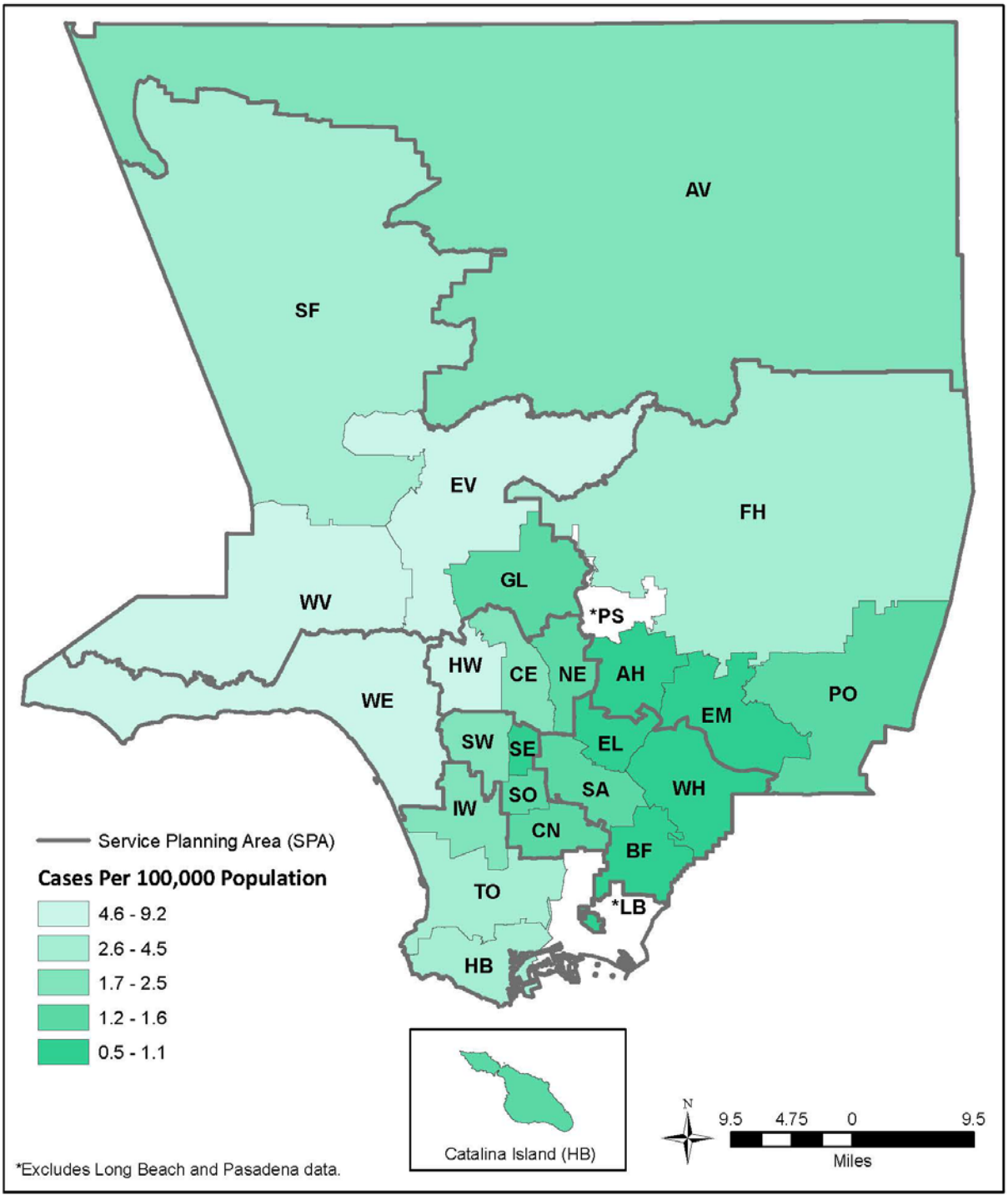


Table 1. Reported STEC Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**102**	**100.0**	**1.08**	**90**	**100.0**	**0.95**	**175**	**100.0**	**1.83**	**282**	**100.0**	**2.94**	**309**	**100.0**	**3.20**
Age Group															
<1	5	4.9	–	1	1.1	–	5	2.9	–	10	3.5	9.6	8	2.5	7.8
1–4	43	42.2	8.8	42	46.7	8.6	44	25.1	9.1	45	15.9	9.6	55	17.7	12.2
5–14	17	16.7	1.4	17	18.9	1.4	24	13.7	2.0	41	14.5	3.4	31	10.0	2.6
15–34	24	23.5	0.8	10	11.1	0.4	42	24.0	1.5	57	20.2	2.0	93	30.0	3.3
35–44	4	3.9	–	4	4.4	–	14	8.0	1.1	29	10.2	2.2	21	6.7	1.6
45–54	3	2.9	–	8	8.9	0.6	14	8.0	1.1	23	8.1	1.7	23	7.4	1.7
55–64	1	1.0	–	4	4.4	–	15	8.6	1.4	21	7.4	1.9	29	9.3	2.5
65+	5	4.9	–	4	4.4	–	17	9.7	1.4	56	19.8	4.6	49	15.8	4
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Asian	2	2.0	–	5	5.6	–	13	7.4	0.9	11	3.9	0.8	17	5.5	1.2
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Black	5	4.9	–	3	3.3	–	11	6.3	1.4	16	5.6	2.0	13	4.2	1.6
Hispanic	57	55.9	1.2	54	60.0	1.2	72	41.1	1.5	108	38.2	2.3	110	35.5	2.3
White	36	35.3	1.4	25	27.8	0.9	74	42.3	2.8	147	52.1	5.5	159	51.4	5.9
AI/AN‖	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Other	0	–	–	0	–	–	2	1.1	–	0	–	–	4	1.2	–
Unknown	2	2.0	–	3	3.3	–	3	1.7	–	0	–	–	6	1.9	–
SPA															
1	5	4.9	–	2	2.2	–	4	2.3	–	5	1.7	–	7	2.2	1.8
2	29	28.4	1.3	23	25.6	1.1	42	24.0	1.9	74	26.2	3.3	96	31.0	4.3
3	12	11.8	0.7	20	22.2	1.2	19	10.9	1.1	27	9.5	1.6	24	7.7	1.5
4	11	10.8	1.0	8	8.9	0.7	26	14.9	2.2	32	11.3	2.7	55	17.7	4.6
5	12	11.8	1.9	2	2.2	–	31	17.7	4.7	53	18.7	8.0	62	20.0	9.2
6	13	12.7	1.3	7	7.8	0.7	10	5.7	1.0	21	7.4	2.0	17	5.5	1.6
7	13	12.7	1.0	17	18.9	1.3	20	11.4	1.5	30	10.6	2.3	14	4.5	1.1
8	7	6.9	0.6	11	12.2	1.0	23	13.1	2.1	40	14.1	3.7	34	11.0	3.1
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
‖ American Indian or Alaskan Native.

Map 6. E. Coli—Shiga Toxin-Producing Rates by Health District, Los Angeles County, 2017*



GIARDIASIS

SUMMARY DATA	
Number of Cases	372
Annual Incidence*	
LA County	3.9
California†	1.7
United States†	5.9
Age at Diagnosis	
Mean	39
Median	37
Range	1–37 years

* Cases per 100,000 population.
† CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017

DESCRIPTION

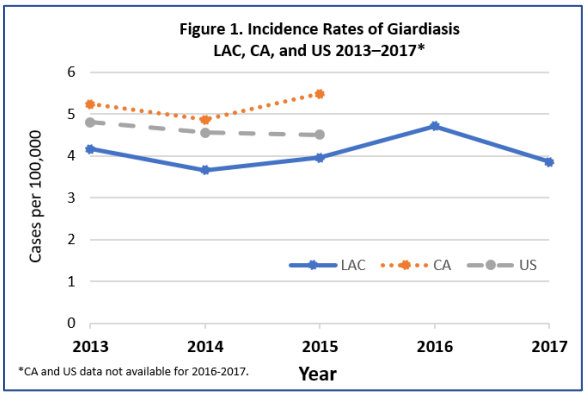
Giardiasis[1] is a diarrheal illness caused by caused by the microscopic parasite *Giardia.* The parasite is found on surfaces or in soil, food, or water that has been contaminated with feces from infected humans or animals. *Giardia* is protected by an outer shell that allows it to survive outside the body for long periods of time and makes it tolerant to chlorine disinfection.

While the parasite can be spread in different ways, water (drinking water and recreational water) is the most common mode of transmission. In the US, giardiasis is one of the most common causes of waterborne diseases in people. Outbreaks have been associated with contaminated municipal and recreational waters, day care centers, and among people who were exposed to feces during sex.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

- In 2017, only laboratory-confirmed symptomatic *Giardia* infections continued to be counted as confirmed cases of giardiasis in LAC.



- Giardiasis disease incidence slightly decreased in LAC from 4.7 cases per 100,000 in 2016 to 3.9 cases per 100,000 (**Figure 1**).
- Males have consistently accounted for a larger proportion of cases. The incidence rate of giardiasis for males was 5.9 per 100,000 and for females was 1.8 cases per 100,000.
- The highest age-specific incidence rate occurred among adults 55–64 years old with 5.3 cases per 100,000. The 15–34 age category had the next highest incidence rate, at 5.1 cases per 100,000 (**Table 1.** Data for **Table 1** is available online.[4]).
- Whites continue to have the highest race/ethnicity-specific incidence rates (**Table 1**). The greatest proportion of cases were reported among Whites (n=203, 54.6%) and Hispanics (n=104, 28.0%) (**Table 1**).
- SPA 4 reported the highest incidence rate of giardiasis with 9.0 cases per 100,000 in 2017 (**Figure 2**). SPA 5 had the second highest incidence rate, with 8.6 cases per 100,000.

[1]www.publichealth.lacounty.gov/acd/Diseases/Giardiasis.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Giardiasis.aspx
[3]www.cdc.gov/parasites/giardia/index.html
[4]publichealth.lacounty.gov/acd/docs/2017Tables/Giardia.xlsx

Figure 2. Incidence Rate of Giardiasis by SPA
LAC, 2013–2017

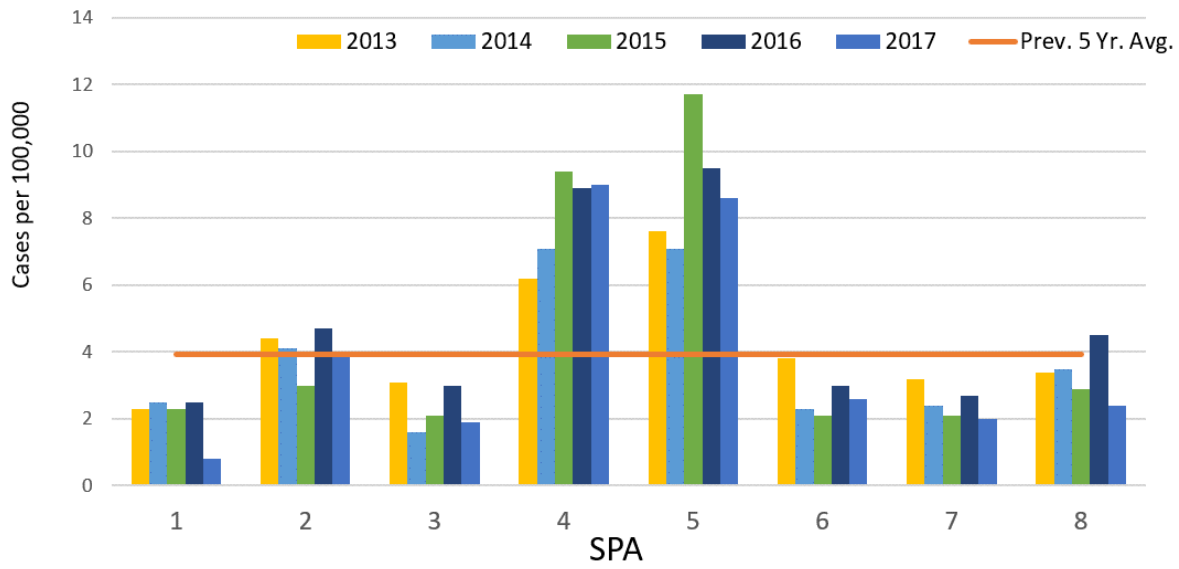


Figure 3. Reported Giardiasis Cases by Month of Onset
LAC, 2017 (N=372)

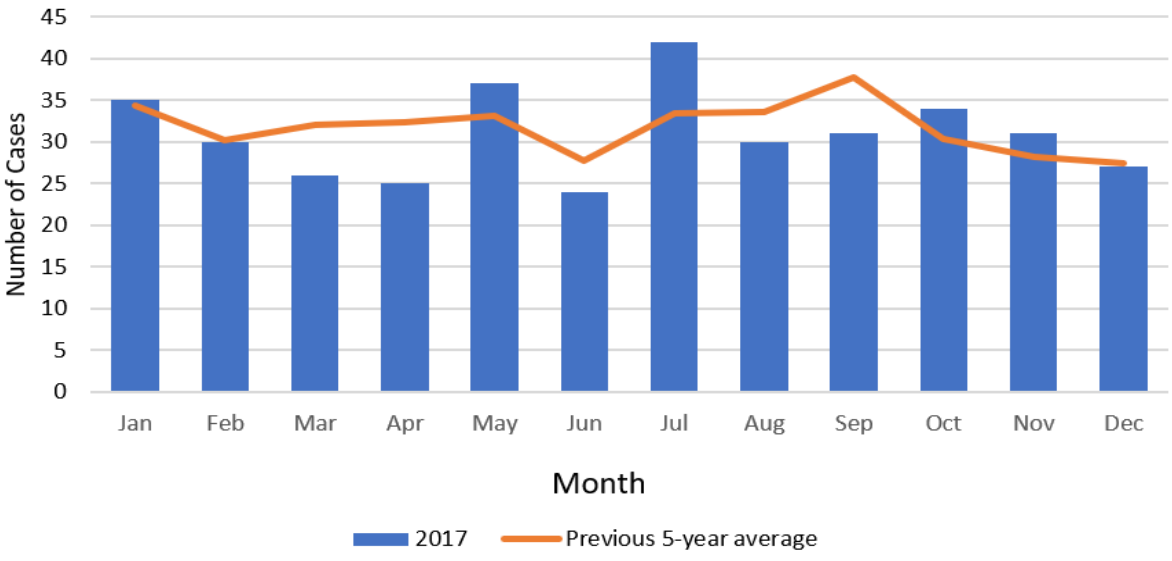
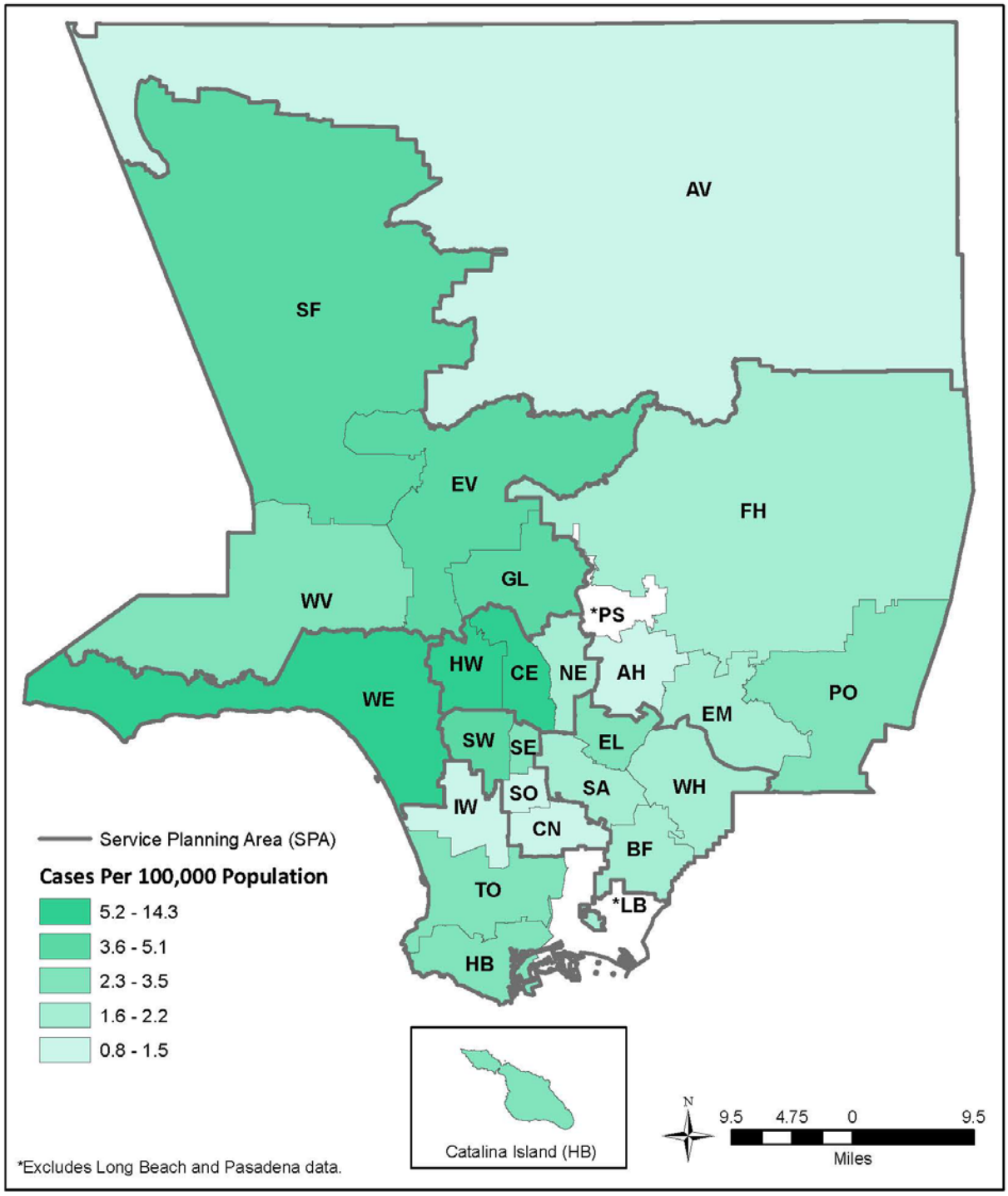


Table 1. Reported Giardiasis Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**392**	**100.0**	**4.17**	**346**	**100.0**	**3.66**	**379**	**100.0**	**3.96**	**452**	**100.0**	**4.71**	**372**	**100.0**	**3.86**
Age Group															
<1	3	0.7	–	0	–	–	0	–	–	2	0.4	–	1	0.3	–
1–4	20	5.1	4.1	19	5.5	3.9	14	3.7	2.9	14	3.1	3.0	8	2.2	1.8
5–14	41	10.5	3.4	27	7.8	2.2	20	5.3	1.7	25	5.5	2.1	20	5.4	1.7
15–34	114	29.1	4.0	96	27.7	3.4	126	33.2	4.5	147	32.5	5.2	143	38.4	5.1
35–44	65	16.6	4.9	70	20.2	5.3	76	20.1	5.7	72	15.9	5.5	54	14.5	4.1
45–54	72	18.4	5.6	63	18.2	4.8	66	17.4	5.0	87	19.2	6.6	52	14.0	3.9
55–64	51	13.0	5.0	42	12.1	4.0	47	12.4	4.2	62	13.7	5.5	62	16.7	5.3
65+	26	6.6	2.3	29	8.4	2.6	29	7.7	2.4	43	9.5	3.5	32	8.6	2.6
Unknown	0	–	–	0	–	–	1	0.3	–	0	–	–	0	–	–
Race/Ethnicity‡															
Asian	25	6.4	1.8	24	6.9	1.7	17	4.5	1.2	27	6.0	1.9	21	5.6	1.5
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Black	27	6.9	3.5	25	7.2	3.2	14	3.7	1.8	26	5.8	3.3	22	5.9	2.8
Hispanic	124	31.6	2.7	113	32.7	2.5	104	27.4	2.2	131	29.0	2.8	104	28.0	2.2
White	210	53.6	7.9	175	50.6	6.6	238	62.8	8.9	252	55.8	9.4	203	54.6	7.6
AI/AN‖	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Other	2	0.5	–	3	0.9	–	4	1.1	–	2	0.4	–	9	2.4	–
Unknown	4	1.0	–	6	1.7	–	2	0.5	–	14	3.1	–	13	3.5	–
SPA															
1	9	2.3	2.3	10	2.9	2.5	9	2.4	2.3	10	2.2	2.5	3	0.8	–
2	95	24.2	4.4	89	25.7	4.1	67	17.7	3.0	105	23.2	4.7	90	24.1	4.0
3	50	12.8	3.1	26	7.5	1.6	34	9.0	2.1	50	11.0	3.0	32	8.6	1.9
4	71	18.1	6.2	82	23.7	7.1	110	29.0	9.4	105	23.2	8.9	107	28.8	9.0
5	49	12.5	7.6	46	13.3	7.1	77	20.3	11.7	63	13.9	9.5	58	15.6	8.6
6	39	9.9	3.8	24	6.9	2.3	22	5.8	2.1	32	7.1	3.0	28	7.5	2.6
7	42	10.7	3.2	31	9.0	2.4	28	7.4	2.1	36	7.9	2.7	26	7.0	2.0
8	37	9.4	3.4	38	11.0	3.5	32	8.4	2.9	49	10.8	4.5	26	7.0	2.4
Unknown	0	–	–	0	–	–	0	–	–	2	0.4	–	2	0.5	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
‖ American Indian or Alaskan Native.

Map 7. Giardiasis
Rates by Health District, Los Angeles County, 2017*



HEPATITIS A

SUMMARY DATA	
Number of Cases	87
Annual Incidence*	
LA County	0.9
California†	0.2
United States†	1.0
Age at Diagnosis	
Mean	42
Median	39
Range	12–84 years

* Cases per 100,000 population.
† CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017

DESCRIPTION

Hepatitis A[1] is a disease caused by the hepatitis A virus, which is a highly contagious virus that infects the liver. The hepatitis A virus is spread person-to-person via a fecal-oral route. People who are infected with hepatitis A can spread the infection for two weeks before they have symptoms. Some people may not have any symptoms of infection. After getting sick, patients can generally spread the virus for about a week. In rare cases, especially among the immunocompromised, infections can last longer. After patients fully recover, they can never get the infection again. Symptoms include fever, weakness, fatigue, nausea, loss of appetite, jaundice (yellowing of the skin or eyes), stomach pain, and vomiting. Not everyone infected with hepatitis A will develop symptoms; however, some common indicators of infection include dark urine, pale stools, and diarrhea. Those at high risk of infection are homeless populations and illicit drug users.

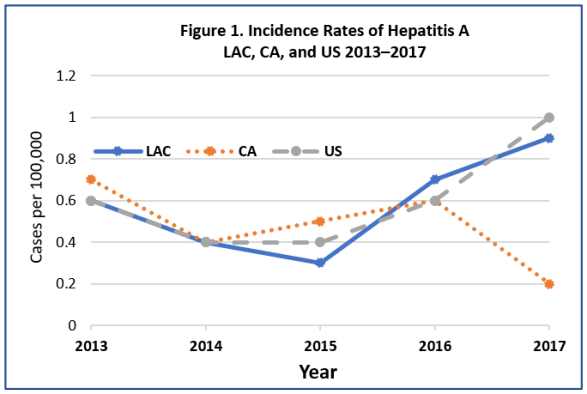
The hepatitis A vaccine is the best method to prevent infection with the virus. Cleaning contaminated surfaces is also critical for prevention. Lastly, proper hand hygiene is very important for prevention of this disease. Because the spread of hepatitis A is spread through the fecal-oral route, it is important to clean and sanitize surfaces that have vomit or feces.

Hepatitis A is a reportable disease, and physicians are required to report hepatitis A cases to LAC DPH. LAC DPH recommends the hepatitis A vaccine for vulnerable populations as well as for those who have frequent close contact with these populations. Suspect cases of hepatitis A should be reported immediately by phone, while the patient is still at the clinical facility, in order to facilitate an on-site interview by a public health investigator and prophylaxis of contacts.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

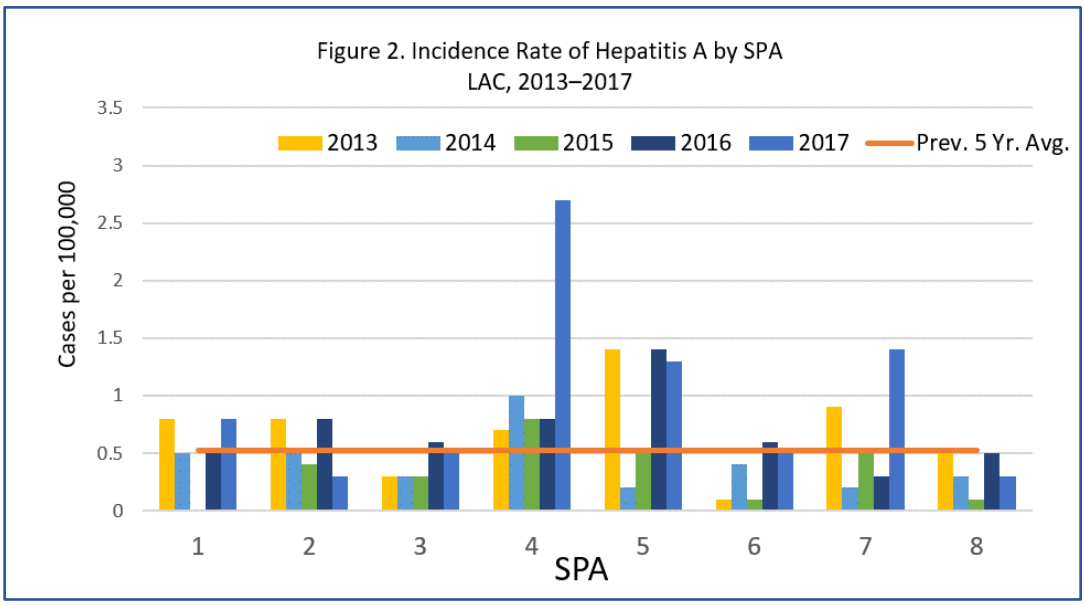
- In 2017, LAC DPH responded to an outbreak of hepatitis A[4] occurring primarily among persons experiencing homelessness or with illicit drug use. This is described further in the **2017 Special Studies Report**.
- This year, the hepatitis A disease incidence rate increased in LAC from 0.69 cases per 100,000 in 2016 to 0.90 cases per 100,000 (**Figure 1**).



- The greatest incidence of hepatitis A was among those 35-44-years-old (1.7 cases per 100,000) followed by those 55–64-years-old (1.2 cases per 100,000) (**Table 1**. Data for **Table 1** is available online.[5]).

[1]www.publichealth.lacounty.gov/acd/Diseases/HepA.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Hepatitis-A.aspx
[3]www.cdc.gov/hepatitis/hav/
[4]publichealth.lacounty.gov/acd/Diseases/HepA.htm
[4]publichealth.lacounty.gov/acd/docs/2017Tables/Hep%20A.xlsx

- Comparing race/ethnicity, the greatest incidence of hepatitis A occurred among Whites (1.7 cases per 100,000) (**Table 1**).
- The highest hepatitis A incidence rates were documented within SPA 4 (2.7 per 100,000) and SPA 7 had the second highest incidence of cases (1.4 per 100,000) (**Figure 2**).
- Of the risk factors involved, international travel affected 46% of those who were infected by the disease this year (**Figure 3**).



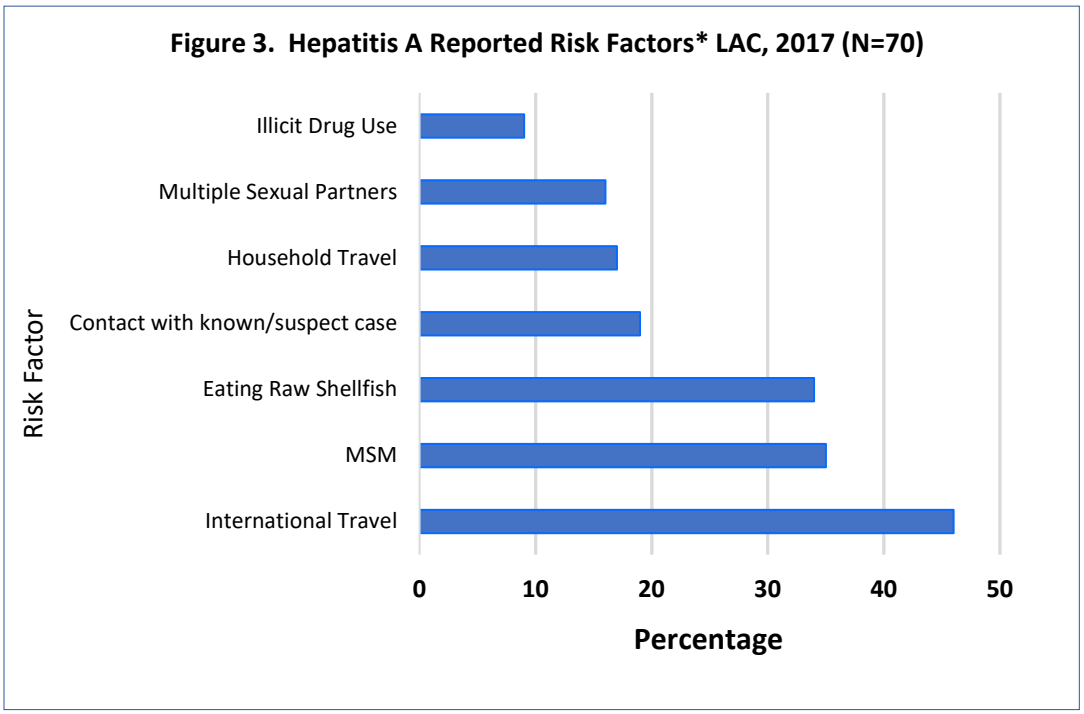
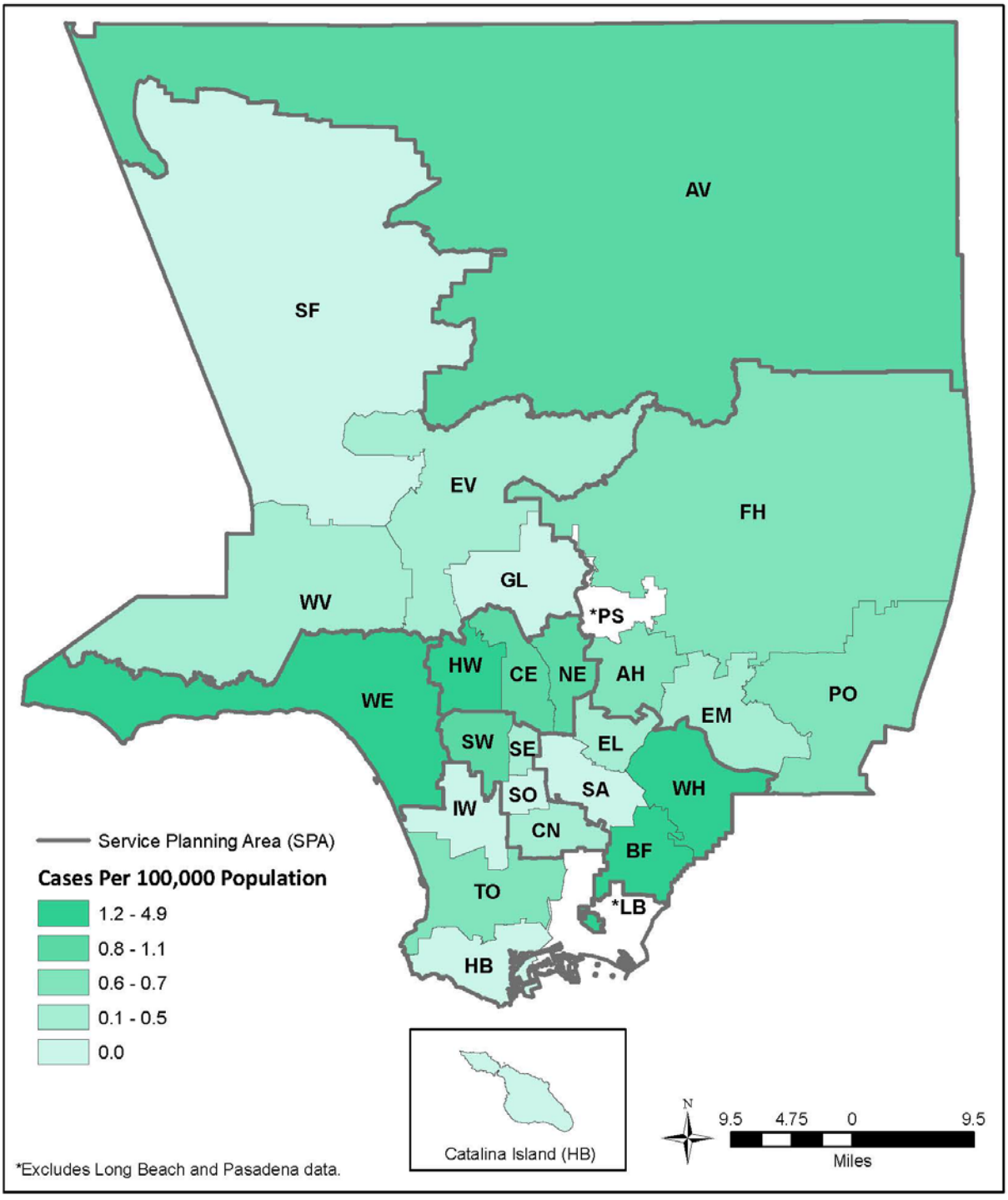


Table 1. Reported Hepatitis A Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**60**	**100.0**	**0.64**	**42**	**100.0**	**0.44**	**33**	**100.0**	**0.34**	**66**	**100.0**	**0.69**	**87**	**100.0**	**0.90**
Age Group															
<1	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
1–4	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
5–14	2	3.3	–	1	2.4	–	1	3.0	–	1	1.5	–	1	1.1	–
15–34	22	36.7	0.8	17	40.5	0.6	12	36.4	0.4	25	37.9	0.9	30	34.5	1.1
35–44	12	20.0	0.9	9	21.4	0.7	9	27.3	0.7	12	18.2	0.9	23	26.4	1.7
45–54	8	13.3	0.6	0	–	–	3	9.1	–	14	21.2	1.1	14	16.1	1.0
55–64	13	21.7	1.3	8	19.0	0.8	4	12.1	–	5	7.6	–	14	16.1	1.2
65+	3	5.0	–	7	16.7	0.6	4	12.1	–	9	13.6	0.7	5	5.7	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Asian	15	25.0	1.1	11	26.2	0.8	11	33.3	0.8	8	12.1	0.6	11	12.6	0.8
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Black	1	1.7	–	4	9.5	–	1	3.0	–	2	3.0	–	3	3.4	–
Hispanic	18	30.0	0.4	14	33.3	0.3	11	33.3	0.2	21	31.8	0.4	28	32.2	0.6
White	26	43.3	1.0	12	28.6	0.5	9	27.3	0.3	35	53.0	1.3	45	51.7	1.7
AI/AN‖	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Other	0	–	–	1	2.4	–	1	3.0	–	0	–	–	0	–	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
SPA															
1	3	5.0	–	2	4.8	–	0	–	–	2	3.0	–	3	3.4	–
2	17	28.3	0.8	12	28.6	0.5	8	24.2	0.4	19	28.8	0.8	6	6.9	0.3
3	5	8.3	–	5	11.9	–	5	15.2	–	10	15.2	0.6	9	10.3	0.5
4	8	13.3	0.7	12	28.6	1.0	9	27.3	0.8	10	15.2	0.8	32	36.8	2.7
5	9	15.0	1.4	1	2.4	–	3	9.1	–	9	13.6	1.4	9	10.3	1.3
6	1	1.7	–	4	9.5	–	1	3.0	–	6	9.1	0.6	5	5.7	–
7	12	20.0	0.9	3	7.1	–	6	18.2	0.5	4	6.1	–	18	20.7	1.4
8	5	8.3	–	3	7.1	–	1	3.0	–	6	9.1	0.5	3	3.4	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	2	2.3	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
‖ American Indian or Alaskan Native.

Map 8. Hepatitis A
Rates by Health District, Los Angeles County, 2017*



HEPATITIS B, ACUTE NONPERINATAL

SUMMARY DATA	
Number of Cases	32
Annual Incidence*	
LA County	0.3
California†	0.1
United States†	1.0
Age at Diagnosis	
Mean	49
Median	49
Range	16–76 years

* Cases per 100,000 population.
† CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017

DESCRIPTION

Hepatitis B is a DNA virus transmitted through activities that involve percutaneous or mucosal contact with infectious blood or bodily fluids. This is often through injection drug use, sexual contact with an infected person, or contact from an infected mother to her infant during birth. Transmission also occurs among household contacts of a person with hepatitis B. Healthcare-associated transmission of hepatitis B is documented in the US and should be considered in persons without traditional risk factors.

Symptoms occur in less than half of those acutely infected and begin an average of 90 days (range: 60–150 days) after exposure. Symptoms include fever, fatigue, loss of appetite, nausea, vomiting, abdominal pain, dark urine, clay-colored bowel movements, joint pain, and jaundice. Approximately 2-10% of adults infected with the hepatitis B virus (HBV) are unable to clear the virus within six months and become chronic carriers. Death from cirrhosis or liver cancer occurs in an estimated 15–25% of those with chronic infection. Overall, hepatitis B is more prevalent and infectious than HIV.

A comprehensive strategy to eliminate hepatitis B virus transmission was recommended in 1991. It includes prenatal testing of pregnant women for HBsAg to identify newborns who require immunoprophylaxis and to identify household contacts who should be vaccinated, routine vaccination of infants, vaccination of adolescents, and vaccination of adults at high risk for infection.

Adult vaccination is recommended for high risk groups including: men who have sex with men (MSM), those with history of multiple sex partners, injection drug users, persons seeking treatment for sexually transmitted diseases, household and sex contacts of persons with chronic HBV infections, healthcare workers, persons with chronic liver disease, persons with HIV, hemodialysis patients, and unvaccinated adults with diabetes mellitus 19-59 years old.

For the purpose of surveillance, LAC DPH uses the 2012 CDC Council of State and Territorial Epidemiologists (CSTE) case definition for acute hepatitis B. The criteria include:

1) Discrete onset of symptoms,
2) Jaundice or elevated alanine aminotransferase (ALT) levels >100 IU/L, and
3) HBsAg positive and anti-HBc IgM positive, (if done).

In 2012, the CDC CSTE modified the acute hepatitis B case definition to include documented seroconversion cases (documented negative HBV test result within six months prior to HBV diagnosis) without the acute clinical presentation.

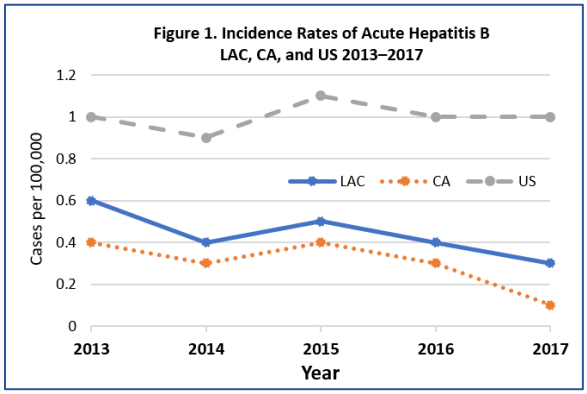
For more information visit:
- CDPH[1]
- CDC[2]

[1]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Hepatitis-B.aspx

[2]www.cdc.gov/hepatitis/hbv/

2017 TRENDS AND HIGHLIGHTS

- The 2017 incidence rate decreased to 0.33 cases per 100,000 from 0.44 cases per 100,000 in the previous year (**Figure 1**).



- The 2017 incidence rate was highest among those aged 45–54-years-old (0.8 cases per 100,000). This is followed by those in the 35–44-years-old and 55–64-years-old age groups (0.6 cases per 100,000). This is similar to 2016, where the highest incidence was also in those aged 45–54-years-old (**Table 1**. Data for **Table 1** is available online.[3]).
- Males composed 69% of the cases and females 31%.
- The incidence rate in 2017 was highest in Native Hawaiian/Other Pacific Islanders (NH/OPI) (5.2 cases per 100,000) followed by Blacks (0.6 cases per 100.000) (**Table 1**). Beginning in 2017, NH/OPI is a new category in the Annual Morbidity report, and the number of cases of NHI/OPI (n=1) is much lower than the number of White (n=13) and Black cases (n=10).
- Three SPAs had incidence rates greater than the overall county rate of 0.33 cases per 100,000: SPA 4 (0.6 cases per 100,000) and SPA's 2 and 6 (0.4 cases per 100,000) (**Figure 2**).
- In 2017, risk factors were identified in 81% (n=25) of the 31 interviewed confirmed cases including some cases with multiple risk factors. Of those with identified risk factors, the most frequently reported risk factors were receiving intramuscular/intravenous (IM/IV) infusions (28%, n=7) and having a dental procedure (28%, n=7). The next frequently reported risk factors in 2017 were patients who had manicures and/or pedicures (24%, n=6), illicit drug use (24%, n=6) and men who have sex with men (MSM) (24%, n=6). Lastly, the next frequently reported risk factor was having multiple sexual partners (20%, n=5) and being hospitalized (20%, n=5).
- The number of cases peaked in January, which was inconsistent with the previous five-year average (**Figure 3**).

[3] publichealth.lacounty.gov/acd/docs/2017Tables/Hep%20B%20acute.xlsx

Figure 2. Incidence Rate of Acute (Nonperinatal) Hepatitis B by SPA
LAC, 2013–2017

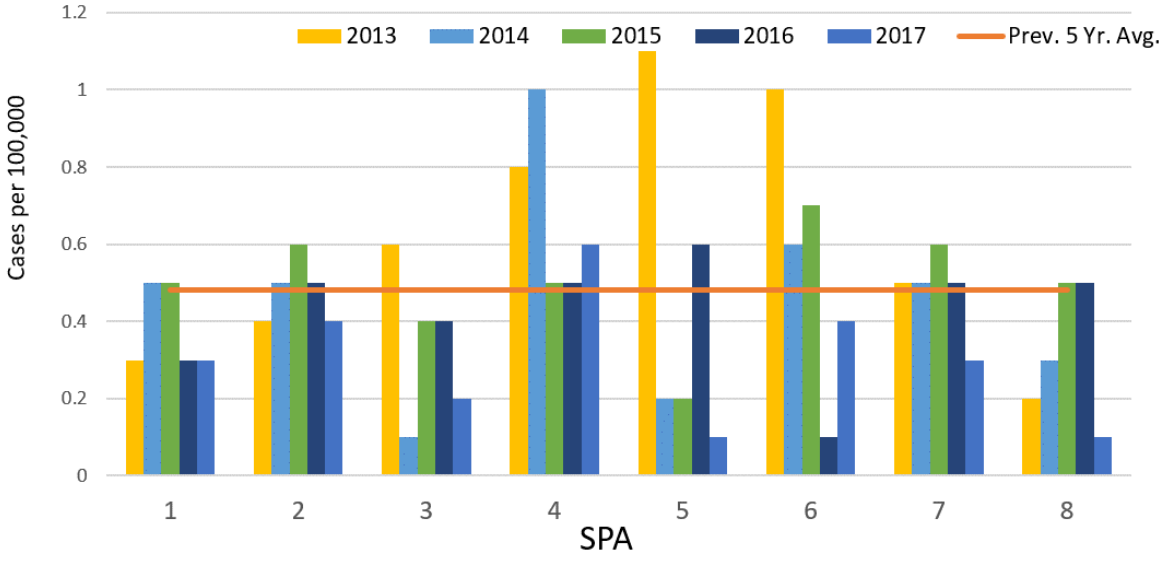


Figure 3. Reported Hepatitis B (Acute, Nonperinatal) Cases by Month of Onset
LAC, 2017 (N=57)

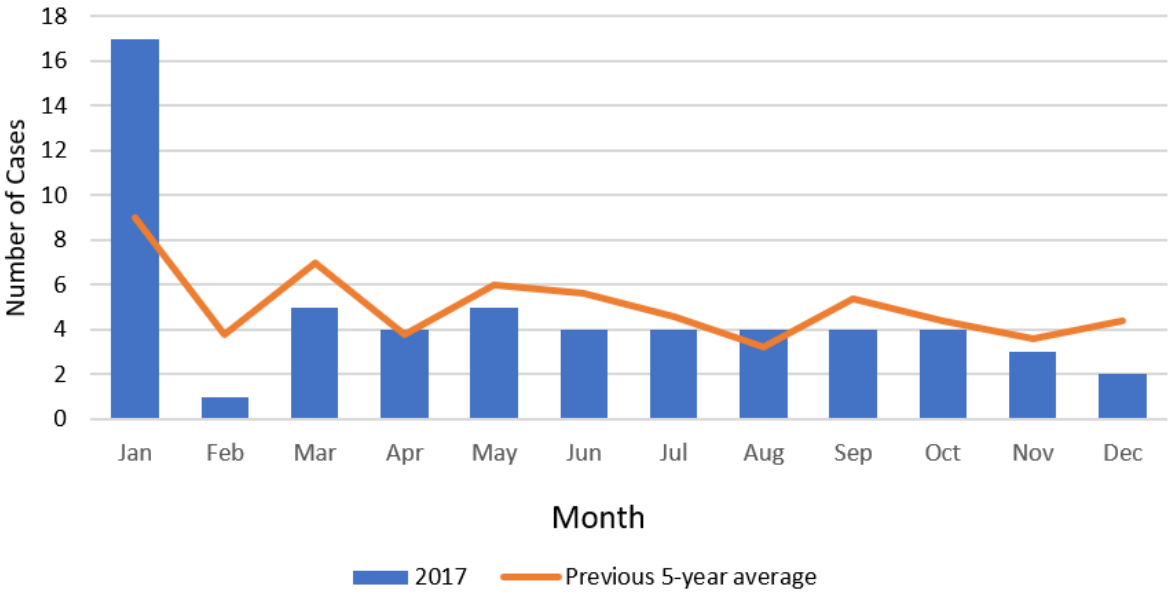


Table 1. Reported Acute (Nonperinatal) Hepatitis B Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**55**	**100.0**	**0.58**	**42**	**100.0**	**0.44**	**50**	**100.0**	**0.52**	**42**	**100.0**	**0.44**	**32**	**100.0**	**0.33**
Age Group															
<1	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
1–4	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
5–14	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
15–34	20	36.4	0.7	5	11.9	–	10	20.0	0.4	6	14.3	0.2	3	9.4	–
35–44	15	27.3	1.1	16	38.1	1.2	14	28.0	1.1	9	21.4	0.7	8	25.0	0.6
45–54	12	21.8	0.9	14	33.3	1.1	18	36.0	1.4	13	30.9	1.0	11	34.4	0.8
55–64	5	9.1	–	3	7.1	–	5	10.0	–	8	19.0	0.7	7	21.9	0.6
65+	3	5.5	–	4	9.5	–	3	6.0	–	6	14.3	0.5	3	9.4	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Asian	6	10.9	0.4	3	7.1	–	5	10.0	–	4	9.5	–	3	9.4	–
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	1	3.1	–
Black	12	21.8	1.5	6	14.3	0.8	9	18.0	1.1	5	11.9	–	5	15.6	–
Hispanic	21	38.2	0.5	20	47.6	0.4	17	34.0	0.4	13	30.9	0.3	10	31.3	0.2
White	15	27.3	0.6	10	23.8	0.4	17	34.0	0.6	19	45.2	0.7	13	40.6	0.5
AI/AN|	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Other	0	–	–	1	2.4	–	0	–	–	0	–	–	0	–	–
Unknown	1	1.8	–	2	4.8	–	2	4.0	–	1	2.4	–	0	–	–
SPA															
1	1	1.8	–	2	4.8	–	2	4.0	–	1	2.4	–	1	3.1	–
2	9	16.4	0.4	12	28.6	0.5	14	28.0	0.6	12	28.6	0.5	9	28.1	0.4
3	9	16.4	0.6	1	2.4	–	6	12.0	0.4	6	14.3	0.4	4	12.5	–
4	9	16.4	0.8	11	26.2	1.0	6	12.0	0.5	6	14.3	0.5	7	21.9	0.6
5	7	12.7	1.1	1	2.4	–	1	2.0	–	4	9.5	–	1	3.1	–
6	10	18.2	1.0	6	14.3	0.6	7	14.0	0.7	1	2.4	–	4	12.5	–
7	6	10.9	0.5	6	14.3	0.5	8	16.0	0.6	7	16.7	0.5	4	12.5	–
8	2	3.6	–	3	7.1	–	6	12.0	0.5	5	11.9	–	1	3.1	–
Unknown	2	3.6	–	0	–	–	0	–	–	0	–	–	1	3.1	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
| American Indian or Alaskan Native.

HEPATITIS B, PERINATAL

SUMMARY DATA	
Infants Born to HBsAg+ Mothers	637
Incidence of Exposure[a]	4.9
HBsAg+ Infant[c]	0
Maternal Age at Diagnosis	33 years

a Number of infants born to HBsAg-positive mothers per 1000 live births in 2017.
b Based on number of infants born per 100,000 live births in 2017.
c Based on number of infants that had post vaccine serology testing.

DESCRIPTION

Perinatal Hepatitis B[1] is a vaccine-preventable disease transmitted through exposure to blood and other bodily fluids of individuals infected with the hepatitis B virus (HBV). A woman can transmit the HBV to her infant from exposure to cervical secretions and blood during the birthing process. National guidelines recommend universal screening of pregnant women for HBsAg during each pregnancy. Testing for HBV deoxyribonucleic acid (HBV DNA) is also recommended to identify infants at greatest risk for infection and guide the use of maternal antiviral therapy during pregnancy. Post-exposure prophylaxis (PEP) with hepatitis B vaccine and hepatitis B immunoglobulin (HBIg) administered within 12 hours of birth followed by completion of a three-dose vaccine series has demonstrated 85%-95% effectiveness in preventing HBV infection in infants born to mothers who are HBsAg positive. However, even infants who received appropriate prophylaxis can become infected when the mother has a high HBV viral load during pregnancy. Post-vaccination serologic (PVS) testing is recommended at age 9–12 months after completing PEP and the vaccine series to verify vaccine success or failure. The LAC Vaccine Preventable Disease Control (VPDC) Program's Perinatal Hepatitis B Prevention Unit (PHBPU) conducts enhanced case management of HBsAg-positive pregnant women, their newborns, and household (HHC)/sexual contacts (SC).

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

- In 2017, 637 infants (including 13 twins) were born to 624 HBsAg+ women.
- The incidence of exposure decreased by 4% from 5.1 to 4.9 per 1000 infants compared to 2017 (**Figure 1**).
- Over half (58%, n=363) of women screened for HBsAg were 15–34 years old (**Table 1**. Data for **Table 1** is available online.[4]).
- Most (84%, n=521) of HBsAg+ women were born outside of the US.
- Most of HBsAg+ women were Asian (78%, n=488). This was followed by Hispanic (4.8%, n=30), Black (4%, n=25), White (4%, n= 25), Other (1.9%, n=12), and Unknown (7.1%, n=44) (**Figures 2 and 3**).
- Approximately 58%, n=362, of the HBsAg+ women reside in SPA 3, which has a large Asian population (**Figure 4**).
- Nearly all (98%, n=610) infants received the first dose of the hepatitis B vaccine and within 12 hours of birth, and nearly all (97%, n=605) received HBIg within 12 hours of birth (**Figure 5**).
- The three-dose hepatitis B vaccination series and post-vaccination serology (PVS) testing to determine immunity to hepatitis B was completed by 32%, n=205, of infants. Nearly all (96%, n=197) of the infants were anti-HBs positive, suggesting immunity to hepatitis B. Only 3%, n=7, failed to develop antibodies and received additional doses of hepatitis B vaccine to develop immunity. No infants tested positive for HBsAg (**Figure 6**).

[1]publichealth.lacounty.gov/ip/perinatalhepb_home.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Perinatal.aspx
[3]www.cdc.gov/hepatitis/hbv/
[4]publichealth.lacounty.gov/acd/docs/2017Tables/Hep%20B%20perinatal.xlsx

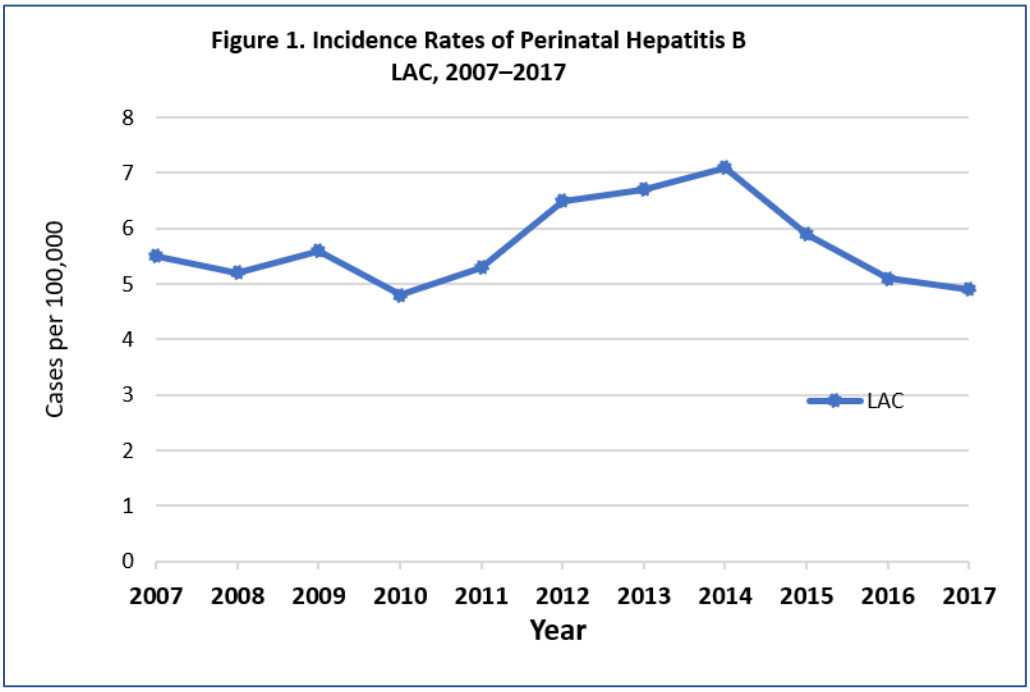


Figure 1. Incidence Rates of Perinatal Hepatitis B
LAC, 2007–2017
Cases per 100,000
8
7
6
5
4
3
2
1
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Year
LAC

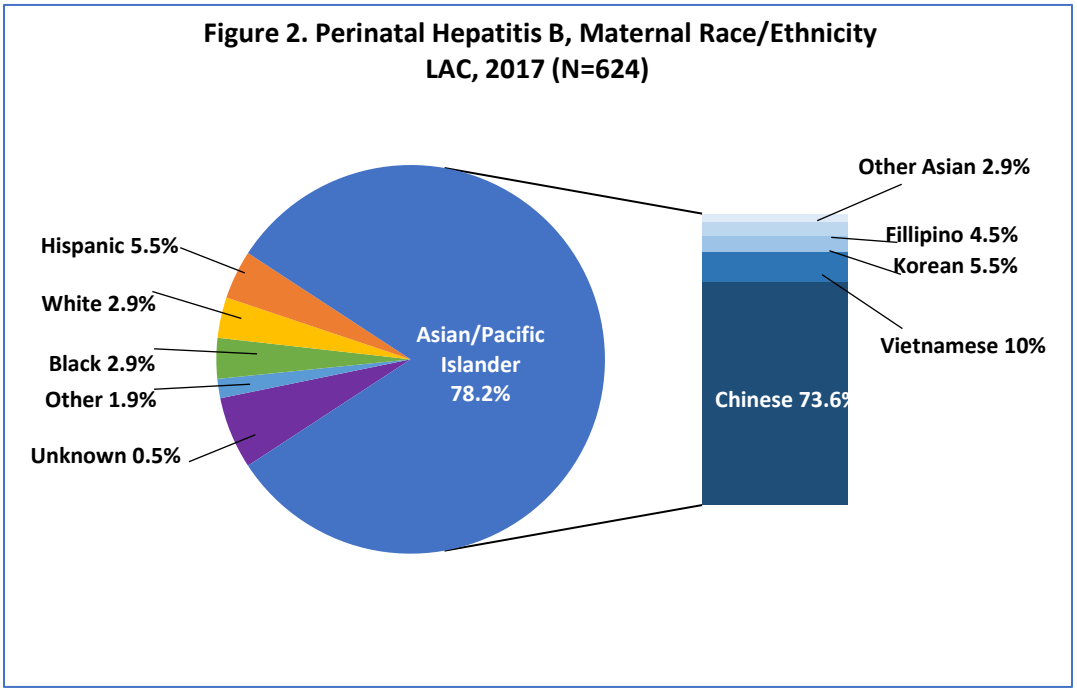


Figure 2. Perinatal Hepatitis B, Maternal Race/Ethnicity
LAC, 2017 (N=624)
Hispanic 5.5%
White 2.9%
Black 2.9%
Other 1.9%
Unknown 0.5%
Asian/Pacific Islander 78.2%
Other Asian 2.9%
Fillipino 4.5%
Korean 5.5%
Vietnamese 10%
Chinese 73.6%

Figure 3. Perinatal Hepatitis B, Maternal Race/Ethnicity
LAC, 2013 - 2017

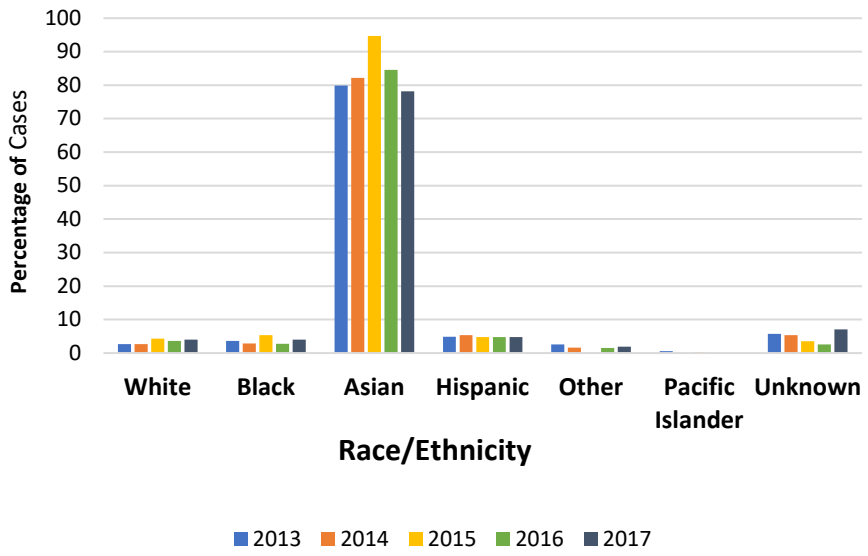


Figure 4. Perinatal Hepatitis B, Maternal HBsAg+ by SPA
LAC, 2017 (N=624)

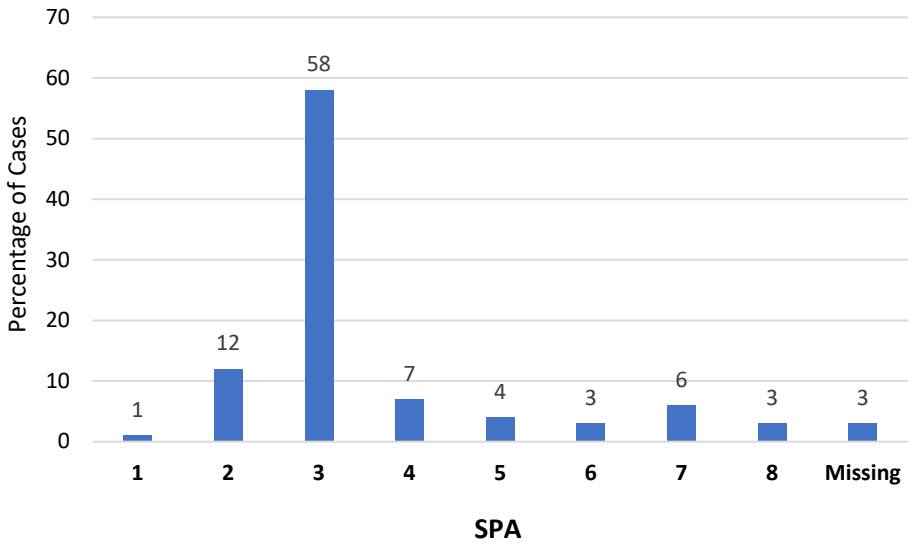


Figure 5. Perinatal Hepatitis B, Infant Hepatitis B Immunoprophylaxis LAC, 2017 (N=637)

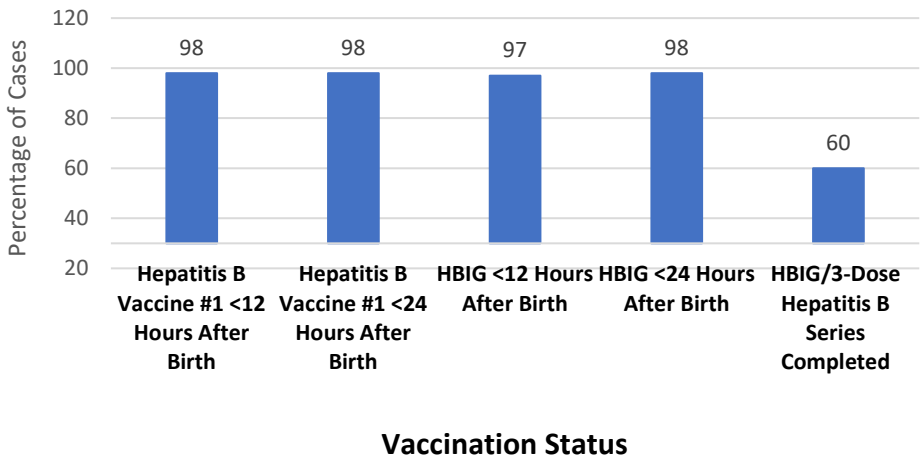
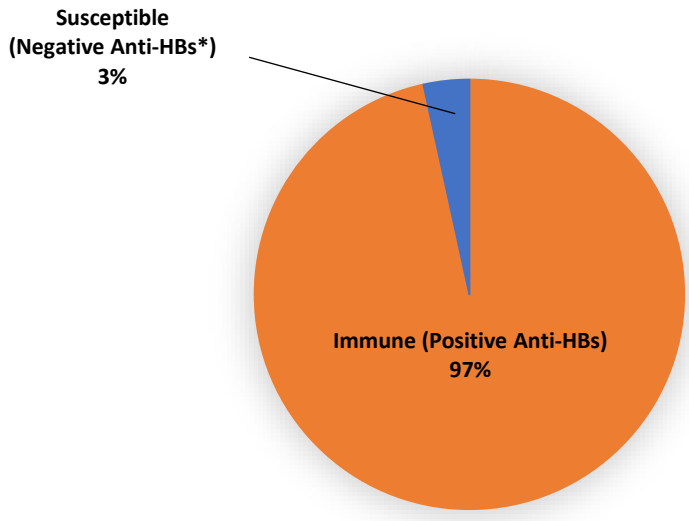


Figure 6. Perinatal Hepatitis B, Infant Post Vaccination Serology (PVS) Results LAC, 2017 (N=205)



***Antibody to Hepatitis B Surface Antigen**

Figure 7. Perinatal Hepatitis B, Household & Sexual Contacts Age Range LAC, 2017 (N=749)

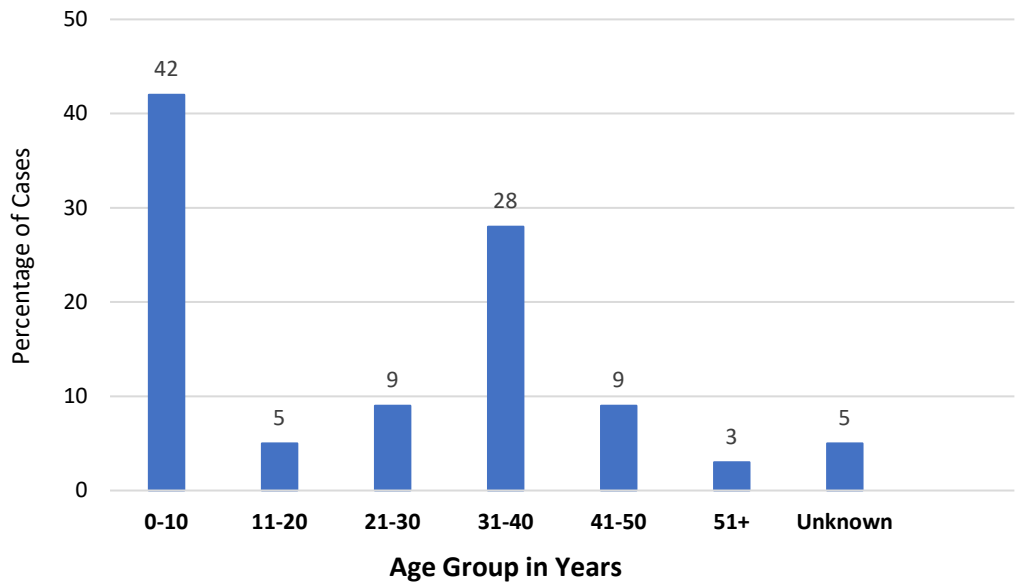


Table 1. Reported Perinatal Hepatitis B Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**891**	**100.0**	**9.47**	**938**	**100.0**	**9.92**	**817**	**100.0**	**8.53**	**724**	**100.0**	**7.54**	**624**	**100.0**	**6.47**
Age Group															
<1	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
1–4	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
5–14	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
15–34	544	61.1	19.2	590	62.9	20.9	503	61.6	17.3	465	64.2	16.0	363	58.2	12.9
35–44	339	38.0	25.4	309	32.9	23.4	299	36.6	21.2	248	34.3	17.5	236	37.8	17.8
45–54	8	0.9	0.6	5	–	–	5	0.6	–	4	0.6	–	1	0.2	–
55–64	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
65+	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Unknown	0	–	–	34	3.6	–	10	1.2	–	7	1.0	–	24	3.8	–
Race/Ethnicity‡															
Asian	712	79.9	52.7	809	86.2	59.6	690	84.5	47.1	613	84.7	41.9	488	78.2	35.1
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Black	33	3.6	4.1	27	2.9	3.4	38	4.7	4.4	20	2.8	2.3	25	4.0	3.2
Hispanic	44	4..9	1.0	52	5.5	1.1	35	4.3	0.7	35	4.8	0.7	30	4.8	0.6
White	24	2.7	0.9	27	2.9	1.0	31	3.1	1.1	26	3.6	0.9	25	4.0	0.9
AI/AN|	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Other	28	2.7	15.5	18	1.9	97.7	14	1.7	–	12	1.7	60.9	12	1.9	71.4
Unknown	51	5.7	–	5	0.5	–	9	1.1	–	18	2.5	–	44	7.1	–
SPA															
1	8	0.9	2.0	12	1.3	3.1	8	0.9	2.0	7	1.0	1.8	8	1.3	2.0
2	76	8.5	3.5	83	8.8	3.8	76	8.5	3.5	82	11.3	3.7	76	12.2	3.4
3	580	65.1	35.5	642	68.4	39.1	580	65.1	35.5	437	60.4	24.3	362	58.0	21.9
4	64	7.2	5.6	60	6.4	5.2	64	7.2	5.6	64	8.8	5.5	42	6.7	3.5
5	36	4.0	5.6	35	3.7	5.4	36	4.0	5.6	26	3.6	3.9	23	3.7	3.4
6	19	2.1	1.8	21	2.2	2.0	19	2.1	1.8	16	2.2	1.5	21	3.4	2.0
7	47	5.3	3.6	39	4.2	3.0	47	5.3	3.6	38	5.2	2.9	39	6.3	3.0
8	60	6.7	5.6	42	4.5	3.9	60	6.7	5.6	42	5.8	2.7	37	5.9	3.4
Unknown	1	0.1	–	4	0.4	–	1	0.1	–	12	1.7	–	16	2.6	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
| American Indian or Alaskan Native.

HEPATITIS C, ACUTE

SUMMARY DATA	
Number of Cases	8
Annual Incidence*	
LA County	0.1
California†	0.0
United States†	1.4
Age at Diagnosis	
Mean	42
Range	21–73 years

* Cases per 100,000 population.
† CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017

DESCRIPTION

Hepatitis C[1] is a liver disease caused by the blood-borne hepatitis C virus (HCV). Infection is mostly spread by sharing needles or other equipment to inject drugs. Hepatitis C can be a short-term illness, but the majority of those infected have chronic infections which is serious disease that can result in long-term health problems, even death. The majority of infected people might not be aware of their infection because they are not clinically ill. There is no vaccine for hepatitis C.

Acute hepatitis C refers to the first several months after someone is infected which can range in severity from a very mild illness with few or no symptoms to a serious condition requiring hospitalization. For reasons that are not known, a minority of those infected are able to clear the virus without treatment in the first six months. Symptoms for acute infection can manifest anytime from two weeks to six months after infection and can include jaundice, fatigue, anorexia, nausea, or vomiting. Though most have mild or no symptoms and usually go undetected.

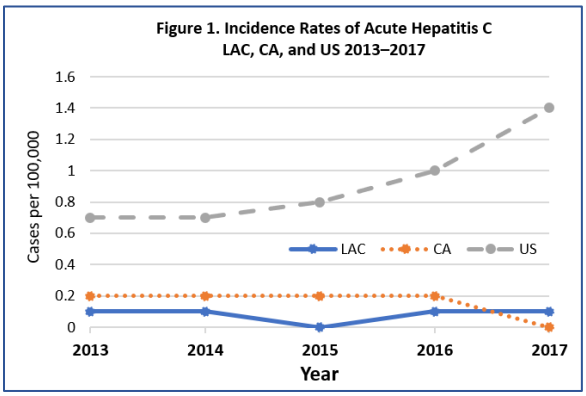
Cases of acute hepatitis C are reportable to LAC DPH and at the state level. ACDC uses the CDC and Council of State and Territorial Epidemiologists (CSTE) criteria for acute hepatitis C to standardize surveillance of this infection. The criteria include a discrete onset of symptoms.

Although there is currently no vaccine to prevent hepatitis C, there are ways to reduce the risk of becoming infected. These include: avoiding sharing or reusing needles, syringes or any other equipment to prepare and inject drugs, steroids, hormones, or other substances; not using personal items that may have come into contact with an infected person's blood such as razors, nail clippers, toothbrushes, or glucose monitors, and/or not getting tattoos or body piercings from an unlicensed facility or in an informal setting.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

- This year, the acute hepatitis C disease incidence rate increased in LAC from 0.05 cases per 100,000 in 2016 to 0.08 cases per 100,000 (**Figure 1**).



- Due to the low number of cases, rate calculations are unreliable and are not provided here (**Table 1**. Data for **Table 1** is available online.[4]).

[1]www.publichealth.lacounty.gov/acd/Diseases/HepC.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/HepatitisC.aspx
[3]www.cdc.gov/hepatitis/hcv/
[4]publichealth.lacounty.gov/acd/docs/2017Tables/Hep%20C.xlsx

Table 1. Reported Acute Hepatitis C Cases Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**5**	**100.0**	**0.05**	**5**	**100.0**	**0.05**	**2**	**100.0**	**0.02**	**5**	**100.0**	**0.05**	**8**	**100.0**	**0.08**
Age Group															
<1	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
1–4	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
5–14	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
15–34	2	40.0	–	2	40.0	–	1	50.0	–	2	40.0	–	4	50.0	–
35–44	1	20.0	–	2	40.0	–	0	–	–	1	20.0	–	0	–	–
45–54	1	20.0	–	1	20.0	–	1	50.0	–	2	40.0	–	2	25.0	–
55–64	1	20.0	–	0	–	–	0	–	–	0	–	–	1	12.5	–
65+	0	–	–	0	–	–	0	–	–	0	–	–	1	12.5	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Asian	0	–	–	1	20.0	–	0	–	–	0	–	–	1	12.5	–
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Black	0	–	–	0	–	–	0	–	–	0	–	–	1	12.5	–
Hispanic	1	20.0	–	2	40.0	–	2	100.0	–	3	60.0	–	2	25.0	–
White	4	80.0	–	2	40.0	–	0	–	–	2	40.0	–	3	37.5	–
AI/AN|	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Other	0	–	–	0	–	–	0	–	–	0	–	–	1	12.5	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
SPA															
1	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
2	1	20.0	–	3	60.0	–	1	50.0	–	0	–	–	2	28.6	–
3	1	20.0	–	2	40.0	–	0	–	–	3	60.0	–	1	14.3	–
4	0	–	–	0	–	–	0	–	–	1	20.0	–	3	42.9	–
5	1	20.0	–	0	–	–	0	–	–	0	–	–	0	–	–
6	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
7	1	20.0	–	0	–	–	0	–	–	0	–	–	0	–	–
8	1	20.0	–	0	–	–	1	50.0	–	0	–	–	1	14.3	–
Unknown	0	–	–	0	–	–	0	–	–	1	20.0	–	1	–	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
| American Indian or Alaskan Native.

LEGIONELLOSIS

SUMMARY DATA	
Number of Cases	165
Annual Incidence*	
LA County	1.7
California†	0.4
United States†	2.3
Age at Diagnosis	
Mean	68
Median	70
Range	20–99 years

* Cases per 100,000 population.
† CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017

DESCRIPTION

Legionellosis[1] is a bacterial infection with two distinct clinical forms: 1) Legionnaires' disease (LD), the more severe form characterized by pneumonia, and 2) Pontiac fever, an acute, self-limited, influenza-like illness without pneumonia. *Legionella* bacteria are common inhabitants of aquatic systems that thrive in warm environments. While at least 46 *Legionella* species and 70 serogroups have been identified, the majority (90%) of LD cases are caused by *Legionella pneumophila* serogroup 1 (LP1).

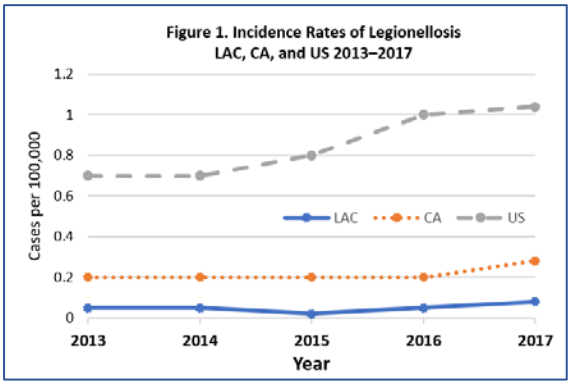
Transmission occurs through inhalation of aerosolized water containing the bacteria or by aspiration of contaminated water. Person-to-person transmission does not occur. The case-fatality rate for LD ranges from 10-15% but can be higher in outbreaks occurring in a hospital setting. People of any age may get LD. However, the disease most often affects older persons, particularly those who are heavy smokers, who have chronic underlying diseases such as diabetes mellitus, congestive heart failure, or lung disease, or who have immune systems that are suppressed by illness or medication.

The implementation of water safety measures to control the risk of transmission of *Legionella* to susceptible hosts in hospitals, hotels, and public places with water-related amenities remains the primary means of reducing LD. Approaches include periodic inspection of water sources and distribution systems, heat exchangers, and cooling towers. Prevention strategies include appropriate disinfection, monitoring, maintenance of both cold and hot water systems, and setting hot water temperatures to ≥50ºC to limit bacterial growth. All healthcare-associated LD case reports are investigated to identify potential outbreak situations. Early recognition and investigation is crucial for timely implementation of control measures.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

- In 2017, there were 165 cases reported (1.7 per 100,000), which was 32.9% lower than that in 2016 (**Figure 1**).



- One case of Pontiac fever and one case diagnosed with a laboratory confirmed *L. micdadei* obtained by lower respiratory culture were reported.
- The case fatality rate slightly increased from 9.5% in 2016 to 9.7% in 2017.
- The most affected age group in LAC was persons ≥65 years old (**Table 1.** Data for **Table 1** is available online.[4]), which is consistent over a five-year period.
- SPA 5 had the highest incidence this year followed by SPA 6 and SPA 8 (**Figure 2**).
- In 2017, January had the greatest number of monthly cases reported, which is part of a trend that started in November 2016 (**Figure 3**).

[1]www.publichealth.lacounty.gov/acd/Diseases/Legion.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Legionellosis%28Legionella%29.aspx
[3]www.cdc.gov/legionella/index.html
[4]www.publichealth.lacounty.gov/acd/docs/2017Tables/Legionellosis.xlsx

- Healthcare-associated (HA) legionellosis in acute care facilities decreased from 5.3% to 4.2% of all confirmed cases in 2017. HA legionellosis in skilled nursing facilities decreased from 6.9% to 3.0%. Possible exposures from both acute care settings and skilled nursing facility accounted 1.2% of all confirmed cases. HA legionellosis had total of three fatalities. Assisted living cases increased from 1.2% to 2.4% with no fatalities reported.
- A total of three outbreaks in healthcare facilities were reported including one skilled nursing facility. In all three outbreaks, environmental samples collected showed multiple findings of *Legionella species-non-pneumophila* (*LP1*) in the water systems. While two of the outbreaks did not find *LP1*, it is evident that conditions for legionella amplification were present and may have contributed to the infections. *LP1* was found in the cooling towers in one of the outbreaks.
- Travel-associated cases staying overnight in commercial lodgings and or residences other than home during the incubation period increased significantly from 8.1% to 12.7% this year. A total of four LAC residents traveled to the same resort hotel were linked to an outbreak investigation reported by CDC. Two unrelated confirmed cases of medical travel abroad were reported this year.
- ACDC participated in one multistate cluster investigation at a theme park located out-of-county. We re-interviewed all closed confirmed cases that fell on the cluster dates by utilizing supplemental questionnaires and review case history forms to identify additional cases. Interviews were also conducted to self-reported suspect individuals. One LAC resident was linked in the outbreak investigation.

Figure 2. Incidence Rate of Legionellosis by SPA
LAC, 2013–2017

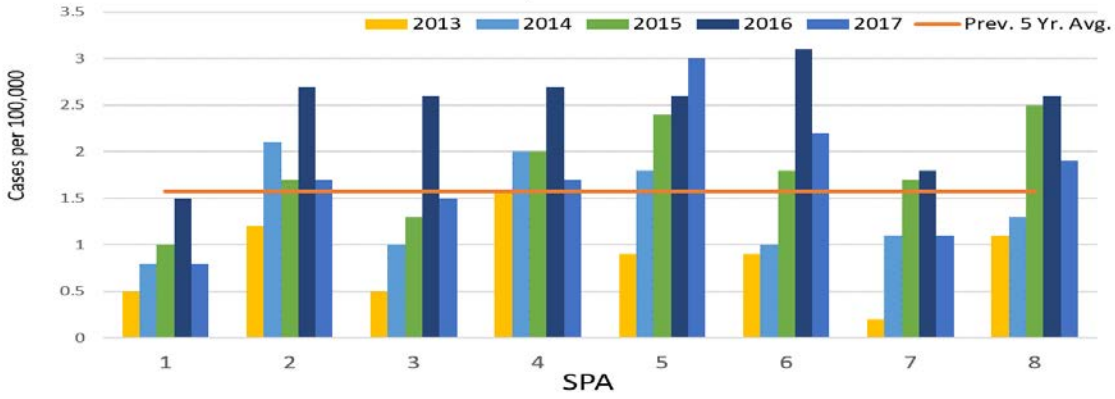


Figure 3. Reported Legionellosis Cases by Month of Onset
LAC, 2017 (N=165)

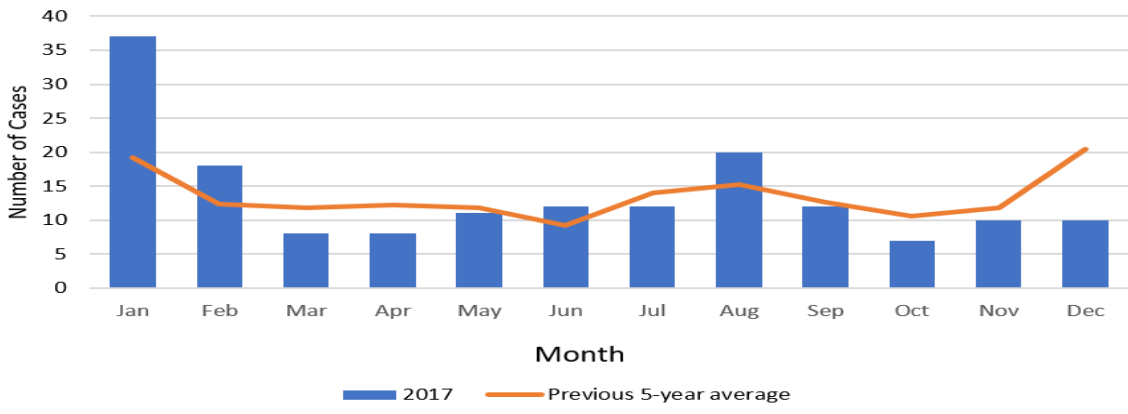
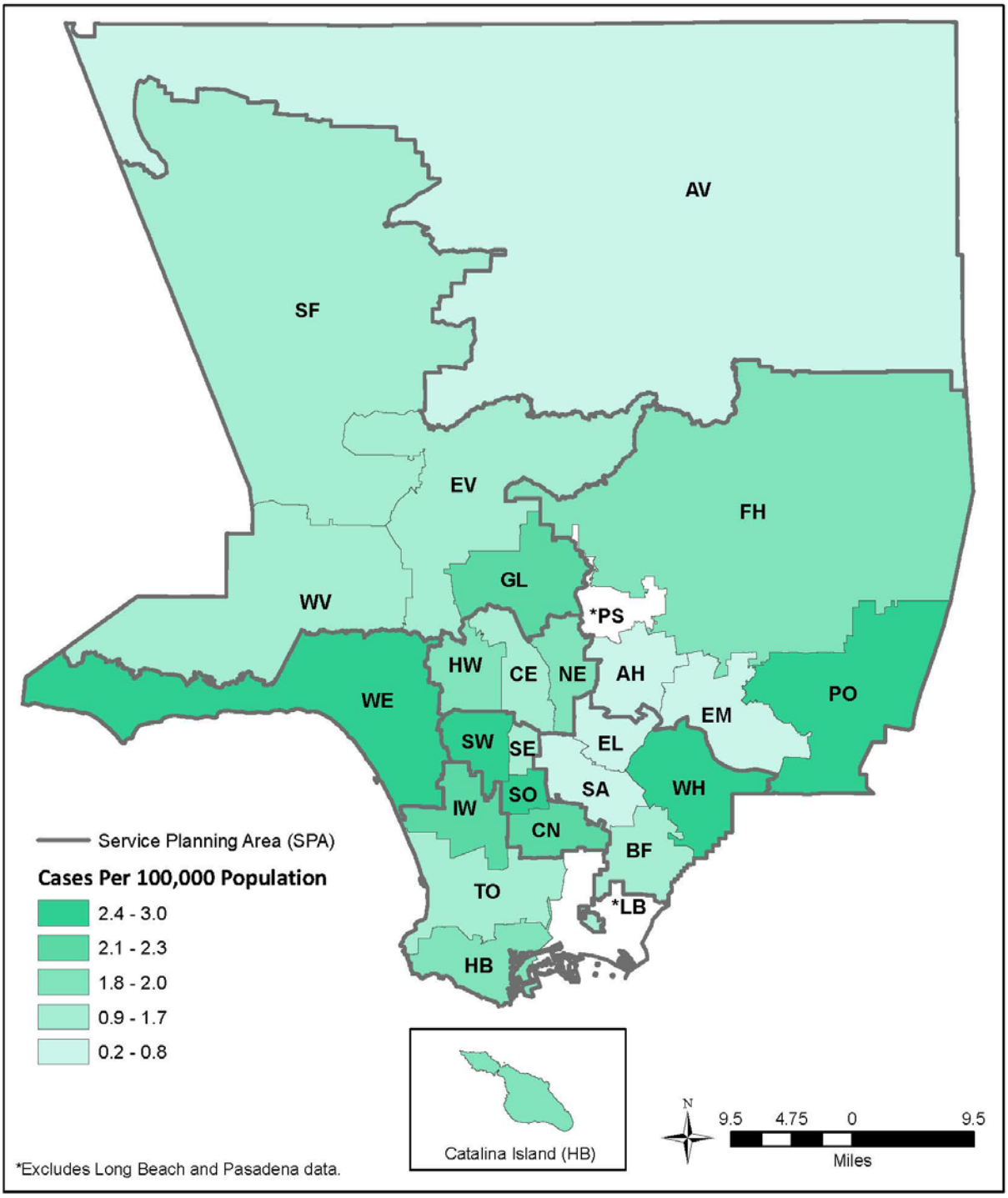


Table 1. Reported Legionellosis Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**85**	**100.0**	**0.90**	**140**	**100.0**	**1.48**	**171**	**100.0**	**1.79**	**245**	**100.0**	**2.55**	**165**	**100.0**	**1.71**
Age Group															
<1	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
1–4	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
5–14	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
15–34	3	3.5	–	3	2.1	–	9	5.3	0.3	8	3.2	0.3	7	4.2	0.2
35–44	4	4.7	–	11	7.9	0.8	11	6.4	0.8	13	5.3	1.0	8	4.8	0.6
45–54	12	14.1	0.9	17	12.1	1.3	14	8.2	1.1	39	16.0	3.0	23	13.9	1.7
55–64	19	22.4	1.9	29	20.7	2.7	31	18.1	2.8	50	20.4	4.4	27	16.7	2.3
65+	47	55.3	4.2	80	57.1	7.1	106	62.0	8.9	135	55.1	11.0	100	60.6	8.1
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Asian	7	8.2	0.5	16	11.4	1.2	11	6.4	0.8	16	7.0	1.1	17	10.3	1.2
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Black	16	18.8	2.1	21	15.0	2.7	29	17.0	3.7	44	18.0	5.6	29	17.6	3.7
Hispanic	24	28.2	0.5	39	27.9	0.8	49	28.7	1.0	93	38.0	2.0	48	29.1	1
White	34	40.0	1.3	62	44.3	2.3	76	44.4	2.8	89	36.0	3.3	71	43.0	2.7
AI/AN‖	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Other	1	1.2	–	0	–	–	3	1.8	–	2	1.0	–	0	–	–
Unknown	3	3.5	–	2	1.4	–	3	1.8	–	1	–	–	0	–	–
SPA															
1	2	2.4	–	3	2.1	–	4	2.3	–	6	2.4	1.5	3	1.8	–
2	27	31.8	1.2	46	32.9	2.1	38	22.2	1.7	61	25.0	2.7	39	23.6	1.7
3	8	9.4	0.5	16	11.4	1.0	22	12.9	1.3	42	17.1	2.6	25	15.2	1.5
4	18	21.2	1.6	23	16.4	2.0	23	13.5	2.0	32	13.1	2.7	20	12.1	1.7
5	6	7.1	0.9	12	8.6	1.8	16	9.4	2.4	17	7.0	2.6	20	12.1	3
6	9	10.6	0.9	10	7.1	1.0	19	11.1	1.8	33	13.4	3.1	23	13.9	2.2
7	3	3.5	–	14	10.0	1.1	22	12.9	1.7	23	9.5	1.8	14	8.5	1.1
8	12	14.1	1.1	14	10.0	1.3	27	15.8	2.5	28	11.4	2.6	21	12.7	1.9
Unknown	0	–	–	2	1.4	–	0	–	–	3	1.2	–	0	–	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
‖ American Indian or Alaskan Native.

Map 9. Legionellosis
Rates by Health District, Los Angeles County, 2017*



LISTERIOSIS, NONPERINATAL

SUMMARY DATA	
Number of Cases	25
Annual Incidence*	
LA County	0.3
California‡	N/A
United States†	0.3
Age at Diagnosis	
Mean	65
Median	61
Range	10–92 years

* Cases per 100,000 population.
† Rate based on CDC FoodNet sentinal sites.
‡ Data not available.

DESCRIPTION

Listeriosis, Nonperinatal[1] is a disease caused by the bacteria *Listeria monocytogenes*. Foods contaminated with *L. monocytogenes* such as raw fruits and vegetables, cold cuts, deli meats, and unpasteurized dairy products can lead to infection. The disease affects primarily persons of advanced age, pregnant women, newborns, and immunocompromised people. Symptoms of listeriosis include fever, muscle aches, and sometimes nausea or diarrhea. If infection spreads, sepsis or meningitis can occur, which may be fatal. Infected pregnant women may experience only a mild, flu-like illness; however, infection during pregnancy can lead to miscarriage or stillbirth, premature delivery, or infection of the newborn.

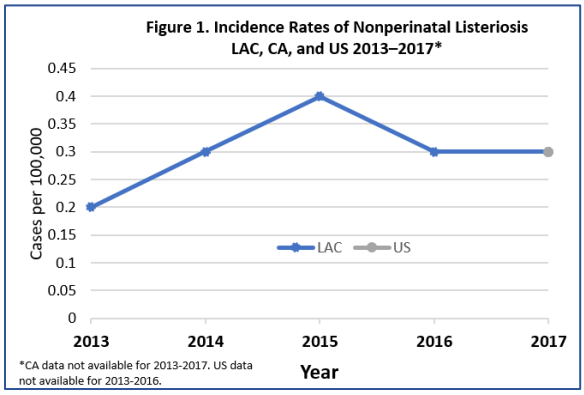
Nonperinatal listeriosis may be prevented by thoroughly cooking raw food from animal sources and avoiding unpasteurized milk or foods made from unpasteurized milk. Individuals at risk for severe outcomes from infection should also avoid soft cheeses and leftover foods or ready-to-eat foods such as deli meats and hot dogs. Deli meats should be cooked until steaming hot.

The CDC has been conducting surveillance for listeriosis for more than 30 years. Its various systems provide a comprehensive view of listeriosis in the United States. FoodNet, a collaborative program among the CDC, 10 state health departments, the US Department of Agriculture's Food Safety and Inspection Service, and the Food and Drug Administration collects information to track rates and report trends for nine germs transmitted commonly by food, including *Listeria*. The National Notifiable Diseases Surveillance System (NNDSS), a reporting system that enables all local, state, territorial, and federal health agencies to share health information to monitor, control, and prevent the occurrence and spread of nationally notifiable infectious diseases, also collects information about listeriosis in the US. The Foodborne Disease Outbreak Surveillance System (FDOSS), which collects reports of foodborne disease outbreaks from local, state, tribal, and territorial public health agencies, also contains information on foods, settings, and germs linked to specific outbreaks.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

- This year, the nonperinatal listeriosis disease incidence rate decreased in LAC from 0.34 cases per 100,000 in 2016 to 0.26 cases per 100,000 (**Figure 1**).



- The greatest incidence of nonperinatal listeriosis was among the 65+ age group (1.0 cases per 100,000) followed by those 55–64-years old (0.6

[1]www.publichealth.lacounty.gov/acd/Diseases/Lister_Non.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Listeriosis.aspx
[3]www.cdc.gov/listeria/index.html

cases per 100,000) (**Table 1**. Data for **Table 1** is available online.[4]).

- Comparing race/ethnicity, the greatest incidence of nonperinatal listeriosis occurred among Asians (0.6 cases per 100,000) (**Table 1**).
- The highest nonperinatal listeriosis incidence rates were documented within SPA 4 (0.6 per 100,000) and SPA 2 had the second highest incidence of cases (0.4 per 100,000) (**Figure 2**).
- The number of cases peaked in January, July, and August (**Figure 3**).

Figure 2. Incidence Rate of Nonperinatal Listeriosis by SPA
LAC, 2013–2017

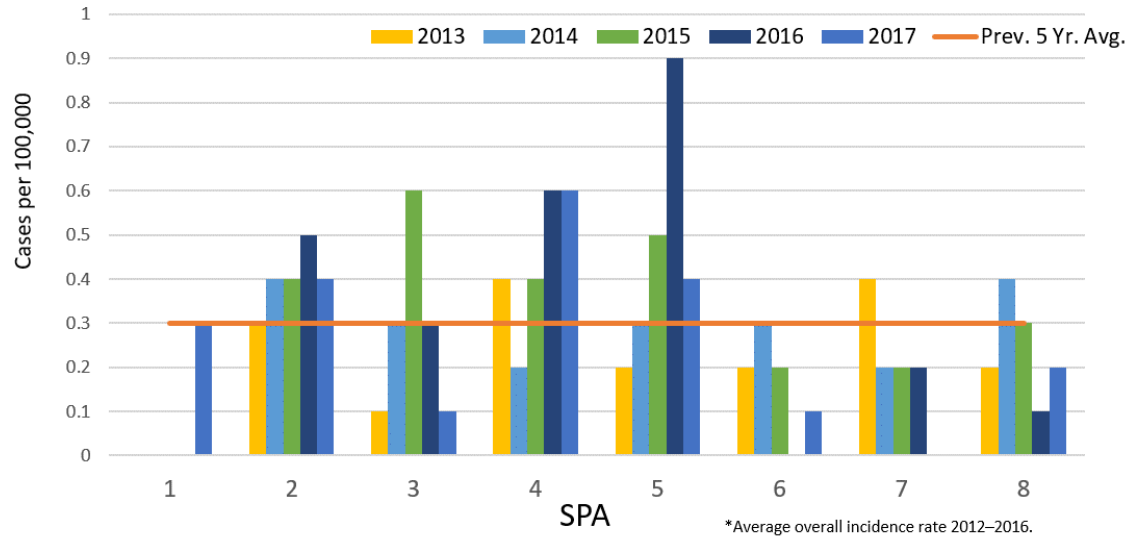
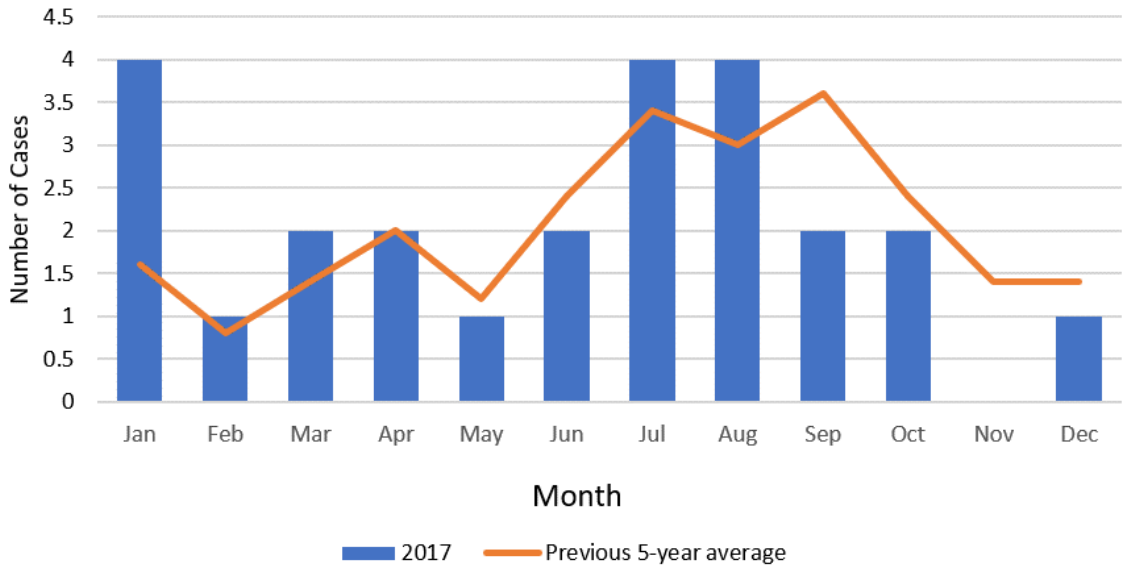


Figure 3. Reported Listeriosis, Nonperinatal, Cases by Month of Onset
LAC, 2017 (N=25)



[4]publichealth.lacounty.gov/acd/docs/2017Tables/Listeria%20nonperinatal.xlsx

Table 1. Reported Nonperinatal Listeriosis Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**23**	**100.0**	**0.24**	**27**	**100.0**	**0.29**	**34**	**100.0**	**0.36**	**33**	**100.0**	**0.34**	**25**	**100.0**	**0.26**
Age Group															
<1	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
1–4	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
5–14	0	–	–	1	3.7	–	0	–	–	0	–	–	1	4.0	–
15–34	0	–	–	0	–	–	1	2.9	–	1	3.0	–	1	4.0	–
35–44	1	4.3	–	2	7.4	–	3	8.8	–	1	3.0	–	0	–	–
45–54	3	13.0	–	1	3.7	–	5	14.7	–	3	9.1	–	4	16.0	–
55–64	3	13.0	–	3	11.1	–	4	11.8	–	4	12.1	–	7	28.0	0.6
65+	16	69.6	1.4	20	74.1	1.8	21	61.8	1.8	24	72.7	2.0	12	48.0	1.0
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Asian	7	30.4	0.5	9	33.3	0.7	6	17.6	0.4	8	24.2	0.6	8	32.0	0.6
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Black	1	4.3	–	1	3.7	–	0	–	–	2	6.1	–	1	4.0	–
Hispanic	8	34.8	0.2	10	37.0	0.2	9	26.5	0.2	7	21.2	0.1	8	32.0	0.2
White	6	26.1	0.2	4	14.8	–	13	38.2	0.5	15	45.5	0.6	8	32.0	0.3
AI/AN|	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Other	0	–	–	0	–	–	1	–	–	1	3.0	–	0	–	–
Unknown	1	–	–	3	–	–	5	–	–	0	–	–	0	–	–
SPA															
1	0	–	–	0	–	–	0	–	–	0	–	–	1	4.0	–
2	7	30.4	0.3	9	33.3	0.4	8	23.5	0.4	11	33.3	0.5	10	40.0	0.4
3	2	8.7	–	5	18.5	–	10	29.4	0.6	5	15.2	–	1	4.0	–
4	4	17.4	–	2	7.4	–	5	14.7	–	7	21.2	0.6	7	28.0	0.6
5	1	4.3	–	2	7.4	–	3	8.8	–	6	18.2	0.9	3	12.0	–
6	2	8.7	–	3	11.1	–	2	5.9	–	0	–	–	1	4.0	–
7	5	21.7	–	2	7.4	–	3	8.8	–	3	9.1	–	0	–	–
8	2	8.7	–	4	14.8	–	3	8.8	–	1	3.0	–	2	8.0	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
| American Indian or Alaskan Native.

LISTERIOSIS, PERINATAL

SUMMARY DATA	
Number of Cases	5
Annual Incidence*	
LA County	4.6
California†	N/A
United States†,‡	N/A
Age at Diagnosis	
Mean	33
Median	35
Range	25–38 years

* Cases per 100,000 population.
† Rates calculated based on less than 19 cases or events are considered unreliable.
‡ CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017

DESCRIPTION

Listeriosis, Perinatal[1] is a disease caused by the bacteria *Listeria monocytogenes*. This disease is a disease transmitted transplacentally from infected pregnant women. Foods contaminated with *L. monocytogenes* such as raw fruits and vegetables, cold cuts, deli meats, and unpasteurized dairy products can lead to infection. These women may experience only mild flu-like symptoms or may be asymptomatic. A perinatal listeriosis case is defined as a mother-infant pair in which one or both persons has a positive *L. monocytogenes* culture from a normally sterile site. Neonatal/infant listeriosis is often divided into early onset (0–6 days after birth) and late onset (7–42 days after birth). Infection during pregnancy may lead to premature birth, stillbirth, or septicemia and/or meningitis in the neonate—even if the mother is asymptomatic.

There is no vaccine to prevent listeriosis. Perinatal listeriosis may be prevented by thoroughly cooking raw food from animal sources and avoiding unpasteurized milk or foods made from unpasteurized milk. Pregnant women at risk for severe outcomes from infection should also avoid soft cheeses and leftover foods or ready-to-eat foods such as deli meats and hot dogs. Deli meats should be cooked until steaming hot.

The CDC has been conducting surveillance for listeriosis for more than 30 years. Its various systems provide a comprehensive view of listeriosis in the United States. FoodNet, a collaborative program among the CDC, 10 state health departments, the US Department of Agriculture's Food Safety and Inspection Service, and the Food and Drug Administration collects information to track rates and report trends for nine germs transmitted commonly by food, including *Listeria*. The National Notifiable Diseases Surveillance System (NNDSS), a reporting system that enables all local, state, territorial, and federal health agencies to share health information to monitor, control, and prevent the occurrence and spread of nationally notifiable infectious diseases, also collects information about listeriosis in the US. The Foodborne Disease Outbreak Surveillance System (FDOSS), which collects reports of foodborne disease outbreaks from local, state, tribal, and territorial public health agencies, also contains information on foods, settings, and germs linked to specific outbreaks.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

- Due to the low number of cases, rate calculations are unreliable and are not provided here (**Table 1**. Data for **Table 1** is available online.[4]).

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[1]www.publichealth.lacounty.gov/acd/Diseases/Lister_Per.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Listeriosis.aspx
[3]www.cdc.gov/listeria/index.html
[4]www.publichealth.lacounty.gov/acd/docs/2017Tables/Listeria%20perinatal.xlsx

Table 1. Reported Perinatal Listeriosis Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**4**	**100.0**	**–**	**5**	**100.0**	**–**	**3**	**100.0**	**–**	**4**	**100.0**	**–**	**5**	**100.0**	**–**
Age Group															
<1	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
1–4	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
5–14	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
15–34	4	100.0	–	3	60.0	–	2	66.7	–	0	–	–	2	40.0	–
35–44	0	–	–	2	40.0	–	1	33.3	–	3	75.0	–	3	60.0	–
45–54	0	–	–	0	–	–	0	–	–	1	25.0	–	0	–	–
55–64	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
65+	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Asian	0	–	–	1	20.0	–	0	–	–	0	–	–	1	20.0	–
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Black	0	–	–	0	–	–	0	–	–	1	25.0	–	0	–	–
Hispanic	3	75.0	–	2	40.0	–	2	66.7	–	3	75.0	–	3	60.0	–
White	1	25.0	–	1	20.0	–	1	33.3	–	0	–	–	1	20.0	–
AI/AN‖	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Other	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Unknown	0	–	–	1	20.0	–	0	–	–	0	–	–	0	–	–
SPA															
1	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
2	1	25.0	–	1	20.0	–	0	–	–	0	–	–	3	60.0	–
3	1	25.0	–	1	20.0	–	1	33.3	–	1	25.0	–	0	–	–
4	0	–	–	1	20.0	–	0	–	–	0	–	–	0	–	–
5	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
6	0	–	–	1	20.0	–	1	33.3	–	0	–	–	1	20.0	–
7	1	25.0	–	0	–	–	0	–	–	1	25.0	–	1	20.0	–
8	1	25.0	–	1	20.0	–	1	33.3	–	2	50.0	–	0	–	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–

* Data is suppressed for 5 or fewer cases.

† Rate calculations based on less than 19 cases or events are considered unreliable.

‡ Race/ethnicity categorization changed for 2017. See Overview.

§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.

‖ American Indian or Alaskan Native.

MEASLES

SUMMARY DATA	
Number of Cases	3
Annual Incidence*	
LA County†	N/A
California†	N/A
United States†	N/A
Age at Diagnosis	
Mean	39
Median	58
Range	1–59 years

* Cases per 100,000 population.
† Rates calculated based on less than 19 cases or events are considered unreliable.

DESCRIPTION

Measles[1] is a disease caused by a virus. Transmission occurs from person-to-person by coughs or sneezes. This disease is highly contagious—the measles virus can stay in the air for up to two hours after an infected person has left. Thus, a person can get infected by being in a room where an infected person once was present. This disease is so contagious that if one person has it, up to 90% of the people around his/her will also become infected if they are not protected. Symptoms of measles include cough, runny nose, red eyes, and a rash of tiny red spots that starts at the head and spreads to the rest of the body.

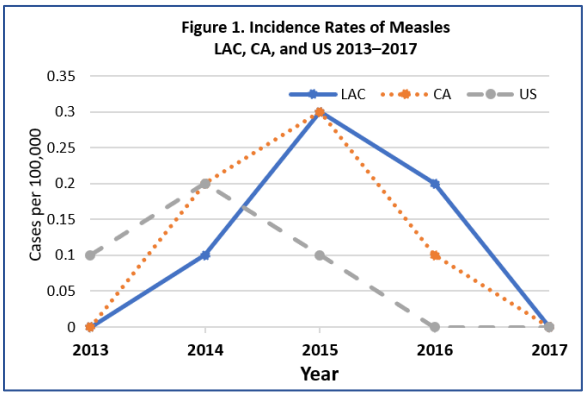
Measles cases are reported by states to the CDC through the National Notifiable Diseases Surveillance System (NNDSS). Both probable and confirmed cases should be reported nationally. Prompt recognition, reporting, and investigation of measles is important because the spread of the disease can be limited with early case identification and public health response including vaccination and quarantine of susceptible contacts without presumptive evidence of immunity. Laboratory confirmation is essential for all measles outbreaks. State and local health departments have the lead in investigating measles cases and outbreaks when they occur.

The best way to prevent getting measles is by vaccination. The MMR vaccine can be used to prevent measles, mumps, and rubella. The MMR vaccine is given later than some other childhood vaccines because antibodies transferred from the mother to the baby can provide some protection from disease and make the MMR vaccine less effective until about 1 year of age.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

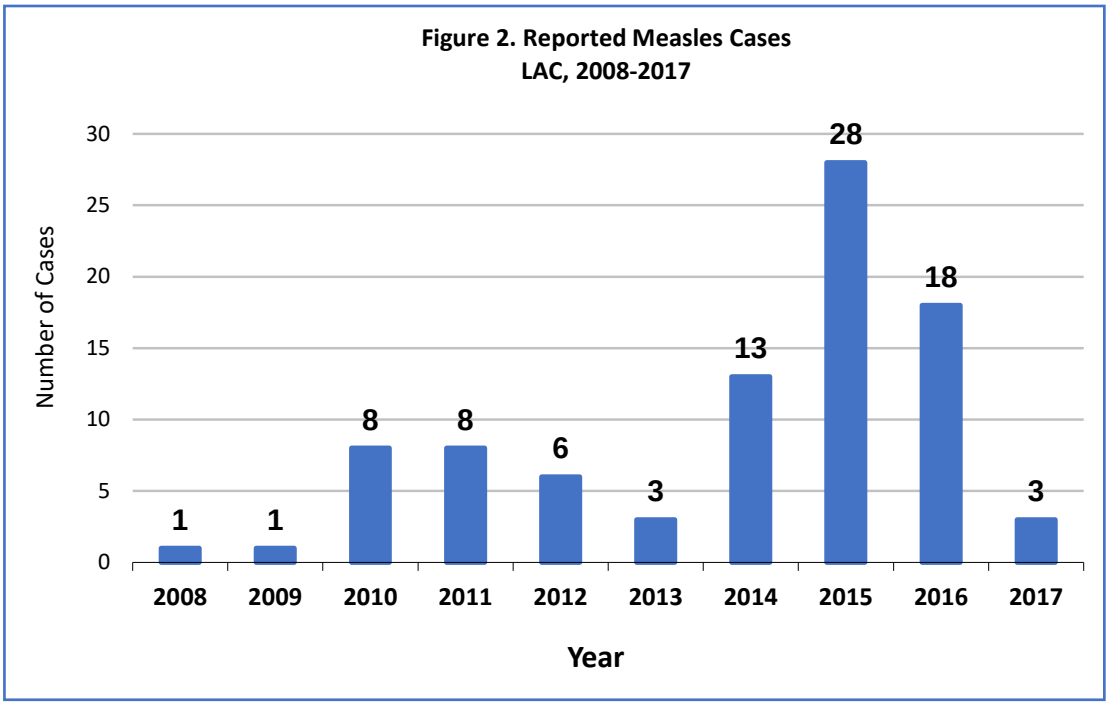
- This year, the measles disease incidence rate decreased in LAC from 0.19 cases per 100,000 in 2016 to 0.03 cases per 100,000 (**Figure 1**).

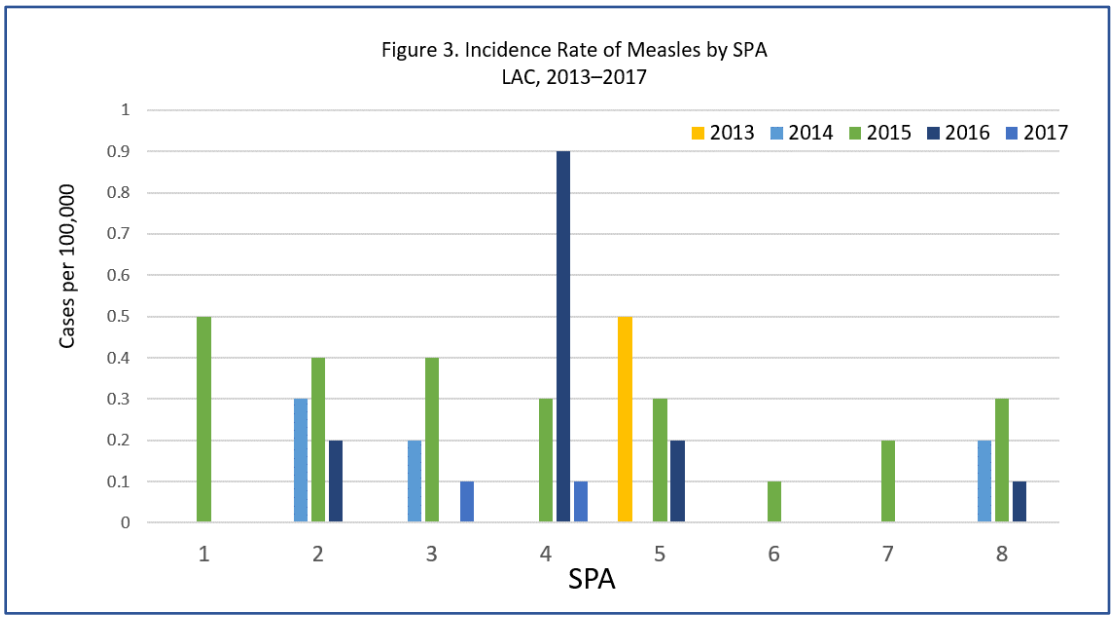


- The greatest incidence of measles was in the 0–4-year-old and 55–64-year-old age groups (0.2 cases per 100,000) (**Table 2**. Data for **Table 2** is available online.[4]).
- Comparing race/ethnicity, the greatest incidence of measles occurred among Whites (0.1 cases per 100,000) (**Table 2**).
- The highest number of measles cases that was reported in LAC was 28, and this occurred in 2015 (**Figure 2**).
- The highest measles incidence rates were documented within SPA 3 and SPA 4 (0.1 per 100,000) (**Figure 3**).

[1]publichealth.lacounty.gov/ip/VPD_measles.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/measles.aspx
[3]www.cdc.gov/measles/
[4]publichealth.lacounty.gov/acd/docs/2017Tables/Measles.xlsx

- The number of cases peaked in December, which was inconsistent with the previous five-year average (**Figure 4**).
- There were three confirmed cases of measles that were eligible for but were not up-to-date on their vaccinations (**Table 1**).





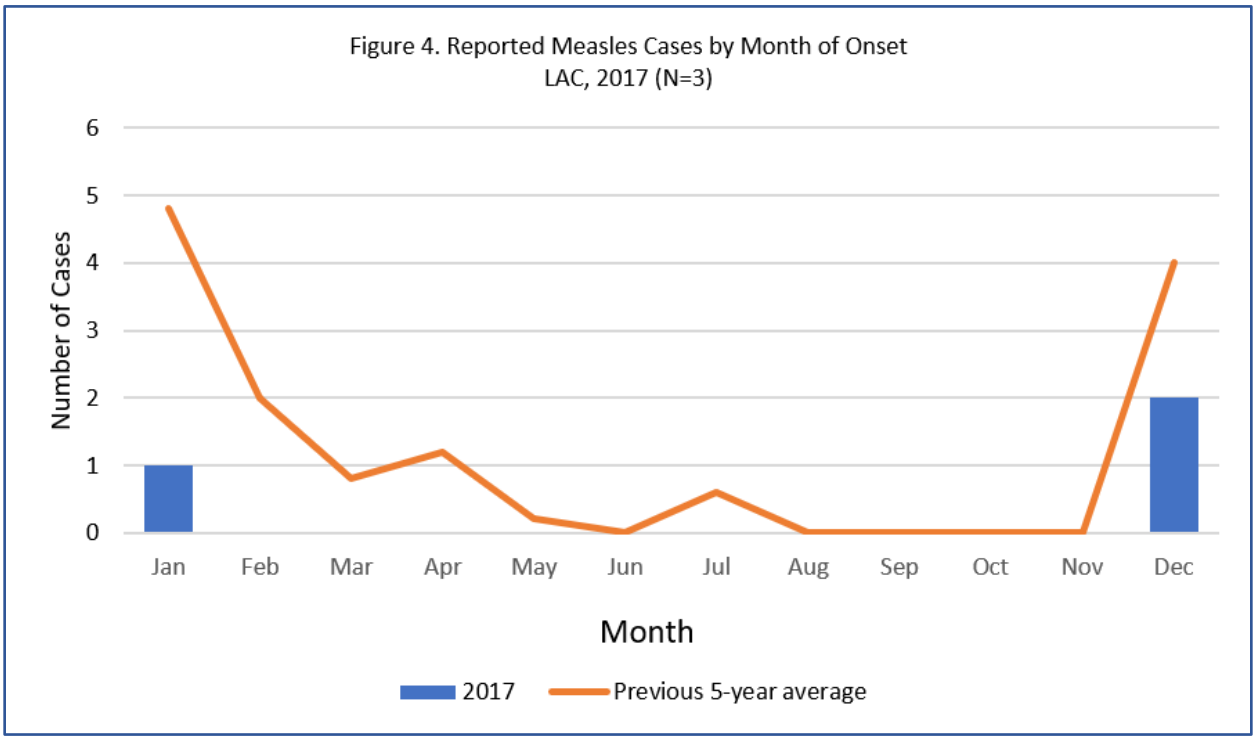


Table 1. Vaccination Status of Reported Confirmed Measles Cases, LAC, 2017

	Reported Cases	Cases Too Young to Be Vaccinated[1]	Cases Eligible for Vaccination and Up-to-Date[2]	Cases Eligible for Vaccination and Not Up-To-Date[3]	Personal Beliefs Exemption School Vaccine Waivers Among Cases Age <18 Years (n=1)
No.	3	0	0	3	0
%	100%	0%	9.4%	90.5%	0.0%

[1] Cases less than 12 months of age.
[2] Cases 12 months of age and older and who are up-to-date with the measles immunization recommendations for their age.
[3] Cases 12 months of age and older and who are not up-to-date with the measles immunization recommendations for their age. Includes cases that have unknown immunization status, have personal belief exemption school vaccine waivers, or have no valid documentation of receiving measles vaccines prior to disease onset.

Table 2. Reported Measles Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**3**	**100.0**	**0.03**	**13**	**100.0**	**0.14**	**28**	**100.0**	**0.29**	**18**	**100.0**	**0.19**	**3**	**100.0**	**0.03**
Age Group															
<1	0	–	–	2	15.4	–	5	17.9	–	0	–	–	0	–	–
1–4	0	–	–	3	23.1	–	2	7.1	–	2	11.1	–	1	33.3	–
5–14	0	–	–	4	30.8	–	1	3.6	–	7	38.9	0.6	0	–	–
15–34	1	33.3	–	1	7.7	–	11	39.3	0.4	6	33.3	0.2	0	–	–
35–44	0	–	–	2	15.4	–	5	17.9	–	1	5.9	–	0	–	–
45–54	1	33.3	–	1	7.7	–	2	7.1	–	2	11.1	–	0	–	–
55–64	1	33.3	–	0	–	–	1	3.6	–	0	–	–	2	66.7	–
65+	0	–	–	0	–	–	1	3.6	–	0	–	–	0	–	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Am Indian	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Asian	0	–	–	3	23.1	–	2	7.1	–	0	–	–	0	–	–
Black	0	–	–	0	–	–	1	3.6	–	1	5.6	–	0	–	–
Hispanic	0	–	–	2	15.4	–	14	50.0	0.3	1	5.6	–	0	–	–
Pacific Islander	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
White	3	100.0	–	7	53.8	0.3	11	39.3	0.4	16	88.9	0.6	3	100.0	–
Other	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Unknown	0	–	–	1	7.7	–	0	–	–	0	–	–	0	–	–
SPA															
1	0	–	–	0	–	–	2	7.1	–	0	–	–	0	–	–
2	0	–	–	7	53.8	0.3	8	28.6	0.4	5	27.8	–	0	–	–
3	0	–	–	4	30.8	–	7	25.0	0.4	0	–	–	2	66.7	–
4	0	–	–	0	–	–	3	10.7	–	11	61.1	0.9	1	33.3	–
5	3	100.0	–	0	–	–	2	7.1	–	1	5.6	–	0	–	–
6	0	–	–	0	–	–	1	3.6	–	0	–	–	0	–	–
7	0	–	–	0	–	–	2	7.1	–	0	–	–	0	–	–
8	0	–	–	2	15.4	–	3	10.7	–	1	5.6	–	0	–	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.

MENINGITIS, VIRAL

SUMMARY DATA	
Number of Cases	283
Annual Incidence*	
LA County	2.9
California†	N/A
United States†	N/A
Age at Diagnosis	
Mean	33
Median	33
Range	0–96 years

* Cases per 100,000 population.
† Not nationally reportable.

DESCRIPTION

Meningitis[1], or aseptic meningitis syndrome, is a term used to define any meningitis (infectious or noninfectious). This disease is most commonly caused by viruses, which is particularly true for one with a cerebrospinal fluid lymphocytic pleocytosis. The cause of these types of meningitis is not apparent after initial evaluation, and routine stains and cultures do not support a bacterial or fungal etiology. Viral meningitis can occur at any age but is most common among the very young. Symptoms can include sudden onset of fever, severe headache, stiff neck, photophobia, drowsiness, confusion, nausea, and vomiting and usually last from seven to ten days.

The most common cause of viral meningitis is nonpolio enteroviruses, which are not vaccine-preventable and account for 85-95% of all cases in which a pathogen is identified. Transmission of enteroviruses may be by the fecal-oral, respiratory, or another route specific to the etiologic agent. Other viral agents that can cause viral meningitis include herpes simplex virus (HSV), varicella-zoster virus (VZV), mumps virus, lymphocytic choriomeningitis virus, human immunodeficiency virus (HIV), adenovirus, parainfluenza virus type 3, influenza virus, measles virus, and arboviruses such as West Nile virus (WNV).

All cases of viral meningitis are reportable to LAC DPH within one day. LAC DPH conducts passive surveillance of viral meningitis cases with suspected or confirmed viral etiologies. Cases included in LAC DPH surveillance require, at minimum, a clinically compatible illness and may or may not include laboratory evidence.

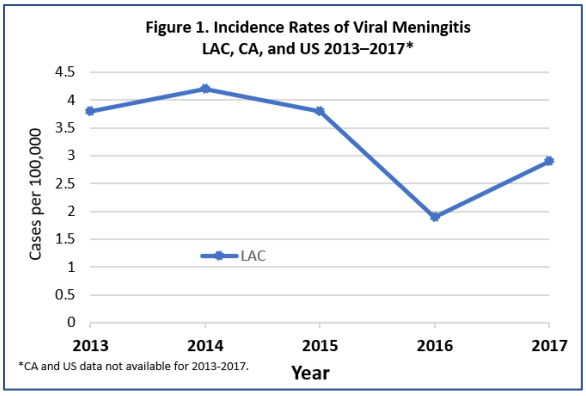
Antiviral agents are available for HSV and VZV; however, in most cases, only supportive measures are available for the treatment of viral meningitis. Recovery is usually complete and associated with low mortality rates.

Several types of viral meningitis cases are vaccine-preventable including those caused by VZV, mumps, influenza, and measles. Good personal hygiene, especially hand washing and avoiding contact with oral secretions of others, is the most practical and effective preventive measure for non-vaccine preventable causes.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

- In 2017, viral/aseptic meningitis incidence increased from 1.9 cases per 100,000 in 2016 to 2.9 cases per 100,000 (**Figure 1**).



[1]publichealth.lacounty.gov/acd/Mening.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/meningococcal.aspx
[3]www.cdc.gov/meningitis/

- The distribution of viral/aseptic meningitis by age groups remains similar to previous years with the <1-year-old age group experiencing the highest age-specific incidence rate at 43.7 cases per 100,000 (**Table 1**. Data for **Table 1** is available online.[4]).
- In 2017 and in prior years, the highest incidence rates by race/ethnicity occurred among Whites (3.0 cases per 100,000) followed by Hispanics (2.2 cases per 100, 000) (**Table 1**).
- SPA 1 reported the highest incidence of viral meningitis in LAC at 3.8 cases per 100,000 followed by SPA 8 at 3.7 cases per 100,000 (**Figure 2**).
- The peak months for viral meningitis cases occurred between July and September. WNV meningitis contributed to a large proportion of these cases (**Figure 3**).
- Four fatalities were documented, and no outbreaks occurred.

Figure 2. Incidence Rate of Viral Meningitis by SPA
LAC, 2013–2017

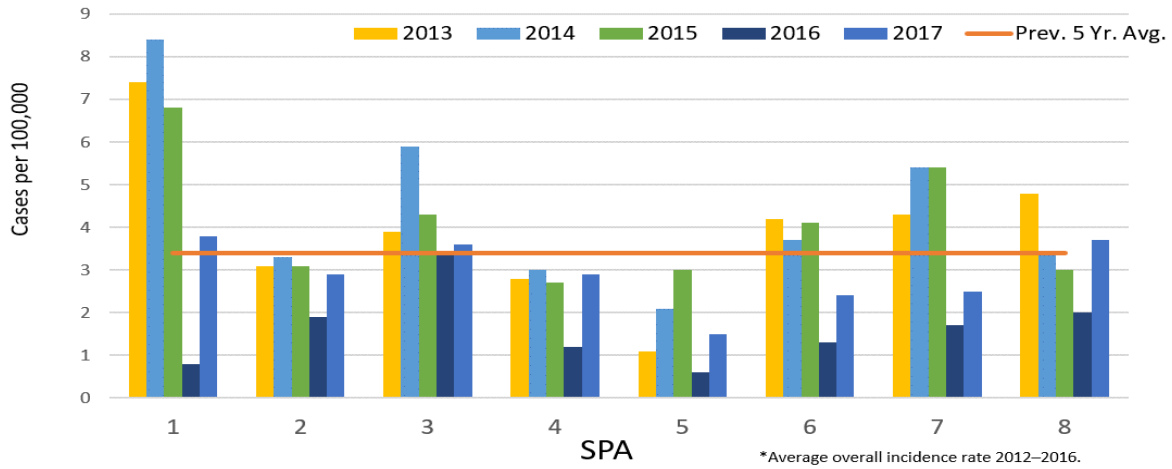
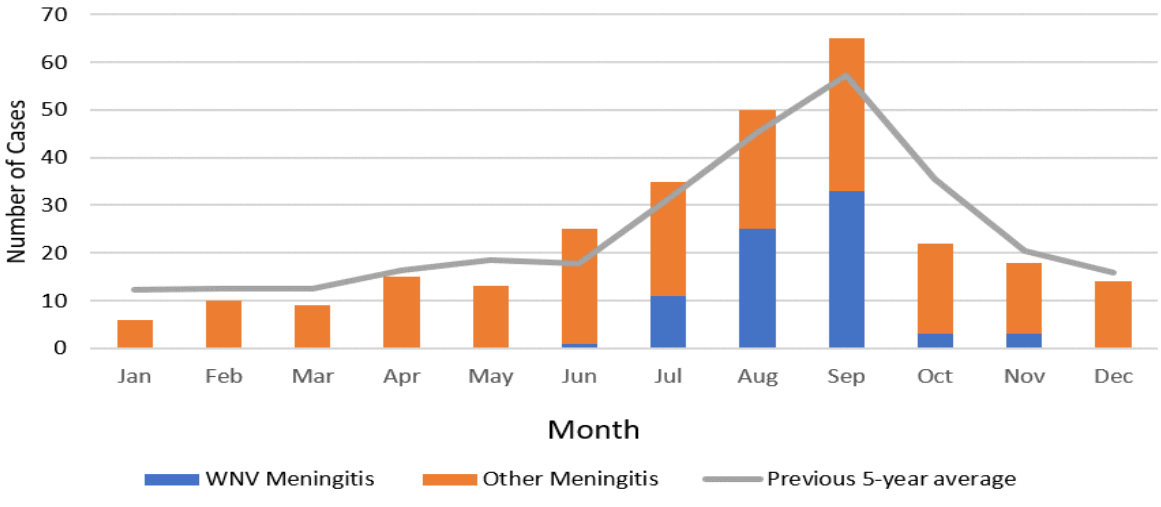


Figure 3. Reported Meningitis Cases by Month of Onset
LAC, 2017 (N=283)



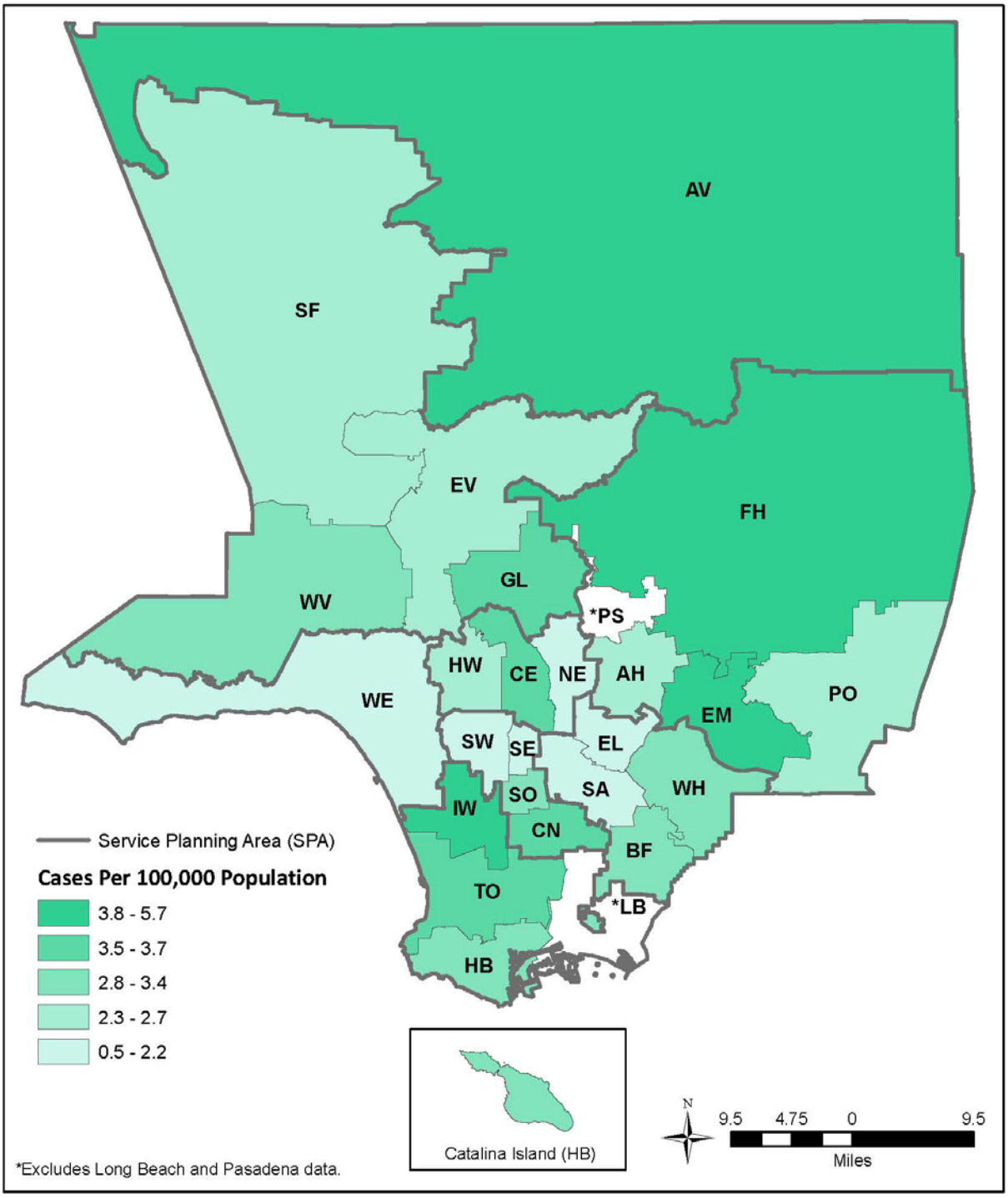
[4]publichealth.lacounty.gov/acd/docs/2017Tables/Meningitis%20Viral.xlsx

Table 1. Reported Viral Meningitis Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**355**	**100.0**	**3.77**	**400**	**100.0**	**4.23**	**367**	**100.0**	**3.83**	**183**	**100.0**	**1.91**	**283**	**100.0**	**2.93**
Age Group															
<1	43	12.1	35.6	47	11.8	39.7	41	11.2	37.9	17	9.3	16.4	45	15.9	43.7
1–4	9	2.5	1.8	8	2.0	1.6	2	0.5	–	4	2.2	–	2	0.7	–
5–14	57	16.1	4.7	54	13.5	4.5	51	13.9	4.2	7	3.8	0.6	37	13.1	3.1
15–34	105	29.6	3.7	114	28.5	4.0	101	27.5	3.6	41	22.4	1.5	62	21.9	2.2
35–44	27	7.6	2.0	43	10.8	3.3	38	10.4	2.9	28	15.3	2.1	36	12.7	2.7
45–54	44	12.4	3.4	43	10.8	3.3	41	11.2	3.1	34	18.6	2.6	29	10.3	2.2
55–64	35	9.9	3.4	42	10.5	4.0	42	11.4	3.8	28	15.3	2.5	42	14.8	3.6
65+	31	8.7	2.8	44	11.0	3.9	51	13.9	4.3	24	13.1	2.0	30	10.6	2.4
Unknown	4	1.1	–	5	1.3	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Asian	21	5.9	1.5	22	5.5	1.6	21	5.7	1.5	16	8.7	1.1	14	5.0	1.0
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	2	0.7	–
Black	26	7.3	3.3	26	6.5	3.3	24	6.5	3.1	10	5.5	1.3	11	3.9	1.4
Hispanic	158	44.5	3.4	186	46.5	4.0	174	47.4	3.7	71	38.8	1.5	105	37.1	2.2
White	88	24.8	3.3	99	24.8	3.7	106	28.9	3.9	53	29.0	2.0	81	28.6	3.0
AI/AN|	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–
Other	19	5.4	–	12	3.0	–	8	2.2	–	5	2.7	–	23	8.1	–
Unknown	43	12.1	–	55	13.8	–	34	9.3	–	28	15.3	–	47	16.6	–
SPA															
1	29	8.2	7.4	33	8.3	8.4	27	7.4	6.8	3	1.6	–	15	5.3	3.8
2	67	18.9	3.1	73	18.3	3.3	68	18.5	3.1	43	23.4	1.9	65	23.0	2.9
3	64	18.0	3.9	97	24.3	5.9	71	19.3	4.3	56	30.6	3.4	59	20.9	3.6
4	32	9.0	2.8	34	8.5	3.0	31	8.4	2.7	14	7.7	1.2	34	12.0	2.9
5	7	2.0	1.1	14	3.5	2.1	20	5.4	3.0	4	2.2	–	10	3.5	1.5
6	43	12.1	4.2	38	9.5	3.7	43	11.7	4.1	14	7.7	1.3	26	9.2	2.4
7	56	15.8	4.3	71	17.8	5.4	71	19.3	5.4	22	12.0	1.7	33	11.7	2.5
8	52	14.6	4.8	37	9.3	3.4	33	9.0	3.0	22	12.0	2.0	40	14.1	3.7
Unknown	5	1.4	–	3	0.8	–	3	0.8	–	5	2.7	–	1	–	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
| American Indian or Alaskan Native.

Map 10. Meningitis, Viral
Rates by Health District, Los Angeles County, 2017*



MENINGOCOCCAL DISEASE

SUMMARY DATA	
Number of Cases	10
Annual Incidence*	
LA County	0.1
California†	0.2
United States†	0.1
Age at Diagnosis	
Mean	34
Median	26
Range	12–72 years

* Cases per 100,000 population.
† CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017

DESCRIPTION

Invasive Meningococcal Disease (IMD)[1] is a disease that occurs most often as meningitis, an infection of the cerebrospinal fluid (CSF), or meningococcemia, an infection of the bloodstream. Transmission occurs via direct or droplet contact with nose or throat secretions of persons colonized in the upper respiratory tract with *Neisseria meningitidis* bacteria. Symptoms include sudden onset of fever, headache, nausea, vomiting, stiff neck, petechial rash, and lethargy, which can progress to overwhelming sepsis, shock, and death within hours. Despite effective antibiotic therapy, the mortality rate remains between 10-15%. Long-term sequelae include significant neurologic or orthopedic complications such as deafness or amputation. Meningococcal disease affects all age groups but occurs most often in infants.

Surveillance of IMD involves LAC DPH defining reports as confirmed when *N. meningitidis* has been isolated from or evidenced by polymerase chain reaction (PCR) analysis in a normally sterile site (e.g., blood or CSF). In the absence of a positive culture, reports are defined as probable if the *N. meningitidis* antigen is detected by immunohistochemistry or latex agglutination. Reports are classified as suspected cases when they present with clinical diagnosis of purpura fulminans or demonstrate gram-negative diplococci by gram staining [**1**].

A total of four vaccines are available in the US that can prevent meningococcal disease. Two protect against serogroups A, C, Y, and W-135, and two protect against serogroup B. Two quadrivalent conjugate vaccines, MenACWY-D and MenACWY-CRM, are licensed for use in persons 2-55-years-old. The quadrivalent polysaccharide meningococcal vaccine (MPSV4), which had been licensed for persons ≥56-years-old, was discontinued in 2017. Persons in this age group should receive one of the quadrivalent conjugate vaccines. MenACWY-D is also licensed for use in children 9-23-months-old. Lastly, two serogroup B vaccines, MenB-FHbp and MenB-4C, were approved for use in persons aged 10-25-years-old [**2**].

Vaccination with meningococcal conjugate vaccine is routinely recommended for all persons 11 through 12-years-old with a booster dose at 16-years-old and for those at increased risk for meningococcal disease [**3**]. In 2016, the Advisory Committee on Immunization Practices (ACIP) recommended routine use of meningococcal vaccine for HIV positive persons ≥2-years-old [**4**]. Serogroup B meningococcal vaccination is recommended in addition to quadrivalent conjugate vaccine for people ≥10-years-old who are at increased risk for meningococcal disease. Within LAC, DPH recommended vaccination for men who have sex with men (MSM) in 2014 due to an increase of IMD among MSM in LAC that occurred from 2012-2014. In 2016, this recommendation was expanded to all gay/MSM, regardless of other risk factors including HIV status due to a southern California regional outbreak that began in March 2016.

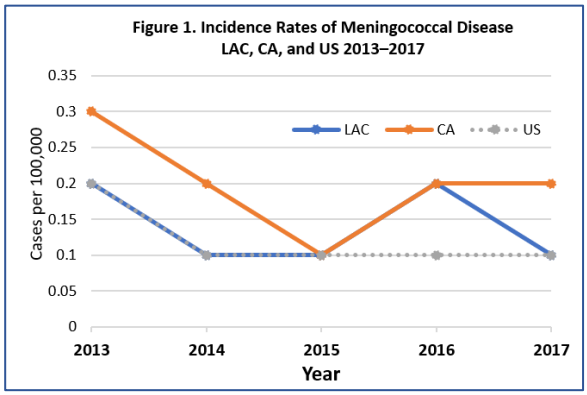
Antimicrobial chemoprophylaxis of close contacts of sporadic cases of IMD remains the primary means for prevention of IMD among close contacts. Because the rate of secondary disease for close contacts is highest during the first few days after onset of disease in the primary patient, antimicrobial chemoprophylaxis should be administered as soon as possible—ideally within 24 hours after the case is identified. Conversely, chemoprophylaxis administered >14 days after last date of exposure to the index case is probably of limited or no value. Prophylactic treatment and

follow-up of close contacts are routinely handled by the LAC DPH Community Health Services.

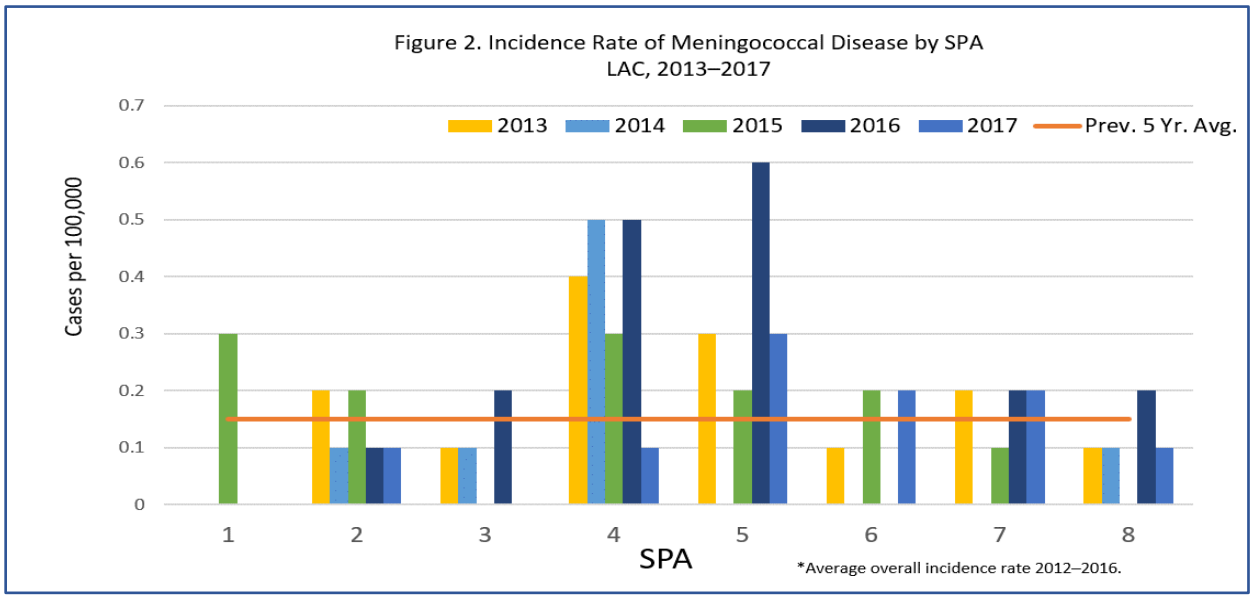
For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

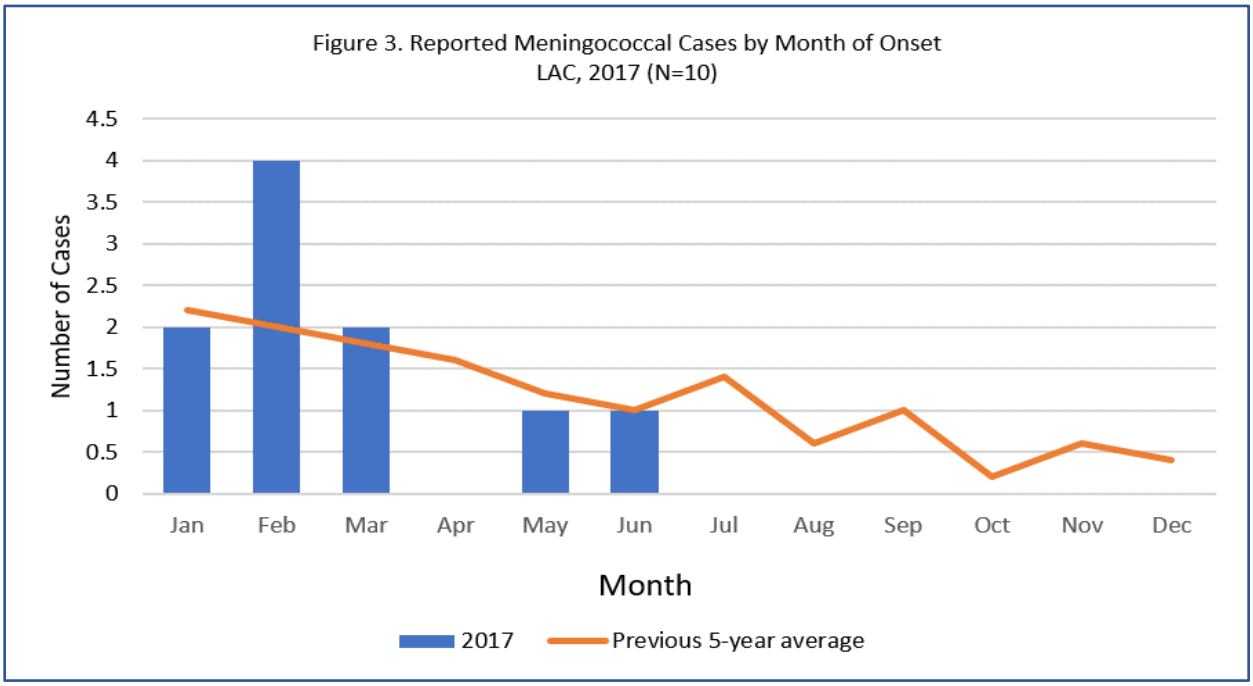
- The incidence of IMD in LAC has followed the national incidence for the past decade and continues to decrease from a peak of 0.6 cases per 100,000 in 2001 to 0.1 cases per 100,000 in 2017 (**Figure 1**).



- This has been the trend in LAC for the previous five years. In a typical distribution curve depicting incidence by age group for IMD, the peak incidence occurs among infants <1-year-old. This trend is maintained nationally. There have been no cases of IMD in children <1-year-old in LAC since 2010 (**Table 1**. Data for **Table 1** is available online.[4]).
- Due to the number of cases for IMD being less than 19 in 2017 and unreliable for rate
- The monthly onset of disease mirrored the typical seasonal trend where a peak occurs during the winter season. The highest number of cases occurred in February (n=4) (**Figure 3**).
- Two fatalities were documented this year. Both were serogroup C cases.
- In March 2016, an increase in IMD was detected among MSM in LAC and southern California. LAC DPH collaborated with the CDC to investigate cases and enhance vaccination uptake. A supplemental history form was used to collect data on unique risk factors among MSM. No direct geographic and social epidemiologic links were found between outbreak cases. By the end of 2016, there were 27 outbreak-associated cases across southern California, 11 of which were LAC residents (41%). In 2017, outbreak activity slowed down with only 6 outbreak-associated cases across southern California, 3 of which were LAC residents (50%).



[1]publichealth.lacounty.gov/acd/Mening.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/meningococcal.aspx
[3]www.cdc.gov/meningococcal/
[4]publichealth.lacounty.gov/acd/docs/2017Tables/Meningococcal.xlsx



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2. Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report. Updated Recommendations for Use of MenB-FHbp Serogroup B Meningococcal VaccineAdvisory Committee on Immunization Practices (ACIP), 2016. 19 May 2017, 66 (19): 509-513.
3. Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report. Prevention and Control of Meningococcal Disease, Recommendations of the Advisory Committee on Immunization Practices (ACIP). 22 Mar 2013, 62 (2): 1-28.
4. Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report. Recommendations for Use of Meningococcal Conjugate Vaccines in HIV-Infected Persons - Advisory Committee on Immunization Practices, 2016. 2016. 4 Nov 2016, 65 (43): 1189-1194.

Table 1. Reported Meningococcal Disease Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**17**	**100.0**	**0.18**	**11**	**100.0**	**0.12**	**12**	**100.0**	**0.13**	**20**	**100.0**	**0.21**	**10**	**100.0**	**0.10**
Age Group															
<1	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
1–4	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
5–14	1	5.9	–	0	–	–	0	–	–	1	5.0	–	1	10.0	–
15–34	7	41.2	0.2	6	54.5	0.2	4	33.3	–	11	55.0	0.4	5	50.0	–
35–44	3	17.6	–	1	9.1	–	1	8.3	–	4	20.0	–	2	20.0	–
45–54	2	11.8	–	3	27.3	–	3	25.0	–	1	5.0	–	0	–	–
55–64	1	5.9	–	1	9.1	–	1	8.3	–	0	–	–	0	–	–
65+	3	17.6	–	0	–	–	3	25.0	–	3	15.0	–	2	20.0	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Asian	0	–	–	2	18.2	–	0	–	–	1	5.0	–	2	20.0	–
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Black	4	23.5	–	2	18.2	–	2	16.7	–	3	15.0	–	2	20.0	–
Hispanic	6	35.3	0.1	6	54.5	0.1	6	50.0	0.1	9	45.0	0.2	1	10.0	–
White	6	35.3	0.2	1	9.1	–	4	33.3	–	7	35.0	0.3	5	50.0	–
AI/AN‖	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Other	1	5.9	–	0	–	–	0	–	–	0	–	–	0	–	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
SPA															
1	0	–	–	0	–	–	1	8.3	–	0	–	–	0	–	–
2	5	29.4	–	3	27.3	–	4	33.3	–	2	10.0	–	2	20.0	–
3	1	5.9	–	1	9.1	–	0	–	–	3	15.0	–	0	–	–
4	4	23.5	–	6	54.5	0.5	3	25.0	–	6	30.0	0.5	1	10.0	–
5	2	11.8	–	0	–	–	1	8.3	–	4	20.0	–	2	20.0	–
6	1	5.9	–	0	–	–	2	16.7	–	0	–	–	2	20.0	–
7	3	17.6	–	0	–	–	1	8.3	–	3	15.0	–	2	20.0	–
8	1	5.9	–	1	9.1	–	0	–	–	2	10.0	–	1	10.0	–
Unknown	0	–	–	0	–	–	0	–	–	–	–	–	0	–	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
‖ American Indian or Alaskan Native.

MOSQUITO-BORNE DISEASES OF TRAVELERS

SUMMARY DATA				
Disease	Dengue	Chikungunya	Zika	Malaria
Number of Cases	19	9	17	38
Annual Incidence*				
LA County	N/A	N/A	N/A	N/A
California	N/A	N/A	N/A	N/A
United States	N/A	N/A	N/A	N/A
Age at Diagnosis				
Mean	38	38	36	38
Median	34	35	32	37
Range	9–71 years	15–70 years	19–70 years	0–82 years

* Not applicable as there is no local transmission.

DESCRIPTION

Several mosquito-borne diseases affect LAC residents who travel abroad: dengue[1], chikungunya[2], and Zika[3], which are mainly transmitted by *Aedes aegypti* and *A. albopictus* mosquitoes. Malaria[4], which is transmitted by *Anopheles* mosquitoes, is another mosquito-borne disease that affects LAC residents. These diseases are typically found in the tropical and subtropical areas of the world. The mosquito vectors for all four diseases have been found in LAC; however, these diseases are not currently found in mosquitoes in LAC.

The best methods to prevent infection from mosquito-borne diseases is to eliminate mosquito breeding sources and avoid mosquito bites. People visiting or residing in regions where there is risk of mosquito-borne disease should take precautions by using mosquito Environmental Protection Agency (EPA)-approved repellants and wearing protective clothing. Travelers to countries where malaria is endemic should take additional precautions by taking the appropriate antimalarial prophylaxis as prescribed and utilizing bed nets. Unlike malaria, there is no prophylactic medicine or vaccine available to prevent dengue, Chikungunya, or Zika.

Dengue

Dengue, a flavivirus related to the West Nile virus (WNV) and Zika virus, is the most common vector-borne viral disease in the world. Infection with dengue virus has a range of clinical presentations from asymptomatic infection to severe systemic febrile illness. Treatment is supportive.

No cases of dengue acquired within the continental US were reported between 1946 and 1980. Since 1980, locally-acquired outbreaks have been documented in Texas, Florida, and Hawaii. Concern for the reemergence of dengue in Florida, Texas, and Hawaii as well as increases in dengue among returning US travelers over the past 20 years has prompted heightened vigilance among the medical and public health communities.

Dengue was added to the list of Nationally Notifiable Infectious Conditions in 2009; however, it has been a

notifiable condition in California and LAC for several decades. Confirmation of dengue requires that a clinically compatible case be laboratory confirmed with testing of paired serological specimens, a single positive serological specimen confirmed by a plaque reduction neutralization test (PRNT), or by molecular testing. Probable cases require only a single serologically positive specimen. Suspect cases are epidemiologically linked without laboratory evidence.

Chikungunya

The symptoms of chikungunya are similar to those of dengue and Zika; the most common symptoms are fever and joint pain. Other symptoms may include headache, muscle pain, joint swelling, or rash. Treatment is supportive.

Outbreaks have occurred in countries in Africa, Asia, Europe, and the Indian and Pacific Oceans. In late 2013, the chikungunya virus was found for the first time in the Americas on islands in the Caribbean. On July 16, 2014, the first locally-acquired cases in the continental US was identified in Florida.

For purposes of surveillance, confirmation of chikungunya requires that a clinically compatible case be laboratory-confirmed with testing of paired serological specimens, a single positive serological specimen confirmed by PRNT, or by molecular testing. Probable cases require only a single serologically positive specimen.

Zika

Zika virus, a flavivirus related to Dengue and WNV, was first discovered in 1947, and the first human cases were detected in 1952. Since then, outbreaks of Zika have been reported in tropical Africa, Southeast Asia, and the Pacific Islands. In 2014, an outbreak of Zika virus occurred in Brazil and rapidly spread to neighboring countries. The first LAC resident became ill with this virus after returning from El Salvador in late 2015. In 2017, local transmission of Zika virus was reported in Florida and Texas.

The most common symptoms of Zika virus disease are fever, diffuse macular papular rash, joint pain, and conjunctivitis. Other symptoms include muscle pain, headache, pain behind the eyes, and vomiting. The illness is usually mild with symptoms lasting from several days to a week. Severe disease requiring hospitalization is uncommon. Most persons infected with Zika are asymptomatic. Only 20% of infected persons experience symptoms. Increased reports of Guillain-Barré syndrome, a rare post-infectious central nervous system condition, has been linked to previous infections with Zika. Death from Zika is rare.

Unlike the other flaviviruses, Zika can be passed from a pregnant woman to her fetus. Infection during pregnancy can cause microcephaly and other adverse pregnancy and birth outcomes. In addition, infected persons can also spread Zika to their sexual partners. However, this method of transmission accounts for only 1% of cases.

Confirmed cases are those with clinically compatible illness, epidemiological risk factors, and either a single positive serological specimen confirmed by PRNT and negative for other arboviruses, or by molecular testing of urine or plasma specimen. Probable cases have a single serologically positive specimen with or without PRNT testing and are additionally serologically positive for other flaviviruses.

Malaria

About 1,700 cases of human malaria are diagnosed in the US each year. Local transmission has not occurred in Southern California since 1988-89.

Human malaria is an acute or subacute febrile illness caused by one or more protozoan parasites: *Plasmodium vivax, P. falciparum, P. malariae*, and *P. ovale*. The disease is transmitted by the bite of an infected *Anopheles* sp. mosquito and is characterized by episodes of chills and fever every 2–3 days. The more severe symptoms of *P. falciparum* include jaundice, shock, renal failure, and coma. *P. falciparum*

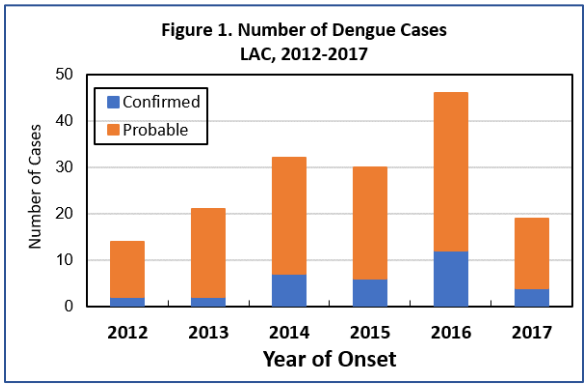
poses the greatest risk of death because it invades red blood cells of all stages and is often drug-resistant.

For the purpose of surveillance, confirmation of malaria requires the demonstration of parasites in thick or thin blood smears or the detection of *Plasmodium* sp. by a polymerase chain reaction (PCR) test regardless of whether the person experienced previous episodes of malaria while outside the country. Cases of malaria identified by the detection of malaria antibodies using rapid diagnostic test (RDT) are classified as suspected cases.

2017 TRENDS AND HIGHLIGHTS

Dengue

- The number of dengue cases in 2017 decreased by 59% from 2016 (19 vs. 46, respectively) and comprised of 4 confirmed and 15 probable cases (**Figure 1**).



  The proportion of confirmed cases remained similar at 21% in 2017 compared to 26% in 2016. Prior to 2015, only 1-2 cases were confirmed per year. The increase in confirmed cases can be attributed to the increase in laboratory evaluation for arboviral diseases due to the emergence of chikungunya and Zika in the Americas in 2014 and 2015, respectively. Because dengue is clinically and epidemiologically similar to both chikungunya and Zika, it is recommended that diagnostic tests for all three arboviruses be conducted together.
- All local cases identified in 2017 reported recent travel to regions endemic for dengue (**Table 1**). The most frequent travel destinations were countries in Asia and the Pacific Islands (63%, n=12).

Chikungunya

- The number of chikungunya cases documented in 2017 remained similar to that in 2016 (9 vs. 8 cases, respectively). All cases in 2017 reported travel to Asia (**Table 1**) including three to Bangladesh and three to India. Notably, an outbreak of chikungunya occurred in South Asia in 2017 and is likely the source of most cases identified in LAC [**1**]. In both 2015 and 2016, the majority of cases reported travel to Mexico or Central America.

Zika

- A total of 17 cases occurred in 2017, a dramatic decline from 100 in 2016. This reflects the decline in Zika transmission occurring globally.
- Cases were either detected with Zika RNA (41%) or Zika acute phase antibodies (59%). Cases were primarily Latino (76%) (**Figure 2**) with an average age of 35.8 years (range: 19-70 years). Also, cases resided throughout the county. Due to heightened concern for women of child-bearing age to be diagnosed and reported to public health, Zika infection was overwhelmingly reported among those 15-34-years-old, accounting for 53% of cases (**Figure 3**). Zika cases were primarily female (82%) for this reason.
- A total of eight of the cases were asymptomatic (47%); however, none were detected among blood donors. None of the symptomatic cases were hospitalized.
- A total of 12 infants were born to Zika cases. All had negative Zika virus test results and appeared healthy in follow-up assessments up to 12 months of age.
- Most cases traveled to a Zika endemic region prior to their illness (94%) (**Table 1**). The majority of cases traveled to Mexico (58%) and Central America (29%). One instance of sexual transmission of Zika virus was identified (6%) where the spouse reported travel to Mexico. This was the first case of sexual transmission of Zika detected in LAC.

Malaria

- The number of reported malaria cases had been declining in LAC since it peaked in 2003 with 60 cases, but since 2013, there has been an increase of cases (**Figure 4**).
- All cases had a known history of recent travel to a country where malaria is endemic (**Table 1**). The majority of cases reported recent travel to countries in Africa (71%, n=27). Nigeria was the most common African destination (67%, n=18). Over half of the malaria cases (63%, n=24) were due to *P. falciparum*.
- Among the 36 cases who were not recent immigrants, eight (22%) used a CDC recommended prophylaxis during their travels (**Figure 5**). Only one case reported completing their regimen. The CDC recommends the following for use as chemoprophylaxis: atovaquone/proguanil, chloroquine, doxycycline, mefloquine, or primaquine. The CDC recommends taking these as prescribed and to completion.

Summary

- Mosquito-borne diseases not found in local mosquitoes are documented among LAC residents returning from travel every year and in every month of the year. A majority of three quarters of cases occurred in the latter half of the year (**Figure 6**).
- Mosquito-borne diseases of travelers can affect persons of all ages. The age of cases ranged from 0 to 82-years-old. The mean ages ranged from 35.8 to 37.9-years-old in 2017. Overall, most cases occurred among those in the 15-34-year-age group (**Figure 4**).
- Travel-associated mosquito-borne diseases affected mainly individuals of non-White race/ethnicities. This trend is likely due to current disease transmission rates at travel destinations and the frequency of travel of these race/ethnicity groups to areas from which they or their families originate. Notably, in 2016, 75% of chikungunya cases were Hispanic/Latino, and all traveled to Mexico and Central America. Whereas, in 2017, 67% of chikungunya cases were Asian, and 75% traveled to South Asia.
- Local infestations of *A. aegypti* have been detected in LAC since 2014 and *A. albopictus* since 2011 and have spread to many cities throughout LAC. With the vectors of dengue, chikungunya, and Zika present in the county, there is heightened concern and vigilance for possible local transmission of these diseases. Consequently, LAC DPH has enhanced collaboration with vector control districts in the county. Cases of Zika, dengue, and chikungunya are shared with vector control agencies in order to enhance surveillance of *Aedes* sp. mosquitos and to encourage local clean-up efforts by residents.
- In 2017, LAC DPH intensified educational outreach to promote awareness and prevention of Zika and other mosquito-borne diseases. A pilot approach to collaborate with two of the highest risk cities for Zika to amplify LAC DPH messaging was implemented. Additionally, a weeklong countywide campaign was conducted to distribute campaign materials to over 14,000 public venues. Evaluation of the outreach efforts found that there was increased awareness and knowledge of Zika among residents who were exposed to campaign materials. Materials in the form of news articles, posters, and social media posts were most effective at conveying prevention messages.

REFERENCES

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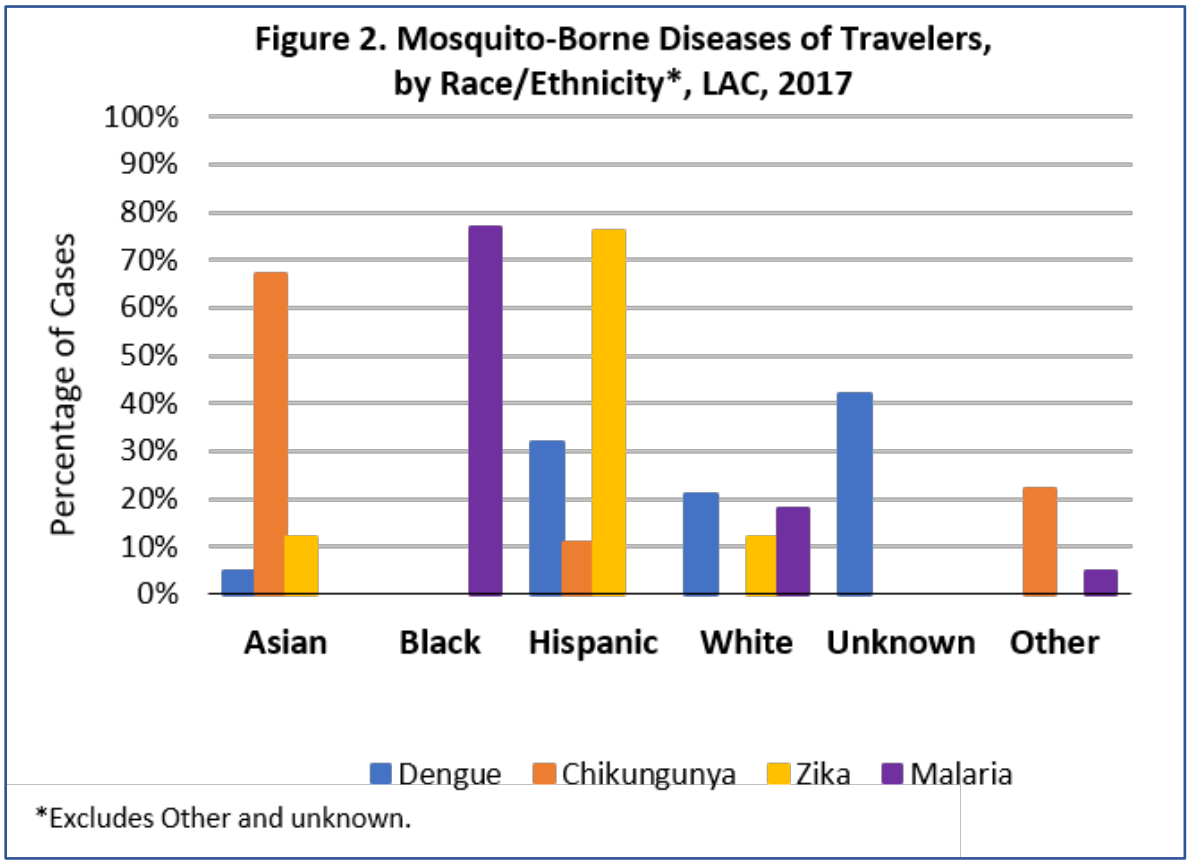


Figure 2. Mosquito-Borne Diseases of Travelers, by Race/Ethnicity*, LAC, 2017
Percentage of Cases
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Asian
Black
Hispanic
White
Unknown
Other
Dengue
Chikungunya
Zika
Malaria
*Excludes Other and unknown.

Figure 3. Mosquito-Borne Diseases of Travelers, by Age Group, LAC, 2017

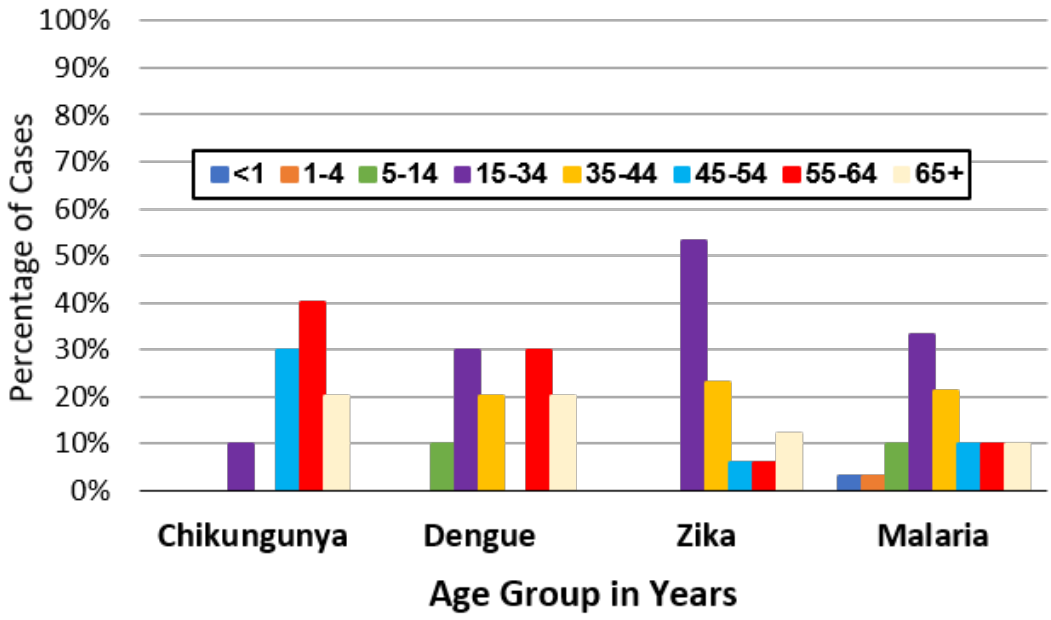


Figure 4. Number of Malaria Cases LAC and US, 2000-2017

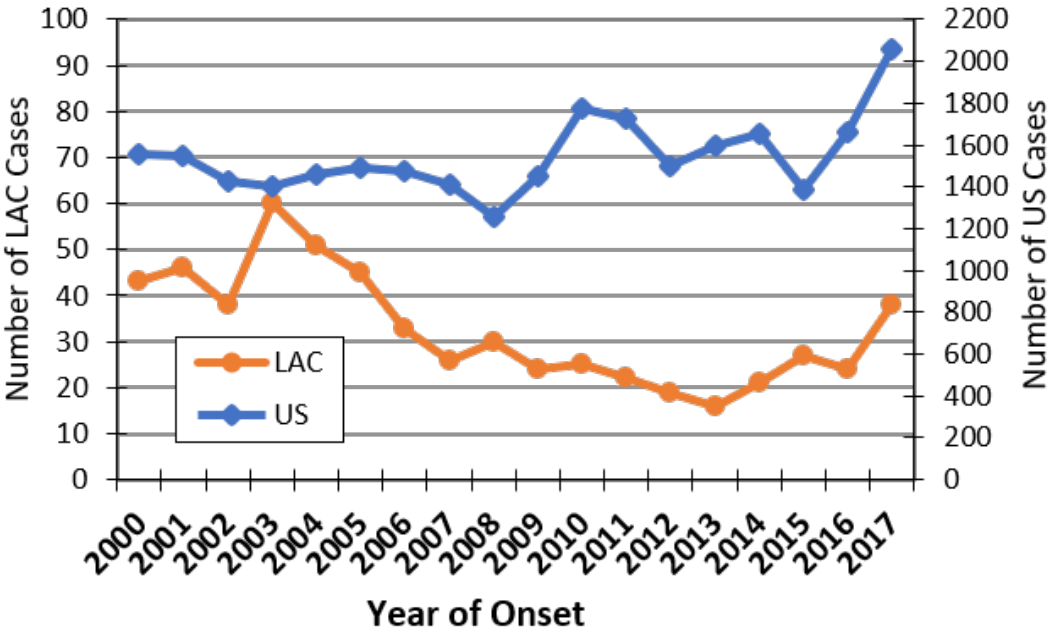
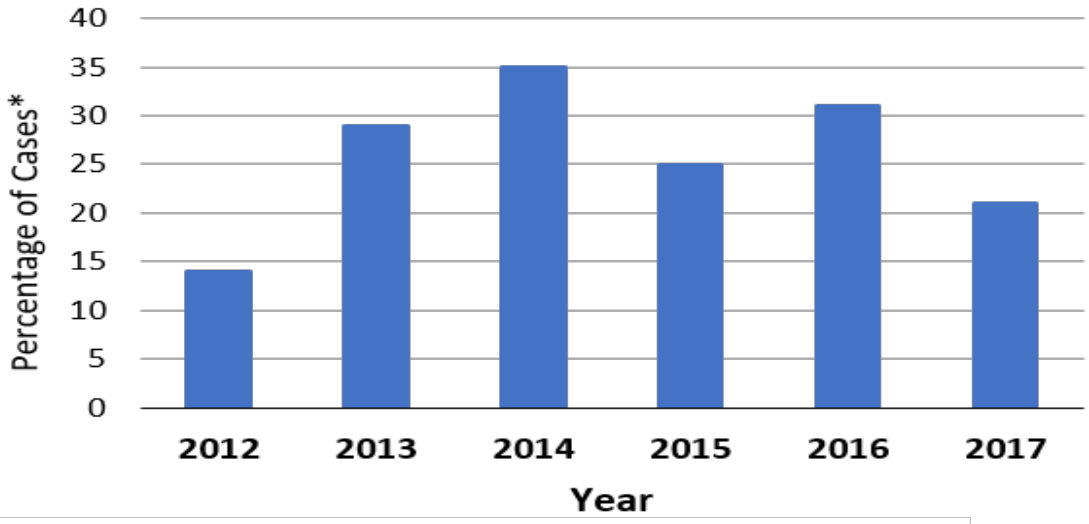


Figure 5. Prophylaxis Use Among Malaria Cases* LAC, 2012-2017



*Among cases who were not recent refugees/immigrants to the US.

Figure 6. Mosquito-Bornes Diseases of Travelers, by Month of Onset, LAC, 2017

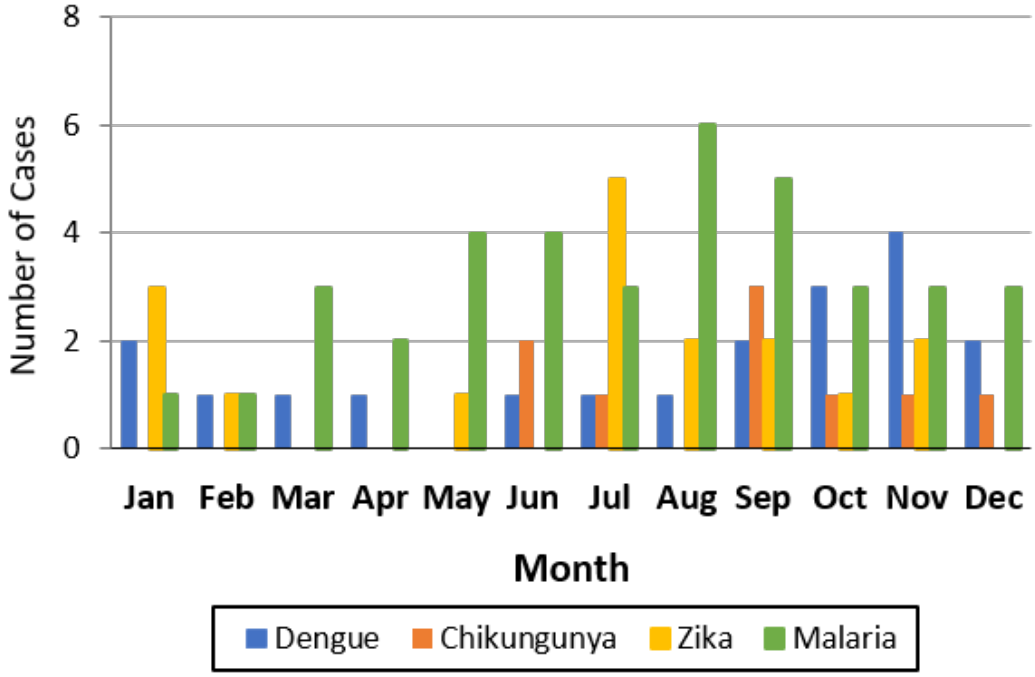


Table 1. Regions of Travel Reported by Cases of Mosquito-Borne Diseases of Travelers LAC, 2017

Region	Dengue (N=19)	Chikungunya (N=9)	Zika (N=16)*	Malaria (N=38)
Africa	1	0	0	27
Asia and Pacific Islands	12	9	2	5
Central America and Mexico	4	0	14	0
South America	1	0	0	2
Caribbean	1	0	0	0
Unknown	0	0	0	4

*One case was sexually-transmitted.

MUMPS

SUMMARY DATA	
Number of Cases	85
Annual Incidence*	
LA County	0.9
California†	0.5
United States†	1.9
Age at Diagnosis	
Mean	36
Median	34
Range	3–77 years

* Cases per 100,000 population.
† CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017

DESCRIPTION

Mumps[1] is a viral infection caused by a paramyxovirus and is spread person-to-person via coughing and sneezing. Mumps is manifests mainly in puffy cheeks and tender, swollen jaws. This is a result of swollen salivary glands under the ears on one or both sides, often referred to as parotitis. An infected person can likely spread mumps from a few days before their salivary glands begin to swell to up to five days after the swelling begins. Other symptoms that might begin a few days before parotitis include fever, headache, muscle aches, tiredness, and loss of appetite. Symptoms can appear anytime from 16-18 days after infection or 12–25 days after infection. Some people who get mumps have very mild symptoms, or no symptoms at all and may not know they have the disease. Most people with mumps recover completely within two weeks.

Complications from mumps can include meningitis, inflammation of the testicles or ovaries, inflammation of the pancreas, and deafness. Anyone who is not immune from either previous mumps infection or from vaccination can get mumps.

Children should get their first dose of the MMR (measles, mumps, rubella) vaccine at 12 months old or later. The second dose of the MMR vaccine is usually administered before the child begins kindergarten. Students (including college students), health care workers, and international travelers should receive two doses of the MMR vaccine.

Mumps is a reportable disease to LAC DPH. An internationally imported case is defined as a case in which mumps results from exposure to mumps virus outside the US. All other cases are considered US-acquired cases. For national reporting, cases will be classified as either internationally imported or US-acquired. Provisional notifications of all probable and confirmed mumps cases should be sent by the State Health Department to the CDC. Electronic reporting of case records should not be delayed because of incomplete information or lack of confirmation. Following completion of case investigations, case records should be updated with any new information and resubmitted to CDC. Final laboratory results may not be available for the initial report but should be submitted via NNDSS when available. The state in which the patient resides at the time of diagnosis should submit the case notification to CDC.

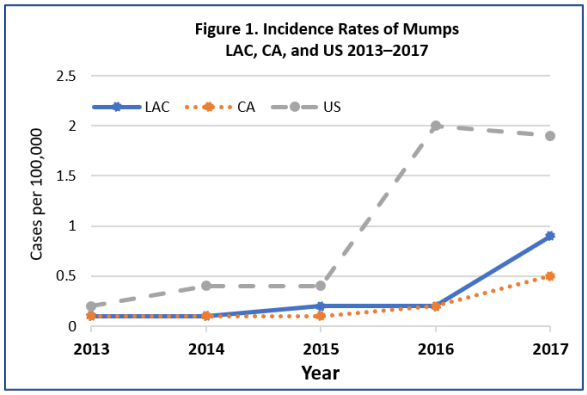
A person with mumps should limit their contact with others during this time. This includes staying home from school and not attending social events. The MMR vaccine prevents most, but not all, cases of mumps and complications caused by the disease. People who have received two doses of the MMR vaccine are about nine times less likely to get mumps than unvaccinated people who have the same exposure to mumps virus. However, some people who receive two doses of MMR can still get mumps, especially if they have prolonged, close contact with someone who has the disease. If a vaccinated person does get mumps, they will likely have less severe illness than an unvaccinated person.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

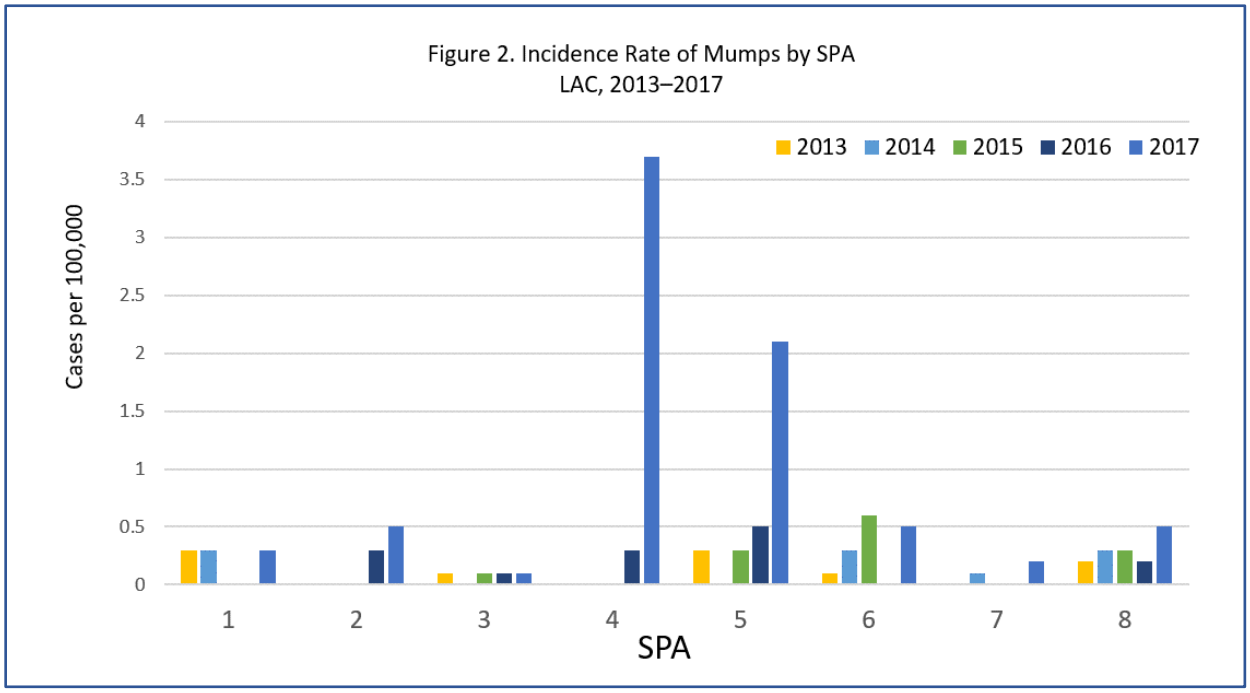
[1]publichealth.lacounty.gov/ip/VPD_mumps.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Mumps.aspx
[3]www.cdc.gov/mumps/

2017 TRENDS AND HIGHLIGHTS

- This year, the mumps disease incidence rate increased in LAC from 0.19 cases per 100,000 in 2016 to 0.88 cases per 100,000 (**Figure 1**).



- The greatest incidence of mumps was in the 15–34-year-old age group (1.4 cases per 100,000) followed by those 35–44 years old (1.3 cases per 100,000) (**Table 3**. Data for **Table 3** is available online.[4]).
- Comparing race/ethnicity, the greatest incidence of amebiasis occurred among Whites (1.4 cases per 100,000) (**Table 3**).
- The highest amebiasis incidence rates were documented within SPA 4 (3.7 per 100,000) and SPA 5 had the second highest incidence of cases (2.1 per 100,000).
- The number of cases peaked in March (**Figure 3**).



[4]publichealth.lacounty.gov/acd/docs/2017Tables/Mumps.xlsx

Figure 3. Reported Mumps Cases by Month of Onset
LAC, 2017 (N=85)

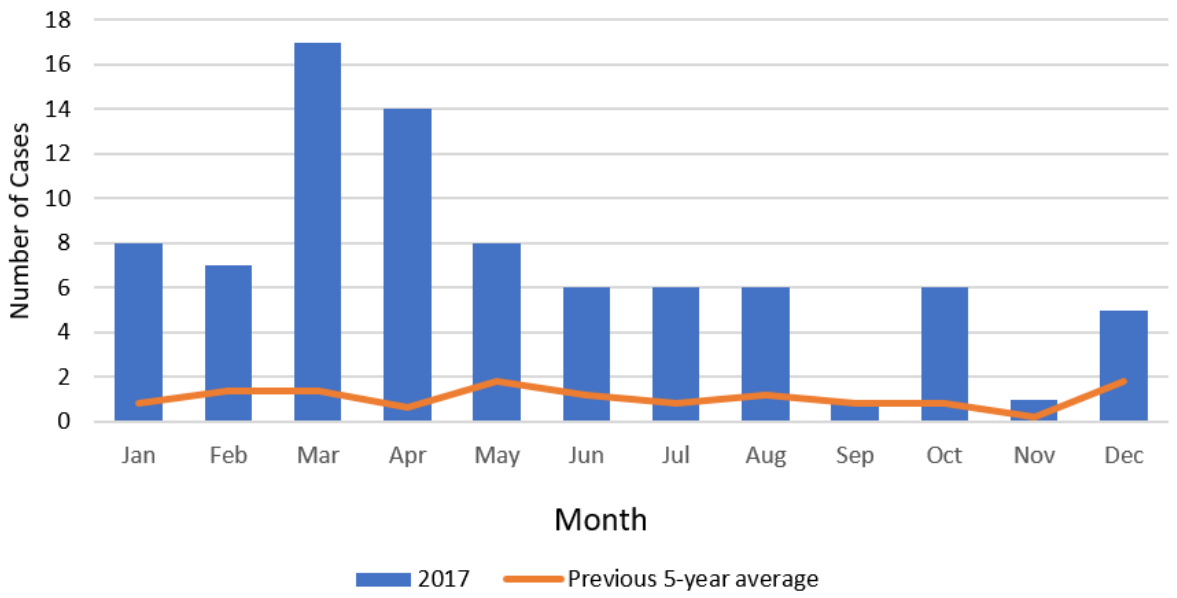
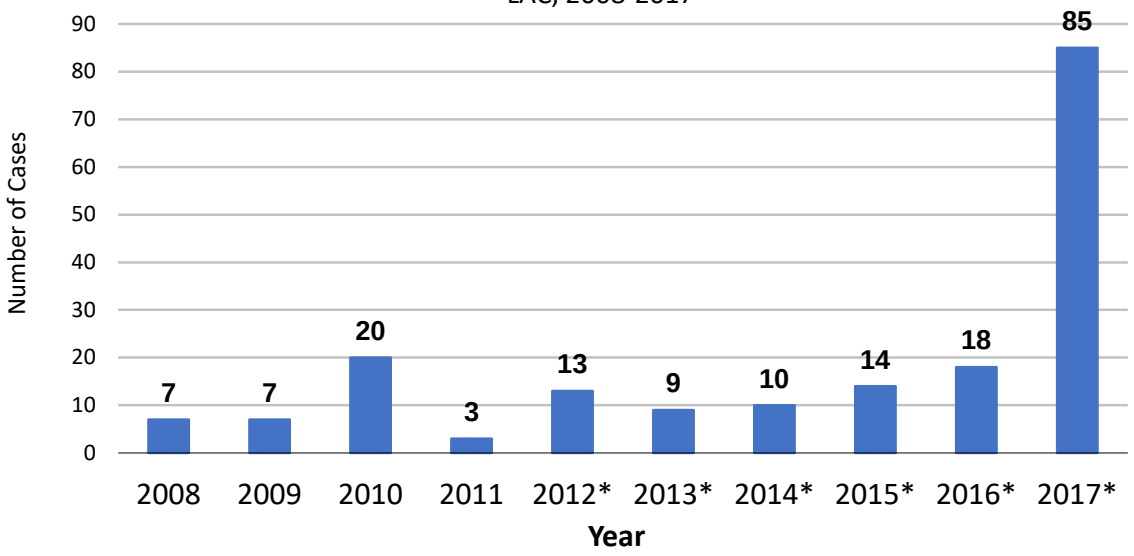


Figure 4. Reported Confirmed Mumps Cases
LAC, 2008-2017*



*Confirmed and probable case classifications were revised in 2012, so probable cases are included in the analysis to be comparable to previous years.

Table 1. Vaccination Status of Reported Confirmed* Mumps Cases, LAC, 2017					
	Reported Cases	**Cases Too Young to Be Vaccinated[1]**	**Cases Eligible for Vaccination and Up-to-Date[2]**	**Cases Eligible for Vaccination and Not Up-To-Date[3]**	**Personal Beliefs Exemption School Vaccine Waivers Among Cases Age <18 Years (n=6)**
No. %	85 100%	0 0%	8 9.4%	77 90.5%	0 0%

* Includes probable cases.
[1] Cases less than 12 months of age.
[2] Cases 12 months of age and older and who are up-to-date with the mumps immunization recommendations for their age.
[3] Cases 12 months of age and older and who are not up-to-date with the mumps immunization recommendations for their age. Includes cases that have unknown immunization status, have personal belief exemption school vaccine waivers, or have no valid documentation of receiving mumps vaccines prior to disease onset.

Table 2. Reported Mumps Cases by Case Classification LAC, 2017 vs. Previous Three-Year Average		
	Confirmed	Confirmed
	2017	2014-2016 Average
Total Cases	85	14
Age at Onset (years)		
Mean	36	30
Median	34	33
Range	3 – 77	3 – 69

Table 3. Reported Mumps Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**9**	**100.0**	**0.10**	**10**	**100.0**	**0.11**	**14**	**100.0**	**0.15**	**18**	**100.0**	**0.19**	**85**	**100.0**	**0.88**
Age Group															
<1	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
1–4	1	11.1	–	0	–	–	1	7.1	–	3	16.7	–	2	2.4	–
5–14	0	–	–	1	10.0	–	3	21.4	–	1	5.6	–	3	3.5	–
15–34	3	33.3	–	3	30.0	–	4	28.6	–	7	38.9	0.2	40	47.1	1.4
35–44	1	11.1	–	5	50.0	–	2	14.3	–	3	16.7	–	17	20.0	1.3
45–54	2	22.2	–	0	–	–	3	21.4	–	3	16.7	–	13	15.3	1.0
55–64	1	11.1	–	0	–	–	1	7.1	–	1	5.6	–	9	10.6	0.8
65+	1	11.1	–	1	10.0	–	0	–	–	0	–	–	1	1.2	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Am Indian	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Asian	2	22.2	–	1	10.0	–	1	7.1	–	3	16.7	–	5	5.9	–
Black	1	11.1	–	5	50.0	–	5	35.7	–	1	5.6	–	5	5.9	–
Hispanic	2	22.2	–	1	10.0	–	4	28.6	–	3	16.7	–	15	17.7	0.3
Pacific Islander	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
White	3	33.3	–	2	20.0	–	3	21.4	–	10	55.6	0.4	38	44.7	1.4
Other	0	–	–	0	–	–	0	–	–	1	5.6	–	0	–	–
Unknown	1	11.1	–	1	10.0	–	1	7.1	–	0	–	–	22	25.9	–
SPA															
1	1	11.1	–	1	10.0	–	0	–	–	0	–	–	1	1.2	–
2	1	11.1	–	1	10.0	–	1	7.1	–	7	38.9	0.3	11	12.9	0.5
3	2	22.2	–	1	10.0	–	2	14.3	–	2	11.1	–	2	2.4	–
4	0	–	–	0	–	–	0	–	–	4	22.2	–	44	51.8	3.7
5	2	22.2	–	0	–	–	2	14.3	–	3	16.7	–	14	16.5	2.1
6	1	11.1	–	3	30.0	–	6	42.9	0.6	0	–	–	5	5.9	–
7	0	–	–	1	10.0	–	0	–	–	0	–	–	3	3.5	–
8	2	22.2	–	3	30.0	–	3	21.4	–	2	11.1	–	5	5.9	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.

PERTUSSIS

SUMMARY DATA	
Number of Cases	476
Annual Incidence*	
LA County	4.9
California†	6.5
United States†	5.8
Age at Diagnosis	
Mean	15
Median	13
Range	0–86 years+

* Cases per 100,000 population.
† CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017
\+ "0" refers to any age between birth and 1 year old , not including 1 year old

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

DESCRIPTION

Pertussis[2] is a respiratory disease, commonly known as whooping cough and highly contagious, caused by a bacteria called *Bordetella pertussis*. These bacteria release toxins that damage and cause respiratory airways to swell. Pertussis spreads via the person-to-person route. Infected people are most contagious for about two weeks after the cough begins. Antibiotics may shorten the amount of time someone is contagious. Early symptoms can last for one to two weeks and include runny nose, low-grade fever, mild/occasional cough, and apnea (a pause in breathing typically in babies. As the disease progresses beyond this timeframe, the traditional symptoms of pertussis may appear and include paroxysms (fits) of many, rapid coughs followed by a high-pitched "whoop" sound, vomiting during or after coughing fits, and exhaustion after coughing fits.

Cases of pertussis are reportable to LAC DPH and nationally-notifiable. State health departments report confirmed and probable pertussis cases to the CDC through the National Notifiable Diseases Surveillance System (NNDSS).[4] Although many pertussis cases are not diagnosed and therefore not reported, the surveillance system is useful for monitoring epidemiologic trends. The limitations of laboratory diagnostics make the clinical case definition essential to pertussis surveillance. The clinical case definition for pertussis is a cough lasting at least two weeks with paroxysms of coughing, an inspiratory "whoop," or post-tussive vomiting, without other apparent causes. Complications include pneumonia, seizures, and encephalopathy. Infants under one year of age are at highest risk for developing severe complications. Pertussis is confirmed by either positive *Bordetella pertussis* culture or PCR.

While pertussis vaccines are the most effective tool to prevent this disease, no vaccine is 100% effective. It is possible for a fully vaccinated person at any age can catch this disease. If a person has received the pertussis vaccine but still gets sick, the infection is usually not severe. There are two vaccines in the US that help prevent this disease: DTaP and Tdap. These vaccines also provide protection against tetanus and diphtheria. Children should receive the DTaP (diphtheria, tetanus, and pertussis) vaccine, and adolescents should receive a Tdap vaccine booster. Pregnant women should receive a Tdap vaccine booster during the third trimester of every pregnancy. Anyone who will be in contact with their baby should be up-to-date with their whooping cough vaccine.

Early treatment of pertussis is critical, especially an infant. Clinicians should strongly consider treating prior to test results if clinical history is strongly suggestive or patient is at risk for severe or complicated disease (e.g., infants). If a clinician diagnoses the patient late, antibiotics will not alter the course of the illness, and without antibiotics, the patient will no longer spread pertussis.

A reasonable guideline is to treat persons older than one year of age within three weeks of cough onset and infants younger than one year of age and

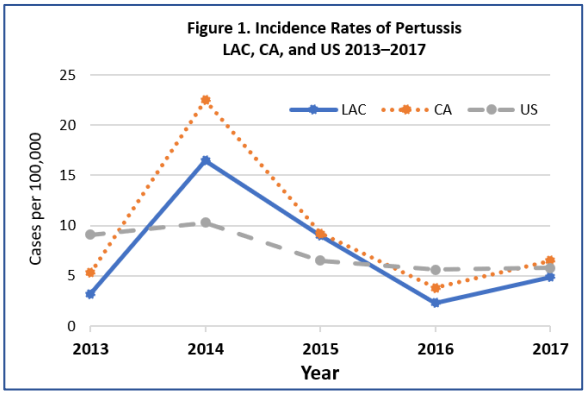
[1]publichealth.lacounty.gov/ip/VPD_pertussis.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/pertussis.aspx
[3]www.cdc.gov/pertussis/
[4]wwwn.cdc.gov/nndss/

pregnant women (especially near term) within six weeks of cough onset.

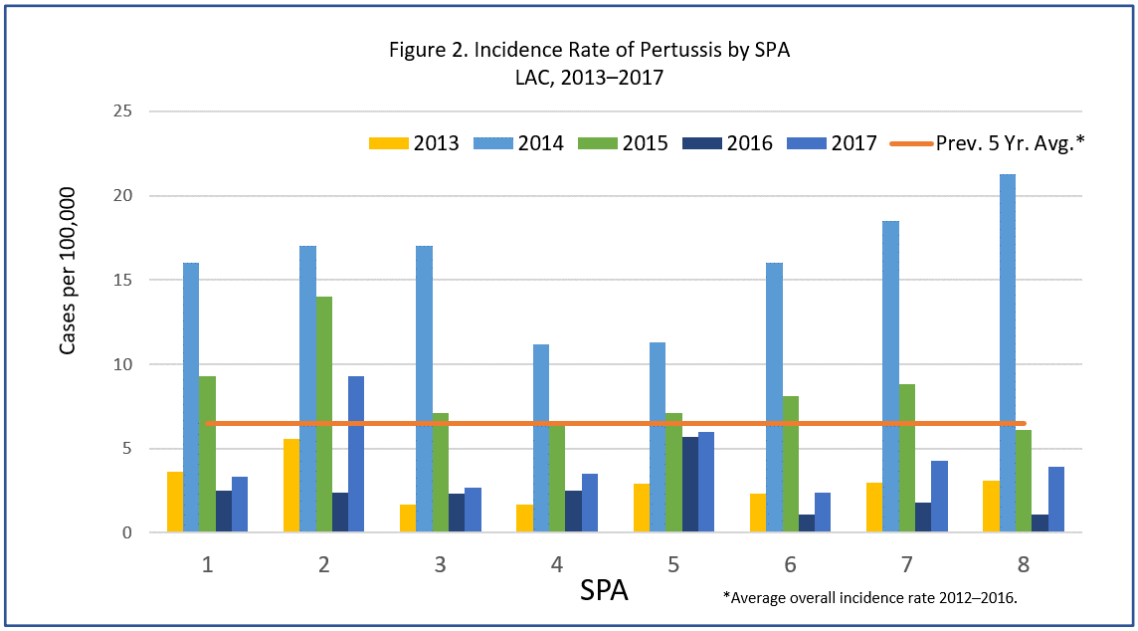
Clinicians should administer a course of antibiotics to close contacts within three weeks of exposure, especially in high-risk settings.

2017 TRENDS AND HIGHLIGHTS

- This year, the pertussis disease incidence rate increased in LAC from 2.26 cases per 100,000 in 2016 to 4.94 cases per 100,000 (**Figure 1**).



- The greatest incidence of pertussis was in the <1-year-old age group (53.5 cases per 100,000) followed by those in the 1–4-year-old age group (15.4 cases per 100,000) (**Table 2**. Data for **Table 1** is available online.[5]).
- Comparing race/ethnicity, the greatest incidence of pertussis occurred among Whites (8.7 cases per 100,000) (**Table 2**).
- The highest pertussis incidence rates were documented within SPA 2 (9.3 per 100,000) and SPA 5 had the second highest incidence of cases (6.0 per 100,000) (**Figure 2**).
- The number of cases peaked in June (**Figure 3**).



[5] publichealth.lacounty.gov/acd/docs/2017Tables/Pertussis.xlsx

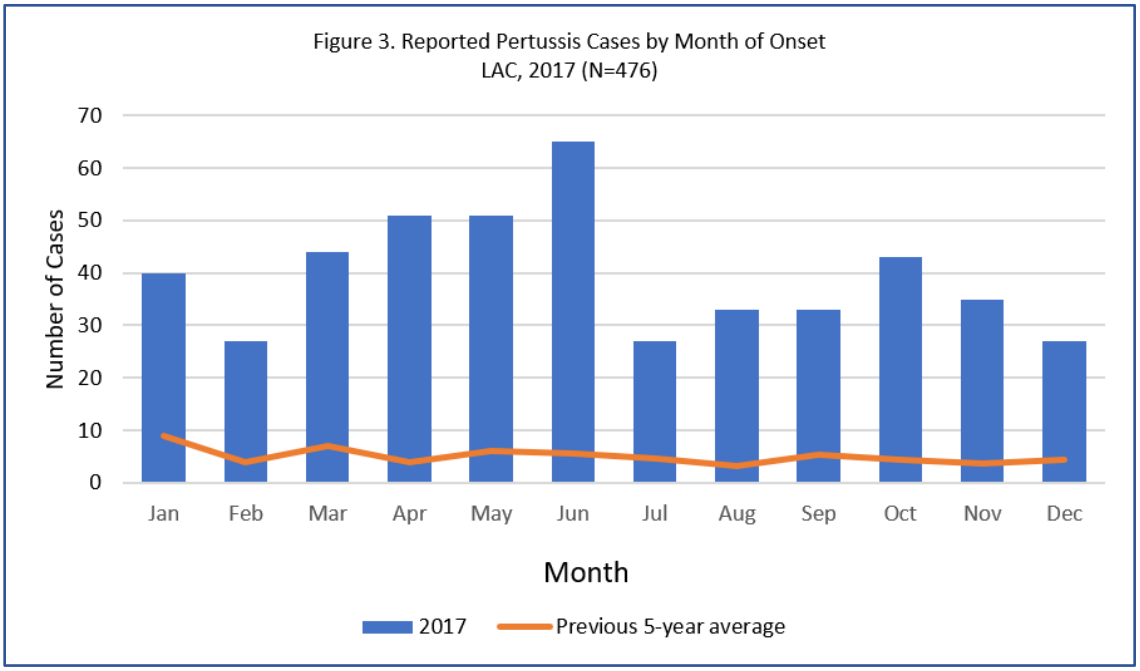


Table 1. Vaccination Status of Reported Pertussis Cases, LAC, 2017					
		Cases Too Young to Be Vaccinated[1]	Cases Eligible for Vaccination and Up-to-Date[2]	Cases Eligible for Vaccination and Not Up-To-Date[3]	Personal Beliefs Exemption School Vaccine Waivers Among Cases Age <18 years (n=407)
No. %	476 100%	16 3.4%	310 65.1%	150 31.5%	10 2.5%

[1]Cases less than 2 months of age.
[2]Cases 2 months of age and older and who are up-to-date with the pertussis immunization recommendations for their age.
[3]Cases 2 months of age and older and who are not up-to-date with the pertussis immunization recommendations for their age. Includes cases that have unknown immunization status, have personal belief exemption school vaccine waivers, or have no valid documentation of receiving pertussis vaccines prior to disease onset.

Table 2. Reported Pertussis Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**296**	**100.0**	**3.15**	**1,558**	**100.0**	**16.48**	**859**	**100.0**	**8.97**	**217**	**100.0**	**2.26**	**476**	**100.0**	**4.94**
Age Group															
<1	59	19.9	48.8	250	16.1	211.4	145	16.9	134.1	35	16.1	33.7	55	11.6	53.5
1–4	33	11.2	6.8	219	14.1	44.8	107	12.5	22.1	45	20.7	9.6	69	14.5	15.4
5–14	88	29.7	7.3	664	42.6	54.9	357	41.6	29.5	62	28.6	5.1	160	33.6	13.2
15–34	75	25.3	2.6	325	20.9	11.5	194	22.6	6.9	42	19.4	1.5	143	30.0	5.1
35–44	15	5.1	1.1	41	2.6	3.1	20	2.3	1.5	7	3.2	0.5	10	2.1	0.8
45–54	13	4.4	1.0	26	1.7	2.0	20	2.3	1.5	8	3.7	0.6	13	2.7	1.0
55–64	6	2.0	0.6	18	1.2	1.7	10	1.2	0.9	12	5.5	1.1	7	1.5	0.6
65+	7	2.4	0.6	15	0.9	1.3	6	0.7	0.5	6	2.8	0.5	19	4.0	1.5
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Am Indian	0	–	–	2	0.1	–	0	–	–	2	0.9	–	1	0.2	–
Asian	8	2.7	0.6	58	3.7	4.2	20	2.3	1.4	8	3.7	0.6	20	4.2	1.4
Black	5	1.7	–	76	4.9	9.7	28	3.3	3.6	5	2.3	–	19	4.0	2.4
Hispanic	146	49.3	3.2	1,013	65.0	22.0	444	51.7	9.5	87	40.1	1.8	188	39.5	4.0
Pacific Islander§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
White	129	43.7	4.9	359	23.0	13.5	238	27.7	8.9	105	48.4	3.9	233	49.0	8.7
Other	1	0.3	–	13	0.8	–	10	1.2	–	0	–	–	3	0.6	–
Unknown	7	2.4	–	37	2.4	–	119	13.9	–	10	4.6	–	12	2.5	–
SPA															
1	14	4.7	3.6	63	4.0	16.0	37	4.3	9.3	10	4.6	2.5	13	2.7	3.3
2	121	40.9	5.6	373	23.9	17.0	312	36.3	14.0	54	24.9	2.4	211	44.3	9.3
3	27	9.1	1.7	279	17.9	17.0	117	13.6	7.1	38	17.5	2.3	45	9.5	2.7
4	19	6.4	1.7	129	8.3	11.2	77	9.0	6.6	29	13.4	2.5	41	8.6	3.5
5	19	6.4	2.9	74	4.8	11.3	47	5.5	7.1	38	17.5	5.7	40	8.4	6.0
6	24	8.1	2.3	165	10.6	16.0	85	9.9	8.1	12	5.5	1.1	26	5.5	2.4
7	39	13.2	3.0	243	15.6	18.5	117	13.6	8.8	24	11.1	1.8	57	12.0	4.3
8	33	11.2	3.1	231	14.8	21.3	67	7.8	6.1	12	5.5	1.1	43	9.0	3.9
Unknown	0	–	–	1	0.1	–	0	–	–	0	–	–	0	–	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Case counts for Pacific Islander from 2013–2016 are included in the Asian category and are not shown in this table.

PNEUMOCOCCAL DISEASE, INVASIVE

SUMMARY DATA	
Number of Cases	512
Annual Incidence*	
LA County	5.3
California†	1.3
United States†	8.2
Age at Diagnosis	
Mean	57
Median	59
Range	0–104 years

* Cases per 100,000 population.
† CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017

DESCRIPTION

Invasive Pneumococcal Disease (IPD)[1] is a disease caused by the bacteria *Streptococcus pneumoniae*. This disease is spread by direct and indirect contact with respiratory secretions and can cause pneumonia, bacteremia, meningitis, and death. *S. pneumoniae* is one of the most common bacterial causes of community acquired pneumonia and otitis media (ear infections). However, these non-invasive forms of infection (except bacteremic community acquired pneumonia) are not counted in LAC surveillance. Therefore, the data presented in this report underestimate all disease caused by *S. pneumoniae* in LAC. IPD is a leading cause of illness in young children and causes considerable illness and death in the elderly.

ACDC has been tracking IPD as part of a special antibiotic resistance surveillance project since late 1995 and added IPD to its list of reportable diseases in October 2002. Cases are defined as LAC residents with a positive *S. pneumoniae* isolate collected from a normally sterile site (e.g., blood, cerebrospinal fluid).

ACDC began evaluating the effectiveness of the 13-valent pneumococcal conjugate vaccine (Prevnar13®) among children 2-59-months-old since 2010. This led to substantial improvements in IPD surveillance data quality for surveillance years 2010-2014. Data quality declined for surveillance year 2015.

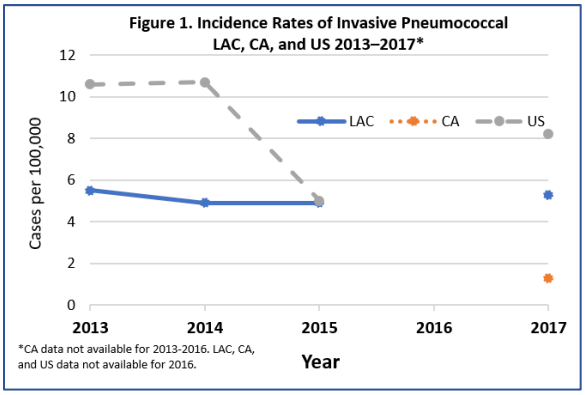
Pneumococcal isolates from persons with IPD are sent to the LAC PHL to assess antimicrobial susceptibility determined by disk or dilution diffusion. Minimum inhibitory concentration (MIC) breakpoints used by participating laboratories are based on standards developed by the Clinical and Laboratory Standards Institute. For this report, an isolate of *S. pneumoniae* is considered non-susceptible to an antibiotic if the results indicate intermediate or high-level resistance.

Two effective vaccines are available to prevent pneumococcal disease. First, Prevnar13® is recommended for all children 2-59-months-old, children ≥6-years-old with certain risk factors for invasive pneumococcal infections, and adults ≥65-years-old. Second, the 23-valent pneumococcal polysaccharide vaccines (Pnu-Imune®23 and Pneumovax®23) are recommended for all adults ≥65-years-old and those <2-years-old who are at high risk for IPD.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

- The incidence rate this year in LAC of 5.3 cases per 100,000 people was similar to the average annual incidence rate of 5.2 cases per 100,000 people over the past five years (**Figure 1**).



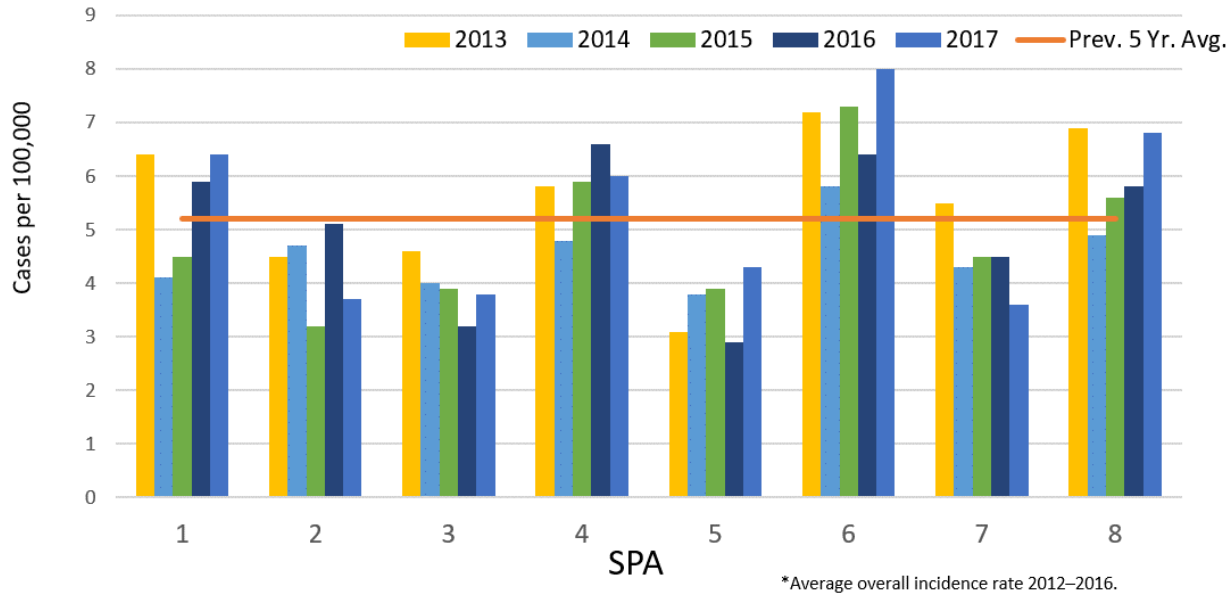
[1]publichealth.lacounty.gov/acd/Diseases/pneumococcal.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Pneumococcal-Disease.aspx
[3]www.cdc.gov/pneumococcal/

- Incidence rates were consistent among all age groups, compared to the previous five-year average (**Table 1**. Data for **Table 1** is available online.[4]).
- Similar to previous years, SPA 6 had the highest incidence rate of IPD (8.0 cases per 100,000) (**Figure 2**). Compared to the rest of LAC, SPA 6 historically has had a high number of Hispanics and Blacks in addition to high numbers of individuals with low income and lack of access to care. This may a contributing factor for the high number of cases in this SPA. More data is needed to study this [1, 2]. SPA 8 had the second highest incidence rate of 6.8 cases per 100,000.
- Consistent with previous years, the 2017 incidence rate in Blacks was substantially higher than rates among all other race/ethnic groups (**Table 1**).
- The percentage of isolates susceptible to penicillin, erythromycin, cefotaxime, ceftriaxone, levofloxacin, and TMP-SMZ was fairly consistent with the previous five years (**Figure 4**).

REFERENCES

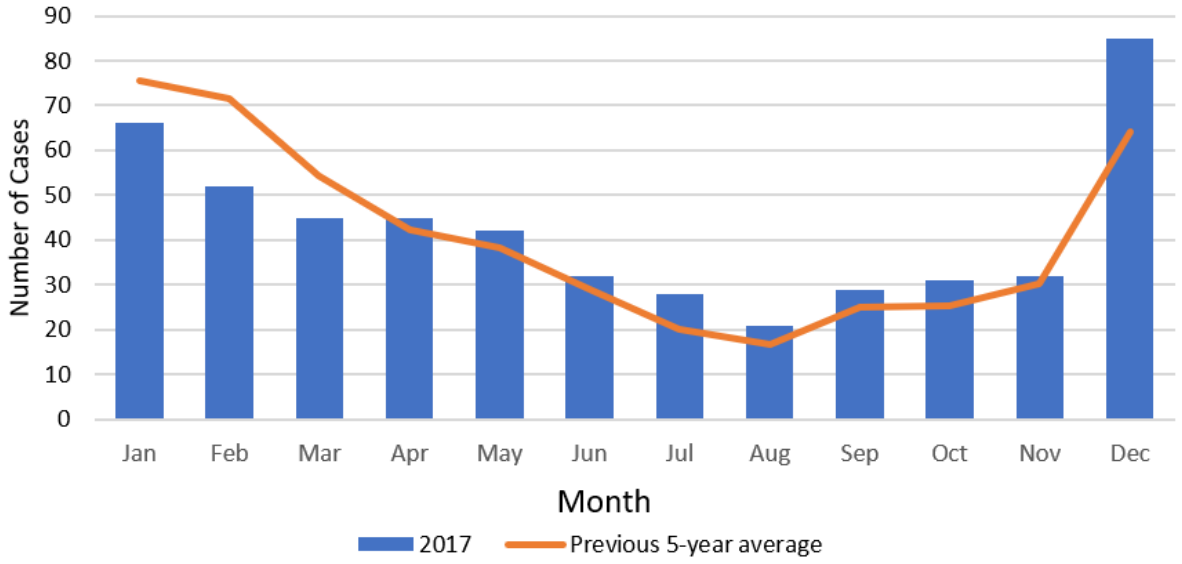
1. Accessed on 7/21/2015 from the Los Angeles County Department of Public Health, LA HealthDataNow!: https://dqs.publichealth.lacounty.gov/
2. Senterfitt JW, Long A, Shih M, Teutsch SM. How Social and Economic Factors Affect Health. Social Determinants of Health, Issue no.1. Los Angeles: Los Angeles County Department of Public Health; January 2013.
3. Active Bacterial Core Surveillance Reports from 2005 to 2014 from the Centers for Disease Control and Prevention's Division of Bacterial Diseases. Report available at: www.cdc.gov/abcs/reports-findings/surv-reports.html

Figure 2. Incidence Rate of Invsive Pneumococcal Disease by SPA
LAC, 2013–2017



[4]publichealth.lacounty.gov/acd/docs/2017Tables/Pneumo.xlsx

Figure 3. Reported Invasive Pneumococcal Disease Cases by Month of Onset
LAC, 2017 (N=512)



* Data is based on specimen collection per month, not month of onset.

Figure 4. Reported Antibiotic Susceptibility of Invasive Pneumococcal Disease Cases, LAC, 2012-2017

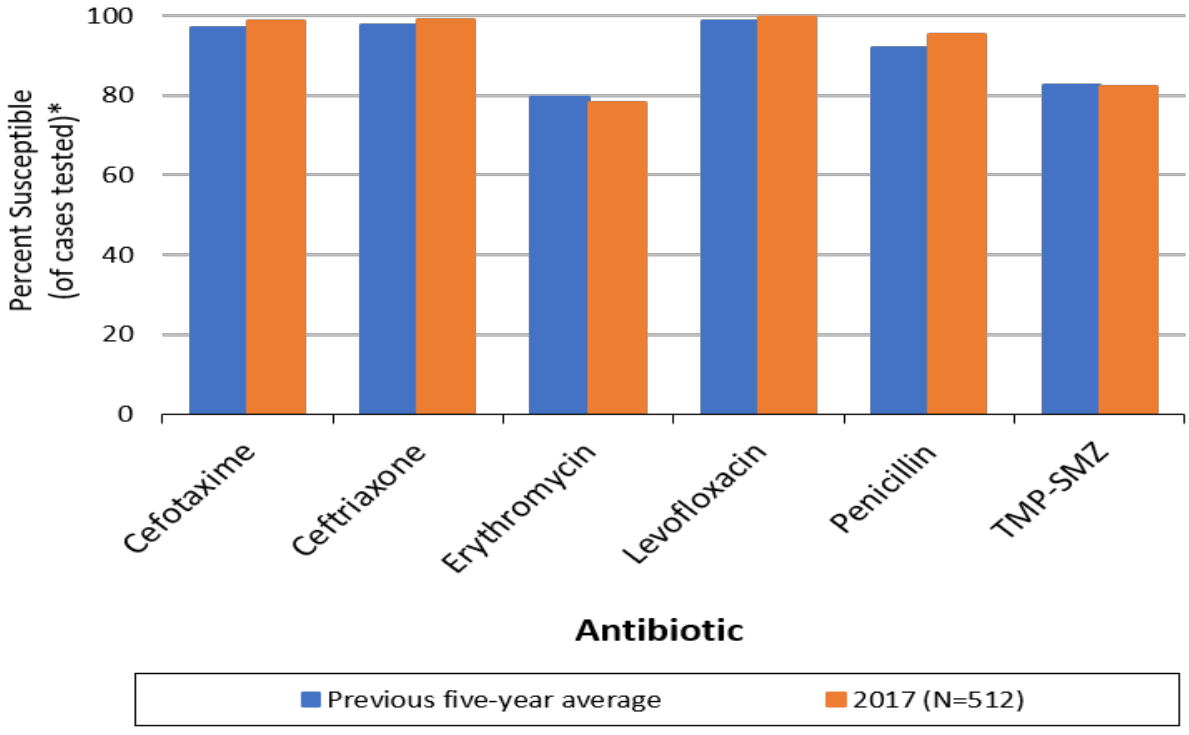
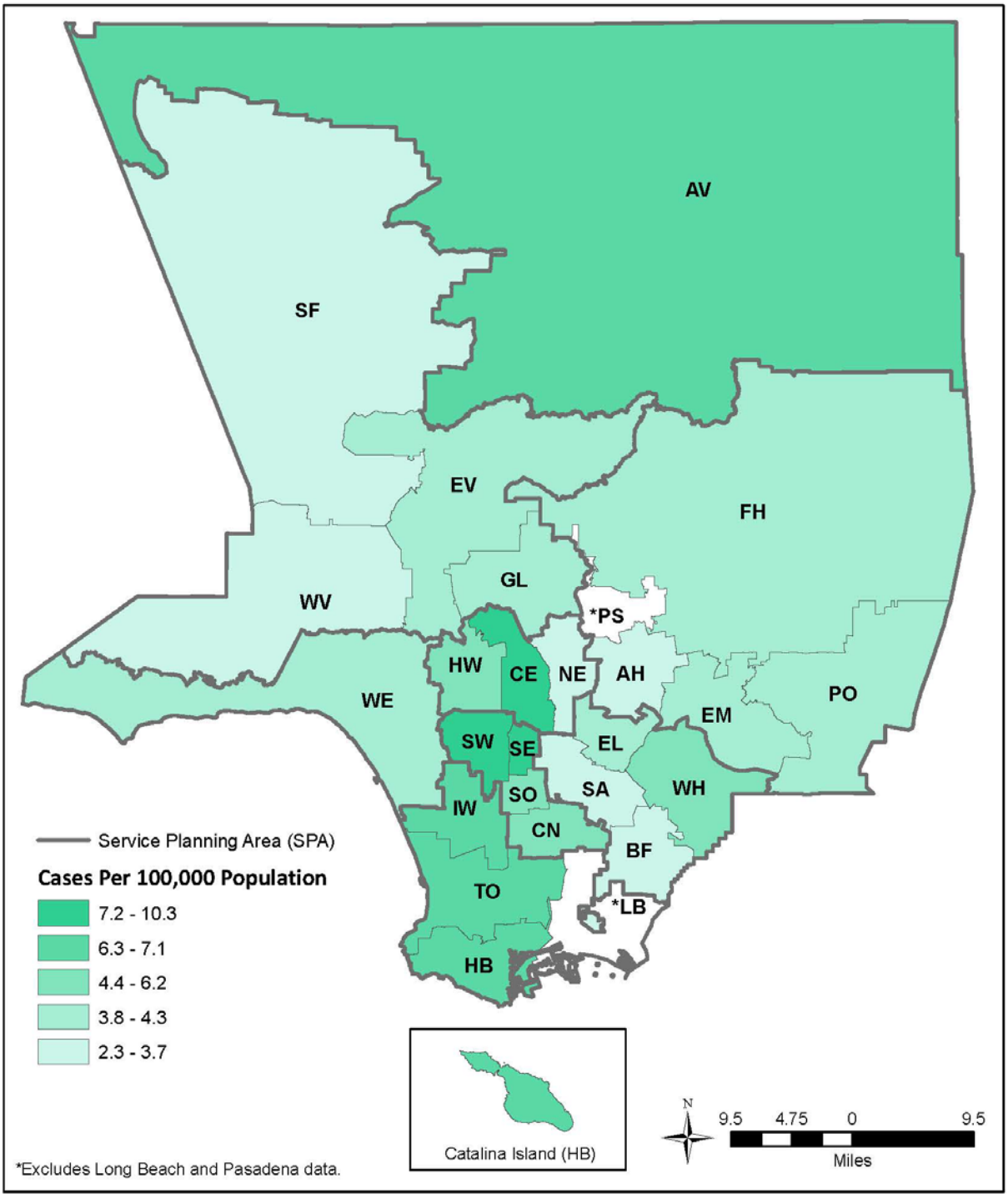


Table 1. Reported Invasive Pneumococcal Disease Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**525**	**100.0**	**3.85**	**460**	**100.0**	**4.51**	**613**	**100.0**	**6.40**	**809**	**100.0**	**8.43**	**512**	**100.0**	**5.3**
Age Group															
<1	7	1.3	5.0	7	1.5	5.9	5	–	–	5	–	–	5	1.0	–
1–4	24	4.6	4.9	18	3.9	3.7	27	5.8	5.6	21	4.2	4.5	22	4.9	4.9
5–14	23	4.4	1.9	12	2.6	1.0	18	3.8	1.5	10	2.0	0.8	15	1.2	1.2
15–34	32	6.1	1.1	31	6.7	1.1	33	7.1	1.2	40	8.0	1.4	37	1.3	1.3
35–44	40	7.6	2.9	42	9.1	3.2	31	6.6	2.3	40	8.0	3.0	40	3.0	3.0
45–54	63	12.0	4.9	65	14.1	5.0	58	12.4	4.4	80	15.9	6.1	86	6.4	6.4
55–64	108	20.6	10.5	97	21.1	9.1	103	22.0	9.3	95	18.9	8.4	92	7.8	7.8
65+	228	43.4	20.5	188	40.9	16.6	193	41.2	16.2	207	41.2	16.8	213	17.2	17.2
Unknown	0	–	–	0	–	–	0	–	–	5	–	–	2	0.4	–
Race/Ethnicity‡															
Asian	32	6.1	2.3	34	7.4	2.5	29	6.2	2.1	17	3.4	1.2	0	0	–
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	35	6.8	2.5
Black	96	18.3	12.2	70	15.2	8.9	87	18.6	11.1	78	15.5	10.0	89	17.4	11.3
Hispanic	209	39.8	4.5	161	35.0	3.5	132	28.2	2.8	116	23.1	2.5	140	27.3	2.9
White	174	33.1	6.5	154	33.5	5.8	119	25.4	4.4	141	28.0	5.3	2	0.4	–
AI/AN|	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	51	10.0	5.1
Other	0	–	–	15	3.3	–	14	3.0	–	0	–	–	137	26.8	–
Unknown	14	2.7	–	26	5.7	–	87	18.6	–	151	30.0	–	57	11.1	–
SPA															
1	25	4.8	6.4	16	3.5	4.1	18	3.8	4.5	23	4.6	5.9	25	4.9	6.4
2	99	18.9	4.5	102	22.2	4.7	72	15.4	3.2	115	22.9	5.1	84	16.4	3.7
3	75	14.3	4.6	66	14.3	4.0	64	13.7	3.9	53	10.5	3.2	63	12.3	3.8
4	66	12.6	5.8	55	12.0	4.8	69	14.7	5.9	78	15.5	6.6	71	13.9	6.0
5	20	3.8	3.1	25	5.4	3.8	26	5.6	3.9	19	3.8	2.9	29	5.7	4.3
6	74	14.1	7.2	60	13.0	5.8	77	16.5	7.3	68	13.5	6.4	86	16.8	8.0
7	73	13.9	5.5	56	12.2	4.3	59	12.6	4.5	59	11.7	4.5	47	9.2	3.6
8	75	14.3	6.9	53	11.5	4.9	61	13.0	5.6	64	12.7	5.8	74	14.5	6.8
Unknown	18	3.4	–	27	5.9	–	22	4.7	–	24	4.8	–	33	6.4	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
| American Indian or Alaskan Native.

Map 11. Pneumococcal Disease, Invasive Rates by Health District, Los Angeles County, 2017*



SALMONELLOSIS

SUMMARY DATA	
Number of Cases	1,107
Annual Incidence*	
LA County	11.5
California†	2.8
United States†	16.7
Age at Diagnosis	
Mean	39
Median	38
Range	1–77 years

* Cases per 100,000 population.
† CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017

DESCRIPTION

Salmonellosis[1] is a disease caused by the bacteria *Salmonella*. This disease is transmitted from person-to-person through fecal-oral spread. *Salmonella* can be found in many foods, including sprouts and other vegetables, eggs, chicken, pork, fruits, and even processed foods, such as nut butters, frozen pot pies, chicken nuggets, and stuffed chicken entrees. Contaminated foods usually look and smell normal, which is why it is important to know how to prevent infection. The incubation period is usually 12–36 hours for gastroenteritis, longer and variable for other manifestations.

Communicability lasts as long as organisms are excreted, usually from 2–5 weeks, but may last for months to years. *Salmonella* illness can be serious and is more dangerous for certain people such as children younger than 5-years old, older adults, and people with immune systems weakened from a medical condition. Warmer weather and unrefrigerated foods create ideal conditions for *Salmonella* to grow. Infected people do not always become sick. The illness usually lasts 4 to 7 days, and most individuals recover without treatment.

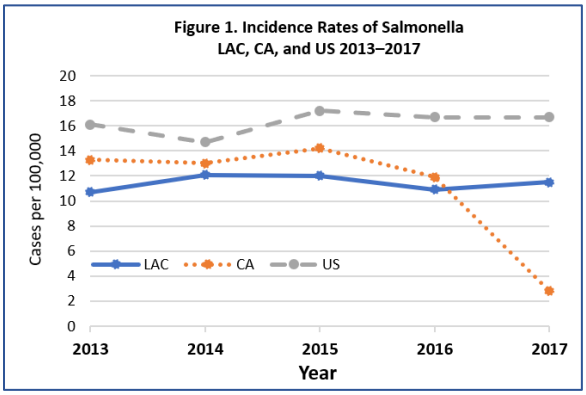
Cases of salmonellosis are reportable at the state level. Surveillance is conducted through electronic laboratory reporting. Currently, data are collected in the Laboratory-based Enteric Disease Surveillance (LEDS) system. The Division of Foodborne, Waterborne, and Environmental Diseases (DFWED) in the National Center for Emerging and Zoonotic Infectious Diseases maintains the national *Salmonella* surveillance data in LEDS.

Proper hand hygiene after contact with animals is important to prevent this disease. Also, washing hands with soap after using the restroom, changing diapers, or helping someone with diarrhea clean up after using the toilet is critical. Those who have *Salmonella* infection, should not prepare food or drinks for others until they no longer have diarrheal symptoms.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

- This year, the salmonellosis disease incidence rate increased in LAC from 10.91 cases per 100,000 in 2016 to 11.48 cases per 100,000 (**Figure 1**).



- The greatest incidence of salmonellosis was in the <1-year-old age group (53.5 cases per 100,000) followed by those 1–4-years old (24.7 cases per 100,000) (**Table 1**. Data for **Table 1** is available online.[4]).
- Comparing race/ethnicity, the greatest incidence of salmonellosis occurred among Whites (14.8

[1]www.publichealth.lacounty.gov/acd/Diseases/Salmonellosis.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Salmonellosis.aspx
[3]www.cdc.gov/salmonella/index.html
[4]www.publichealth.lacounty.gov/acd/docs/2017Tables/Salmonella.xlsx

cases per 100,000), which is consistent across the past 5 years (**Table 1**).

- The highest salmonellosis incidence rates were documented within SPA 5 (14.4 per 100,000) and SPA 2 had the second highest incidence of cases (13.3 per 100,000) (**Figure 2**).
- The number of cases peaked in July, which was the same in 2016 (**Figure 3**).

Figure 2. Incidence Rate of Salmonellosis by SPA
LAC, 2013–2017

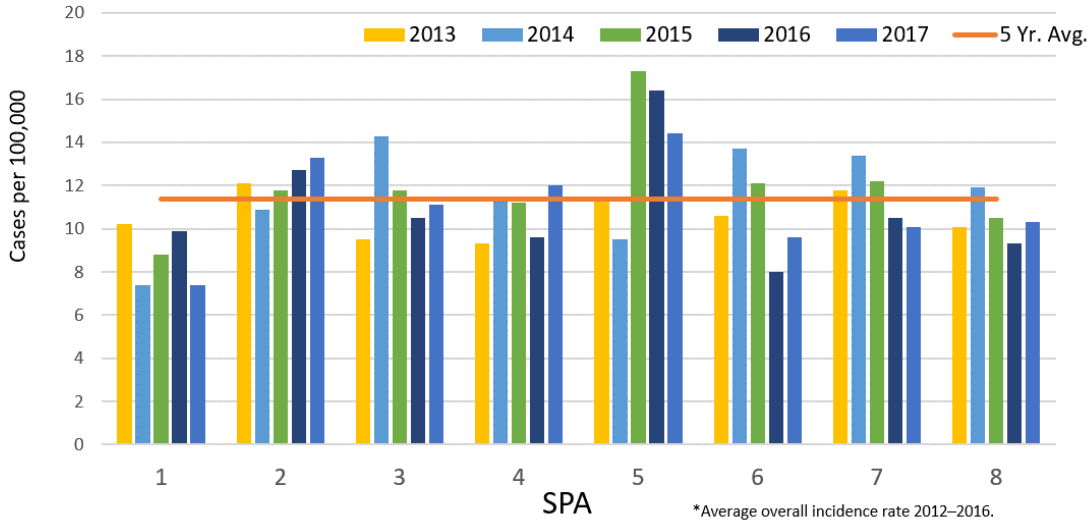


Figure 3. Reported Salmonellosis Cases by Month of Onset
LAC, 2017 (N=1107)

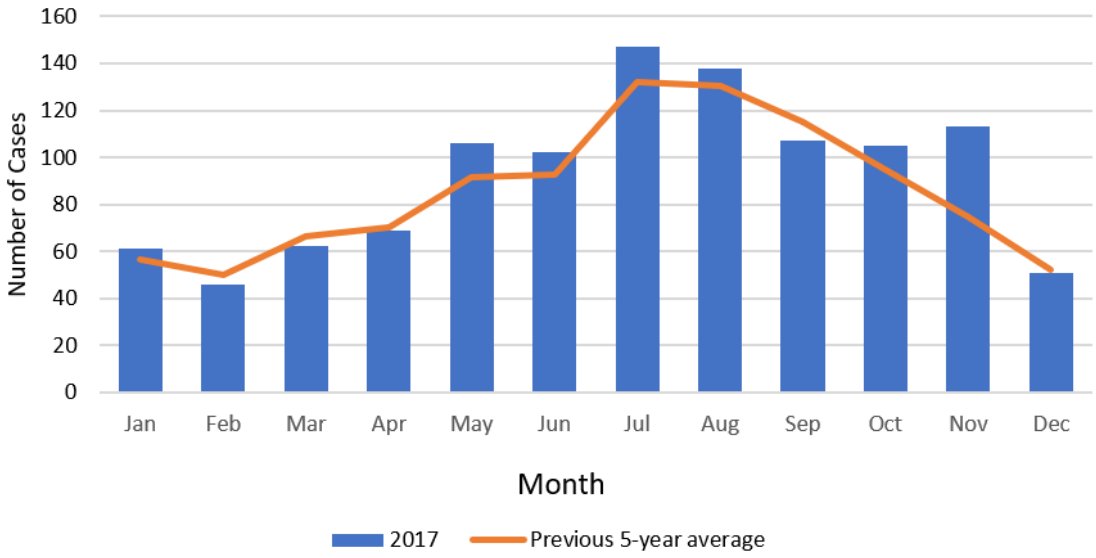
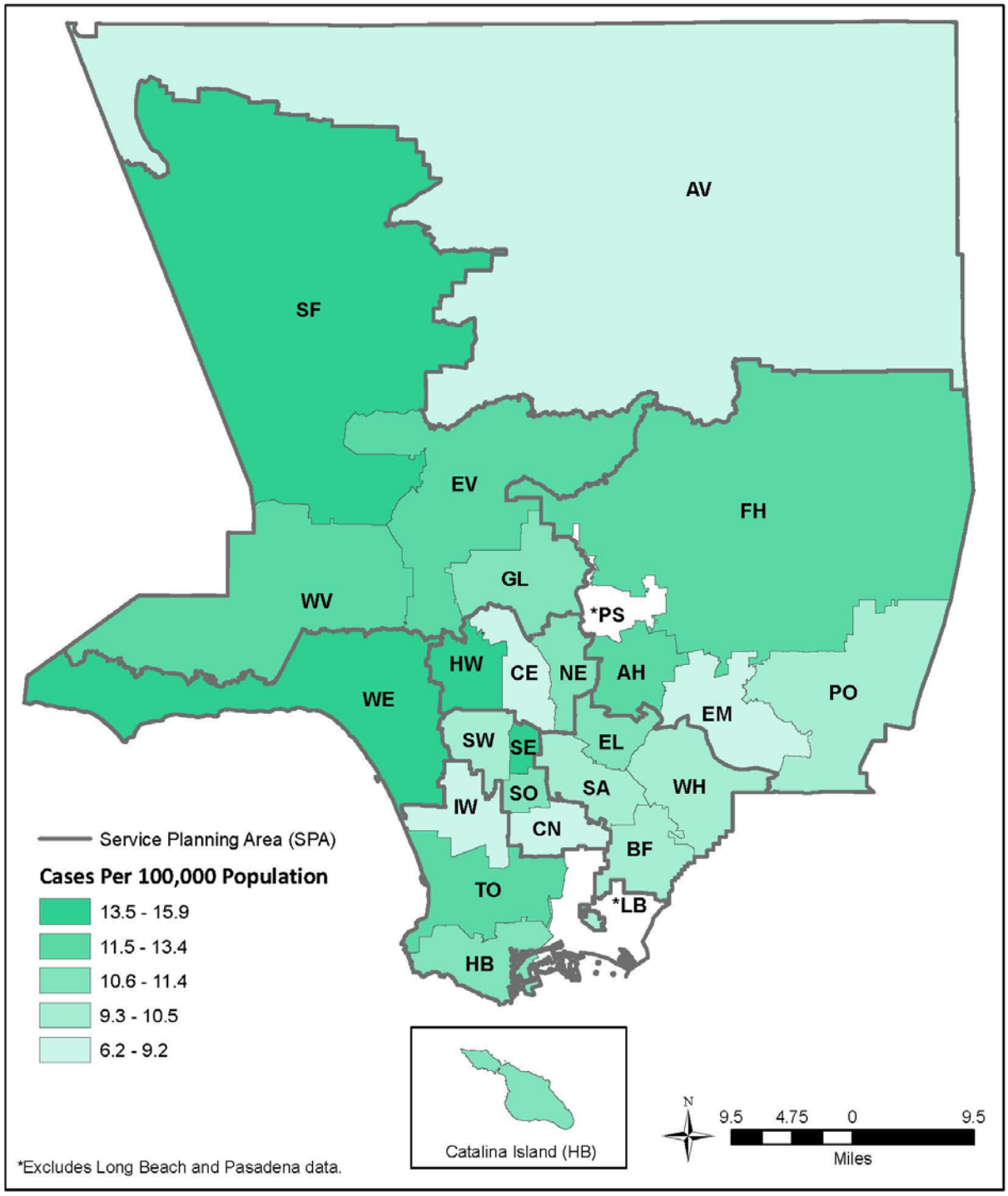


Table 1. Reported Salmonellosis Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**1,010**	**100.0**	**10.74**	**1,141**	**100.0**	**12.07**	**1,144**	**100.0**	**11.95**	**1,047h**	**100.0**	**10.91**	**1,107**	**100.0**	**11.48**
Age Group															
<1	59	5.8	48.8	62	5.4	52.4	60	5.2	55.5	71	6.7	68.4	55	5.0	53.5
1–4	141	14.0	29.0	162	14.2	33.2	116	10.1	23.9	106	10.1	22.6	111	10.0	24.7
5–14	185	18.3	15.3	181	15.9	15.0	148	12.9	12.2	133	12.7	11.0	123	11.1	10.2
15–34	227	22.5	8.0	248	21.7	8.8	297	26.0	10.5	248	23.7	8.8	254	22.9	9.0
35–44	89	8.8	6.7	110	9.6	8.3	123	10.8	9.3	94	9.0	7.1	132	11.9	9.9
45–54	82	8.1	6.3	111	9.7	8.5	124	10.8	9.4	97	9.3	7.3	102	9.2	7.6
55–64	84	8.3	8.2	99	8.7	9.3	105	9.2	9.5	125	11.9	11.0	134	12.1	11.4
65+	143	14.2	12.9	168	14.7	14.8	171	14.9	14.3	171	16.3	13.9	196	17.7	15.8
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Asian	73	7.2	5.3	140	12.3	10.2	102	8.9	7.3	104	9.9	7.5	122	11.0	8.8
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–
Black	69	6.8	8.9	67	5.9	8.5	68	5.9	8.7	58	5.5	7.4	50	4.5	6.3
Hispanic	538	53.3	11.7	575	50.4	12.5	589	51.5	12.6	512	49.0	10.8	539	48.7	11.3
White	318	31.5	12.0	344	30.1	12.9	383	33.5	14.3	370	35.4	13.9	396	35.8	14.8
AI/AN|	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Other	5	0.5	–	10	0.9	–	2	0.2	–	0	–	–	0	–	–
Unknown	7	0.7	–	5	0.4	–	0	–	–	1	–	–	0	–	–
SPA															
1	40	4.0	10.2	29	2.5	7.4	35	3.1	8.8	39	3.7	9.9	29	2.6	7.4
2	262	25.9	12.1	238	20.9	10.9	264	23.1	11.8	285	27.3	12.7	301	27.2	13.3
3	155	15.3	9.5	235	20.6	14.3	196	17.1	11.8	172	16.4	10.5	184	16.6	11.1
4	106	10.5	9.3	130	11.4	11.3	131	11.5	11.2	114	10.9	9.6	143	12.9	12.0
5	74	7.3	11.4	62	5.4	9.5	114	10.0	17.3	109	10.4	16.4	97	8.8	14.4
6	109	10.8	10.6	142	12.4	13.7	127	11.1	12.1	86	8.2	8.0	103	9.3	9.6
7	155	15.3	11.8	176	15.4	13.4	162	14.2	12.2	138	13.2	10.5	133	12.0	10.1
8	109	10.8	10.1	129	11.3	11.9	115	10.1	10.5	102	9.7	9.3	1113	10.2	10.3
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
| American Indian or Alaskan Native.

Map 12. Salmonellosis
Rates by Health District, Los Angeles County, 2017*



SHIGELLOSIS

SUMMARY DATA	
Number of Cases	732
Annual Incidence*	
LA County	7.6
California†	1.9
United States†	4.6
Age at Diagnosis	
Mean	36
Median	35
Range	0–92 years

* Cases per 100,000 population.
† CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017

DESCRIPTION

Shigellosis[1] is a disease caused by the bacteria *Shigella*. This disease is transmitted from person-to-person through fecal-oral spread. Some people who are infected may have no symptoms at all, but may still pass the *Shigella* bacteria to others. Contaminated foods usually look and smell normal, which is why it is important to know how to prevent infection. *Shigella* affects certain populations more than others such as young children, travelers, gay and bisexual men, men who have sex with other men (MSM), and immunocompromised people. Shigellosis symptoms include diarrhea, fever, and stomach cramps starting a day or two after a person is exposed to the bacteria. People who have shigellosis usually get better without antibiotic treatment in 5 to 7 days. People with mild shigellosis may need only fluids and rest. Healthcare providers may prescribe antibiotics for people with severe cases of shigellosis to help them get better faster.

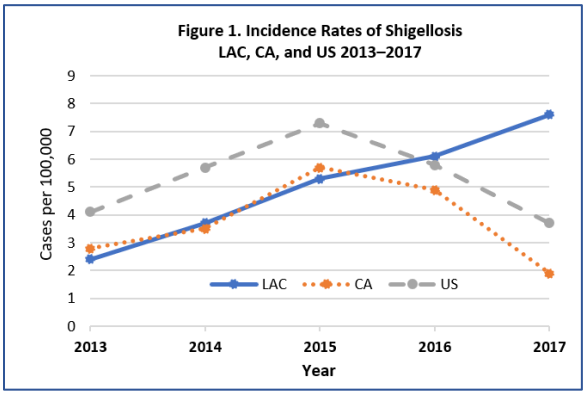
Cases of shigellosis are reportable at the state level. Surveillance is conducted through electronic laboratory reporting. Data are collected in the Laboratory-based Enteric Disease Surveillance (LEDS) system. The Division of Foodborne, Waterborne, and Environmental Diseases in the National Center for Emerging and Zoonotic Infectious Diseases maintains the national *Shigella* surveillance data in LEDS.

Proper hand hygiene before eating or preparing food for others is a key factor in prevention of shigellosis. Also, washing hands with soap after changing diapers or helping to clean another person who went to the bathroom is important. Prevention measures also include avoiding swallowing water from ponds, lakes, or untreated swimming pools. When traveling internationally, follow safe food and water guidelines and wash hands often with soap and water.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

- This year, the shigellosis disease incidence rate increased in LAC from 6.08 cases per 100,000 in 2016 to 7.59 cases per 100,000 (**Figure 1**).



- The greatest incidence of shigellosis was in the 1–4-years-old age group (10.2 cases per 100,000) followed by those 45–54-years old (9.1 cases per 100,000) (**Table 1**. Data for **Table 1** is available online.[4]).
- Comparing race/ethnicity, the greatest incidence of shigellosis occurred among Whites (11.7 cases per 100,000), which is consistent across the past 4 years (**Table 1**).
- The highest shigellosis incidence rates were documented within SPA 4 (20.1 per 100,000) and

[1]www.publichealth.lacounty.gov/acd/Diseases/Shigellosis.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Shigellosis.aspx
[3]www.cdc.gov/shigella/index.html
[4]publichealth.lacounty.gov/acd/docs/2017Tables/Shigellosis.xlsx

SPA 5 had the second highest incidence of cases (17.3 per 100,000) (**Figure 2**).

- The number of cases peaked in September (**Figure 3**).

Figure 2. Incidence Rate of Shigellosis by SPA
LAC, 2013–2017

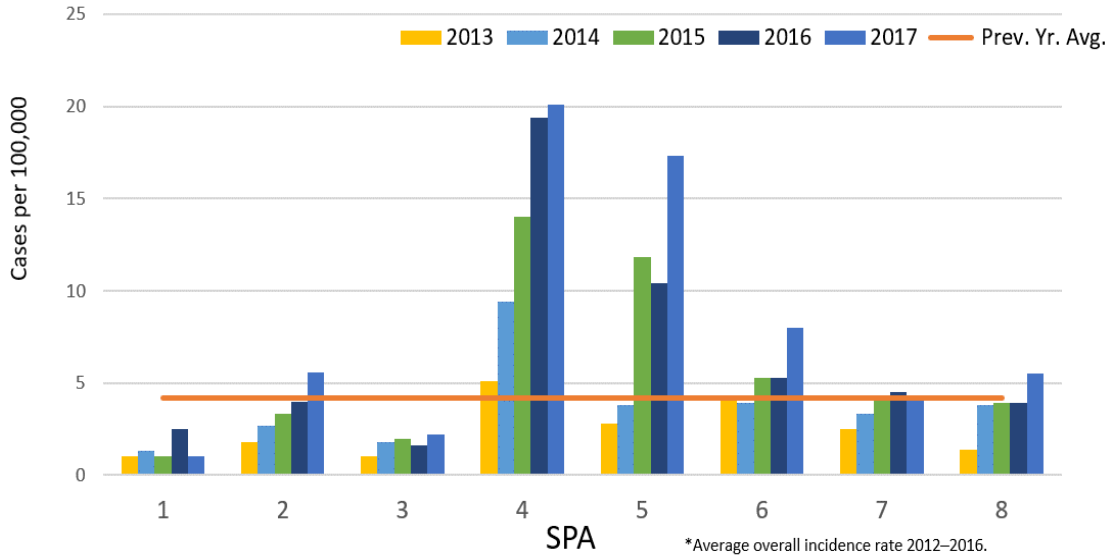


Figure 3. Reported Shigellosis Cases by Month of Onset
LAC, 2017 (N=732)

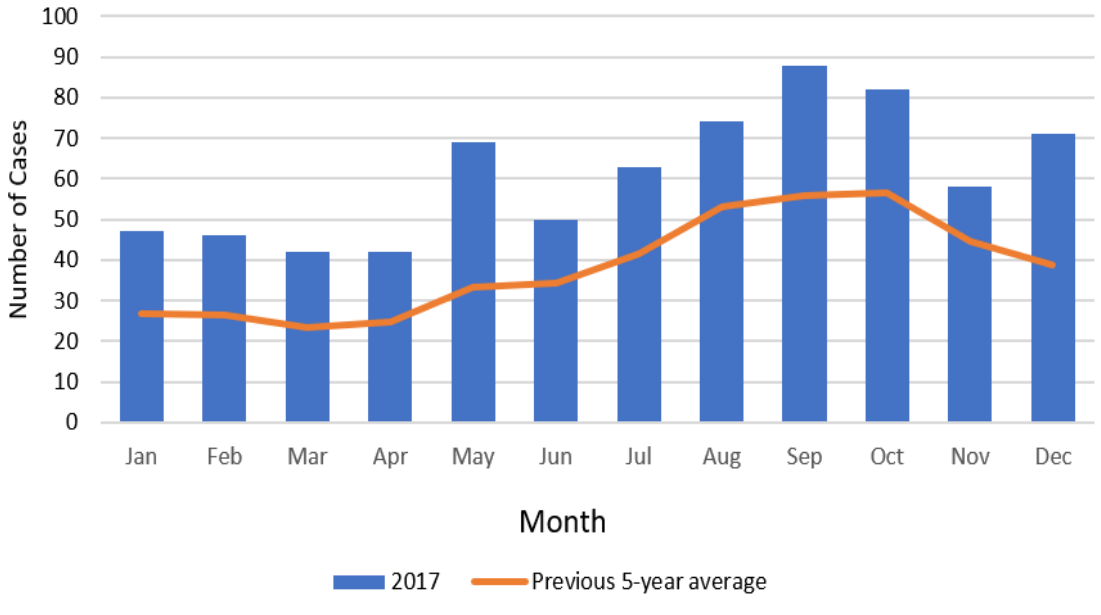
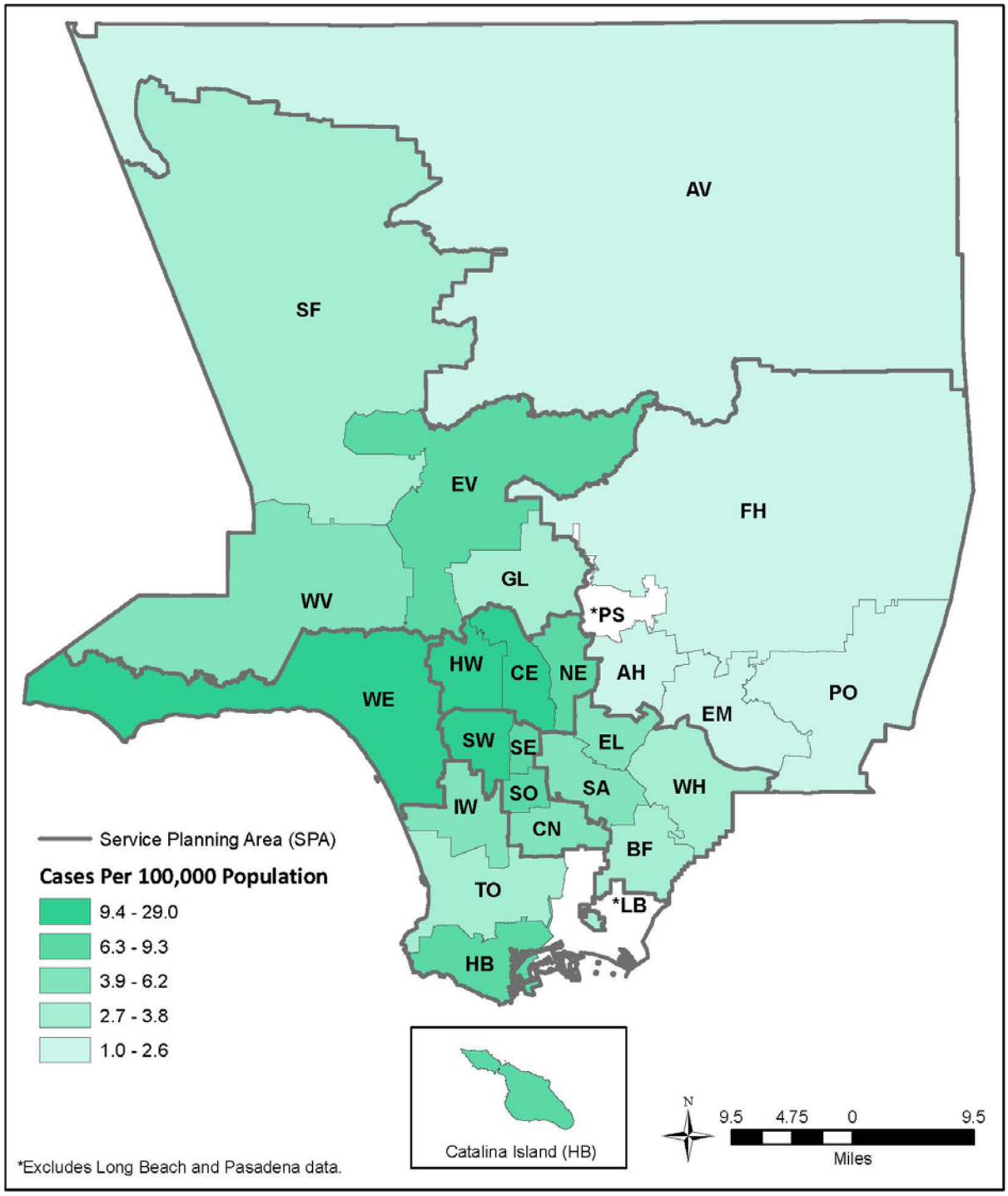


Table 1. Reported Shigellosis Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**227**	**100.0**	**2.41**	**350**	**100.0**	**3.70**	**508**	**100.0**	**5.31**	**584**	**100.0**	**6.08**	**732**	**100.0**	**7.59**
Age Group															
<1	1	–	–	2	–	–	0	–	–	2	–	–	3	–	–
1–4	26	11.5	5.3	30	8.6	6.1	38	7.5	7.8	32	5.4	6.8	46	11.6	10.2
5–14	49	21.6	4.1	51	14.6	4.2	52	10.2	4.3	54	9.3	4.5	69	17.4	5.7
15–34	55	24.2	1.9	85	24.3	3.0	178	35.0	6.3	195	33.4	6.9	244	61.7	8.7
35–44	31	13.7	2.3	64	18.3	4.8	84	16.5	6.3	85	14.6	6.4	113	28.6	8.5
45–54	30	13.2	2.3	57	16.3	4.4	80	15.7	6.1	107	18.3	8.1	121	30.6	9.1
55–64	19	8.4	1.9	30	8.6	2.8	36	7.1	3.3	62	10.6	5.5	70	17.7	6.0
65+	15	6.6	1.4	31	8.9	2.7	40	7.9	3.4	47	8.1	3.8	66	16.7	5.3
Unknown	1	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Asian	5	–	–	17	4.9	1.2	17	3.3	1.2	22	3.8	1.6	26	6.6	1.9
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	1	–	–
Black	25	11.0	3.2	19	5.4	2.4	60	11.8	7.6	73	12.5	9.3	57	14.4	7.2
Hispanic	107	47.1	2.3	167	47.7	3.6	213	41.9	4.5	227	38.9	4.8	312	78.9	6.6
White	82	36.1	3.1	132	37.7	5.0	215	42.3	8.0	261	44.7	9.8	313	79.2	11.7
AI/AN‖	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Other	2	–	–	1	–	–	3	–	–	1	–	–	4	0.5	–
Unknown	6	2.6	–	14	4.0	–	0	–	–	0	–	–	19	4.8	–
SPA															
1	4	–	–	5	–	–	4	–	–	10	1.7	2.5	4	–	–
2	39	17.2	1.8	59	16.9	2.7	74	14.6	3.3	89	15.2	4.0	127	32.1	5.6
3	16	7.0	1.0	29	8.3	1.8	33	6.5	2.0	27	4.6	1.6	36	9.1	2.2
4	58	25.6	5.1	108	30.9	9.4	164	32.3	14.0	230	39.4	19.4	239	60.5	20.1
5	18	7.9	2.8	25	7.1	3.8	78	15.4	11.8	69	11.8	10.4	116	29.3	17.3
6	44	19.4	4.3	40	11.4	3.9	56	11.0	5.3	57	9.8	5.3	86	21.7	8.0
7	33	14.5	2.5	43	12.3	3.3	55	10.8	4.2	59	10.1	4.5	55	13.9	4.2
8	15	6.6	1.4	41	11.7	3.8	43	8.5	3.9	43	7.4	3.9	60	15.2	5.5
Unknown	0	–	–	0	–	–	1	–	–	0	–	–	0	–	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
‖ American Indian or Alaskan Native.

Map 13. Shigellosis
Rates by Health District, Los Angeles County, 2017*



STREPTOCOCCAL DISEASE, GROUP A

SUMMARY DATA	
Number of Cases	419
Annual Incidence*	
LA County	4.3
California†	1.1
United States‡	N/A
Age at Diagnosis	
Mean	51
Median	54
Range	0–100 years

* Cases per 100,000 population.
† CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017
‡ Not nationally reportable.

DESCRIPTION

Group A Streptococcal Disease[1] is a disease caused by the bacteria the group A beta-hemolytic *Streptococcus pyogenes*. Transmission is by direct or, rarely, indirect contact. Illness manifests as various overlapping clinical syndromes including bacteremia without focus, sepsis, cutaneous wound or deep soft-tissue infection, septic arthritis, and pneumonia. Infection can result in severe illness, including death. IGAS occurs in all age groups but more frequently among the very old. Strep throat and scarlet fever are most common in children between 5-15 years old.

Group A strep infections can occur any time during the year. However, some infections are more common in the US in certain seasons. For example, strep throat and scarlet fever are more common in the winter and spring.

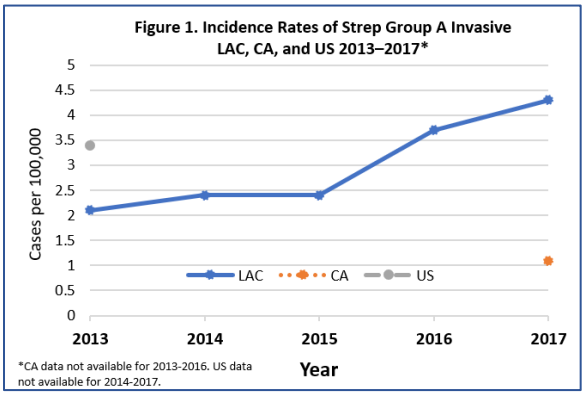
Healthcare providers and laboratories should report cases to the appropriate health department. States then report these cases to the CDC through the National Notifiable Diseases Surveillance System (NNDSS). The CDC tracks invasive group A strep infections through Active Bacterial Core surveillance (ABCs), a population-based, active- and laboratory-based surveillance system. This means local and state health departments routinely contact laboratories to identify all cases, then report those cases to the CDC.

Proper hand hygiene is the best way to protect oneself from group A strep infections. There is currently no vaccine to prevent group A strep infections, although several vaccines are in development. Prophylaxis is when providers give antibiotics to someone to prevent them from getting sick. Most people who are exposed to someone with a group A strep infection should not receive prophylaxis. However, in some situations, providers may recommend prophylaxis for someone exposed to an invasive group A strep infection.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

- This year, the group A strep disease incidence rate increased in LAC from 3.68 cases per 100,000 in 2016 to 4.34 cases per 100,000 (**Figure 1**).



- The greatest incidence of group A strep disease was in the 65+-years-old age group (9.8 cases per 100,000) followed by those 55–64-years old (7.2 cases per 100,000) (**Table 1**. Data for **Table 1** is available online.[4]).

[1] www.publichealth.lacounty.gov/acd/Diseases/Strepto.htm
[2] www.cdph.ca.gov/Programs/CID/DCDC/Pages/Group-A-Streptococcus.aspx
[3] www.cdc.gov/groupastrep/
[4] www.publichealth.lacounty.gov/acd/docs/2017Tables/Strep%20(IGAS).xlsx

- Comparing race/ethnicity, the greatest incidence of group A strep occurred among Blacks (7.7 cases per 100,000), which is consistent with the previous year (**Table 1**).
- The highest group A strep disease incidence rates were documented within SPA 4 (6.8 per 100,000) and SPA 8 had the second highest incidence of cases (4.4 per 100,000) (**Figure 2**).
- The number of cases peaked in January (**Figure 3**).

Figure 2. Incidence Rate of Invasive Group A Streptococcus by SPA
LAC, 2013–2017

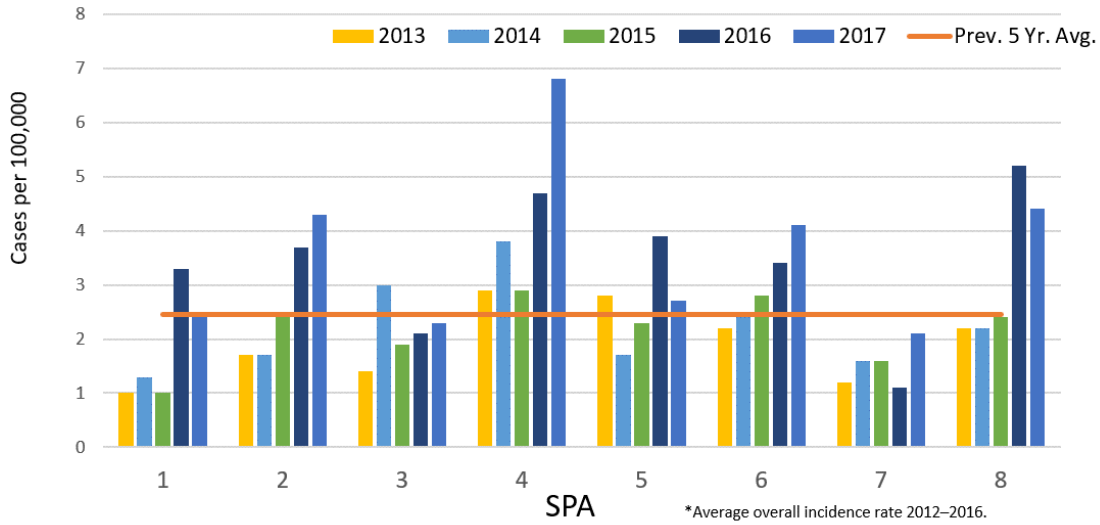


Figure 3. Reported Invasive Group A Streptococcus (IGAS) Cases by Month of Onset
LAC, 2017 (N=419)

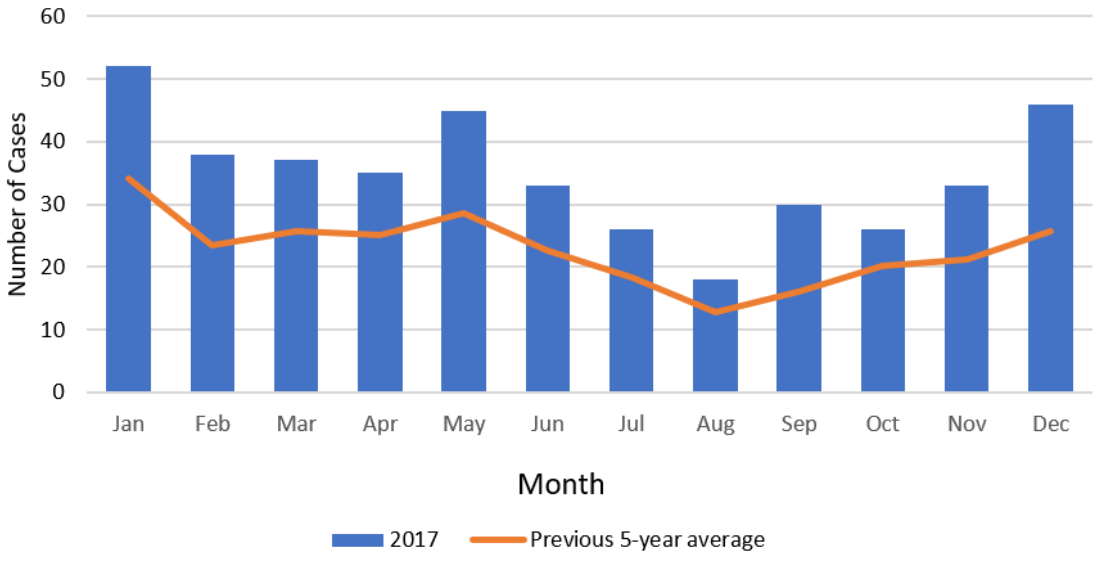
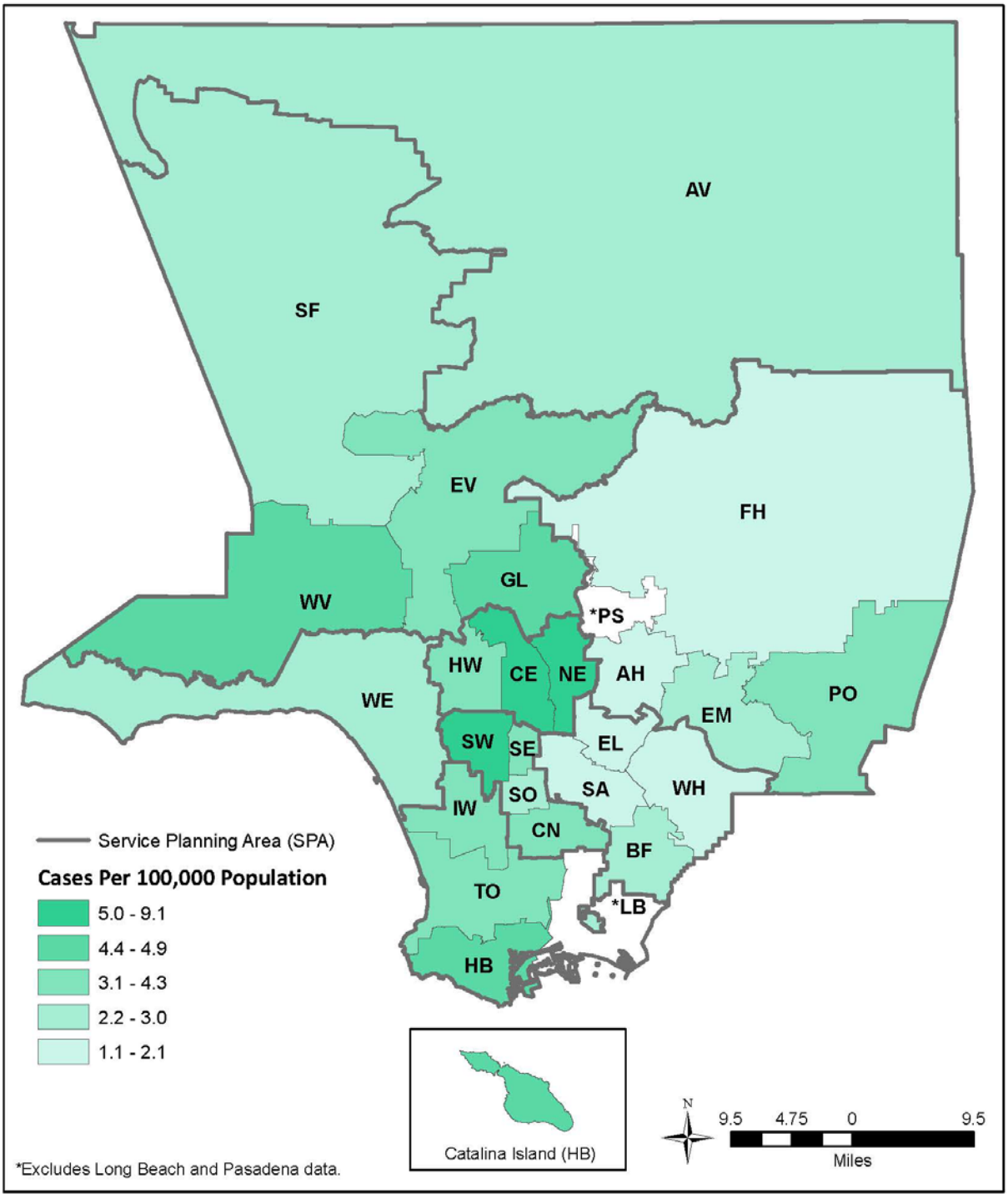


Table 1. Reported Invasive Group A Streptococcus Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**195**	**100.0**	**2.07**	**222**	**100.0**	**2.35**	**227**	**100.0**	**2.37**	**353**	**100.0**	**3.68**	**419**	**100.0**	**4.34**
Age Group															
<1	5	2.6	–	7	3.2	5.9	1	0.4	–	1	0.3	–	3	0.7	–
1–4	4	2.1	–	7	3.2	1.4	7	3.1	1.4	10	2.8	2.1	11	2.6	2.4
5–14	10	5.1	0.8	16	7.2	1.3	16	7.0	1.3	17	4.8	1.4	19	4.5	1.6
15–34	29	14.9	1.0	34	15.3	1.2	29	12.8	1.0	37	10.5	1.3	54	12.9	1.9
35–44	20	10.3	1.5	24	10.8	1.8	25	11.0	1.9	41	11.6	3.1	51	12.2	3.8
45–54	41	21.0	3.2	43	19.4	3.3	43	18.9	3.3	53	15.0	4.0	74	17.7	5.5
55–64	31	15.9	3.0	35	15.8	3.3	37	16.3	3.3	64	18.1	5.6	84	20.0	7.2
65+	54	27.7	4.9	56	25.2	4.9	68	30.0	5.7	125	35.4	10.2	121	28.9	9.8
Unknown	1	0.5	–	0	–	–	1	0.4	–	–	–	–	2	0.5	–
Race/Ethnicity‡															
Asian	8	4.1	0.6	6	2.7	0.4	5	2.2	–	9	2.5	0.6	31	7.4	2.2
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	2	0.5	–
Black	29	14.9	3.7	10	4.5	1.3	14	6.2	1.8	29	8.2	3.7	61	14.6	7.7
Hispanic	29	14.9	0.6	29	13.1	0.6	29	12.8	0.6	77	21.8	1.6	115	27.4	2.4
White	50	25.6	1.9	51	23.0	1.9	52	22.9	1.9	89	25.2	3.3	140	33.4	5.2
AI/AN‖	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	3	0.7	–
Other	5	2.6	–	11	5.0	–	3	1.3	–	10	2.8	–	23	5.5	–
Unknown	74	37.9	–	115	51.8	–	124	54.6	–	139	39.4	–	44	10.5	–
SPA															
1	4	2.1	–	5	2.3	–	4	1.8	–	13	3.7	3.3	10	2.4	2.5
2	38	19.5	1.7	38	17.1	1.7	54	23.8	2.4	83	23.5	3.7	97	23.2	4.3
3	23	11.8	1.4	49	22.1	3.0	31	13.7	1.9	35	9.9	2.1	38	9.1	2.3
4	33	16.9	2.9	44	19.8	3.8	34	15.0	2.9	56	15.9	4.7	81	19.3	6.8
5	18	9.2	2.8	11	5.0	1.7	15	6.6	2.3	26	7.4	3.9	18	4.3	2.7
6	23	11.8	2.2	25	11.3	2.4	29	12.8	2.8	36	10.2	3.4	44	10.5	4.1
7	16	8.2	1.2	21	9.5	1.6	21	9.3	1.6	14	4.0	1.1	28	6.7	2.1
8	24	12.3	2.2	24	10.8	2.2	26	11.5	2.4	57	16.2	5.2	48	11.5	4.4
Unknown	16	8.2	–	5	2.3	–	13	5.7	–	13	3.7	–	55	13.1	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
‖ American Indian or Alaskan Native.

Map 14. Streptococcus, Group A Invasive Rates by Health District, Los Angeles County, 2017*



TYPHOID FEVER, ACUTE

SUMMARY DATA	
Number of Cases	8
Annual Incidence*	
LA County	0.1
California‡	N/A
United States†	0.1
Age at Diagnosis	
Mean	35
Median	25
Range	8–73 years

* Cases per 100,000 population.
† CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017
‡ Rates based on less than 19 observations are considered unreliable.

DESCRIPTION

Typhoid[1] or "enteric fever," is an acute systemic disease caused by the Gram-negative bacillus *Salmonella typhi*. This disease is transmitted from person-to-person through fecal-oral spread. Common symptoms include insidious onset of persistent fever, headache, malaise, anorexia, constipation (more commonly than diarrhea), bradycardia, enlargement of the spleen, and rose spots on the trunk. Humans are the only known reservoir for *S. typhi*.

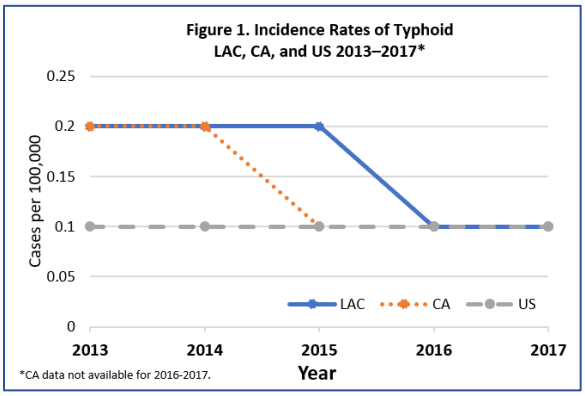
State and local health officials use a standard report form to report detailed epidemiologic information on laboratory-confirmed cases, including patient demographic and clinical information, typhoid vaccination status, and travel history. A case of typhoid fever is defined as an acute illness compatible with typhoid fever in which *Salmonella* serotype Typhi was isolated from a normally sterile site or from stool or urine. Travel-associated typhoid fever is defined as illness in a person who traveled outside of the US in the 30 days before illness began, and domestically acquired typhoid fever is defined as illness in a person without such a travel history.

The best way to prevent and protect oneself from acute typhoid fever is to get vaccinated. Carefully selecting what food and drink while traveling is important. This is because the typhoid fever vaccines do not work 100% of the time. When traveling to areas of risk, it is critical to drink bottled or boiled water. It is important to eat foods that have been thoroughly cooked and are still hot while eating. Avoid raw vegetables and fruits that cannot be peeled. It is best to avoid foods and beverages from street vendors.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

- This year, the acute typhoid fever disease incidence rate decreased in LAC from 0.11 cases per 100,000 in 2016 to 0.08 cases per 100,000 (**Figure 1**).



- The greatest incidence of acute typhoid fever disease was not able to be determined because rate calculations based on less than 19 cases are considered unreliable (**Table 1**. Data for **Table 1** is available online.[4]).
- Comparing race/ethnicity, the greatest incidence of acute typhoid fever was not able to be determined because, again, rate calculations based on less than 19 cases are considered unreliable (**Table 1**).
- The highest acute typhoid fever disease incidence rates among SPAs could not be determined because, again, rate calculations

[1]www.publichealth.lacounty.gov/acd/Diseases/TyphoidCase.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Typhoidfever.aspx
[3]www.cdc.gov/typhoid-fever/index.html
[4]publichealth.lacounty.gov/acd/docs/2017Tables/Typhoid.xlsx

based on less than 19 cases are considered unreliable (**Figure 2**).

- The number of cases peaked in September (**Figure 3**).

Figure 2. Incidence Rate of Typhoid Fever by SPA
LAC, 2013–2017

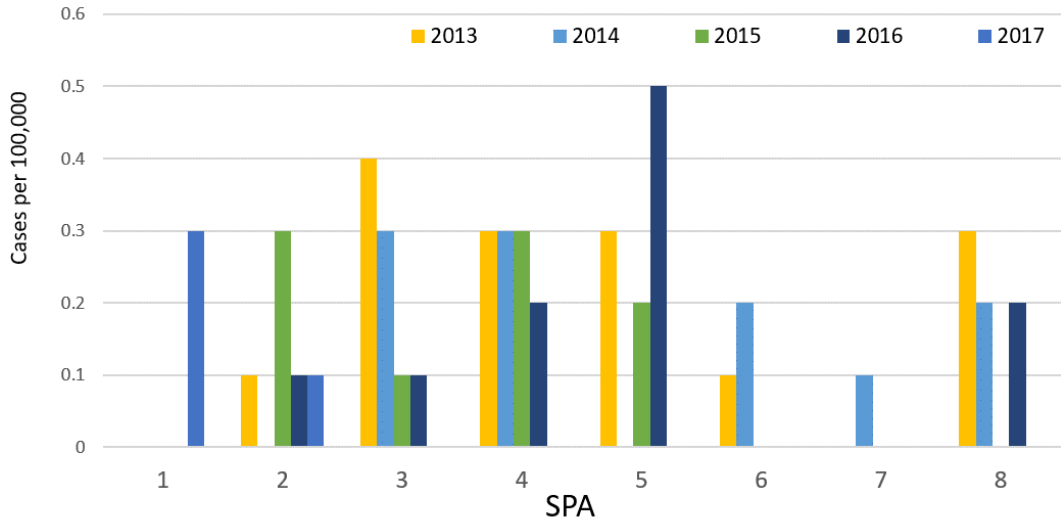


Figure 3. Reported Typhoid Fever Cases by Month of Onset
LAC, 2017 (N=8)

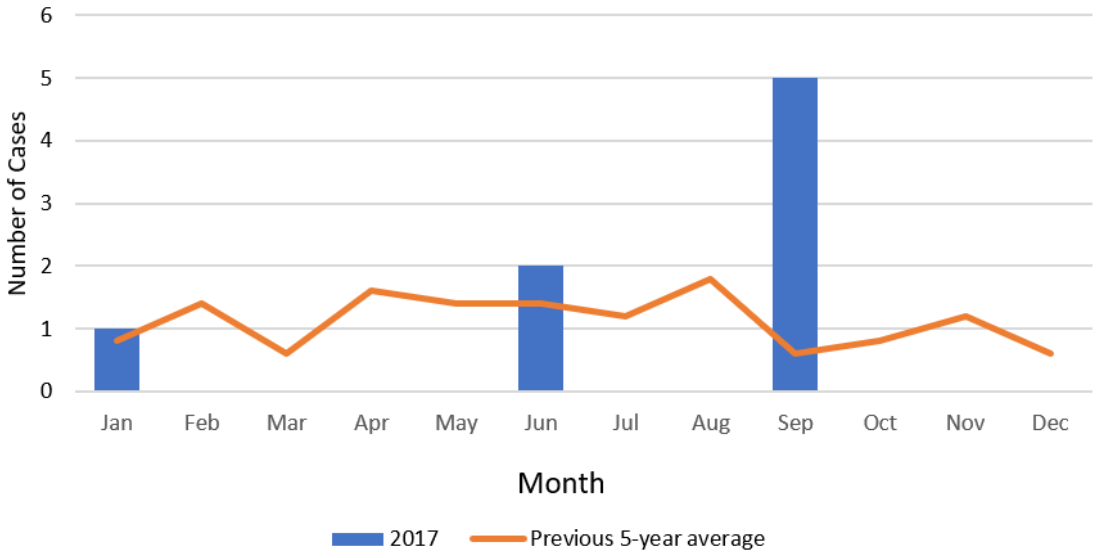


Table 1. Reported Acute Typhoid Fever Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**17**	**100.0**	**0.18**	**15**	**100.0**	**0.16**	**14**	**100.0**	**0.15**	**11**	**100.0**	**0.11**	**8**	**100.0**	**0.08**
Age Group															
<1	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
1–4	3	17.6	–	0	–	–	3	21.4	–	0	–	–	0	–	–
5–14	3	17.6	–	2	13.3	–	2	14.3	–	1	9.0	–	0	–	–
15–34	7	41.2	0.2	7	46.7	0.2	7	50.0	0.2	6	54.5	0.2	5	62..5	–
35–44	1	5.9	–	2	13.3	–	0	–	–	0	–	–	0	–	–
45–54	2	11.8	–	2	13.3	–	0	–	–	1	9.0	–	1	12.5	–
55–64	1	5.9	–	1	6.7	–	1	7.1	–	2	18.1	–	1	12.5	–
65+	0	–	–	1	6.7	–	1	7.1	–	1	9	–	1	12.5	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Asian	12	70.6	0.9	10	66.7	0.7	8	57.1	0.6	5	45.4	–	5	62.5	–
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Black	0	–	–	0	–	–	0	–	–	2	18.1	–	0	–	–
Hispanic	5	29.4	–	5	33.3	–	4	28.6	–	1	9.0	–	2	25.0	–
White	0	–	–	0	–	–	2	14.3	–	1	9.0	–	0	–	–
AI/AN‖	0	–	–	0	–	–	0	–	–	1	9.0	–	0	–	–
Other	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	1	12.5	–
SPA															
1	0	–	–	0	–	–	0	–	–	0	–	–	1	12.5	–
2	2	11.8	–	1	6.7	–	7	50.0	0.3	3	27.2	–	2	25.0	–
3	6	35.3	0.4	5	33.3	–	2	14.3	–	1	9.0	–	0	–	–
4	3	17.6	–	4	26.7	–	4	28.6	–	2	18.1	–	1	12.5	–
5	2	11.8	–	0	–	–	1	7.1	–	3	27.2	–	0	–	–
6	1	5.9	–	2	13.3	–	0	–	–	0	–	–	1	12.5	–
7	0	–	–	1	6.7	–	0	–	–	0	–	–	1	12.5	–
8	3	17.6	–	2	13.3	–	0	–	–	2	18.1	–	1	12.5	–
Unknown	0	–	–	0	–	–	0	–	–	–	–	–	1	12.5	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
‖ American Indian or Alaskan Native.

TYPHUS, FLEA-BORNE

SUMMARY DATA	
Number of Cases	67
Annual Incidence*	
LA County	0.7
California†	0.2
United States‡	N/A
Age at Diagnosis	
Mean	39
Median	37
Range	0–97 years

* Cases per 100,000 population.
† CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017
‡ Not nationally reportable.

DESCRIPTION

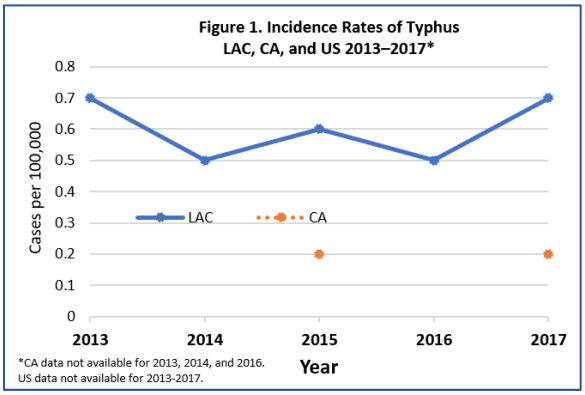
Typhus, Flea-Borne[1] or murine typhus, is a disease caused by a bacteria called *Rickettsia typhi*. This disease is transmitted from person-to-person through contact with infected fleas. People get sick with flea-borne typhus when infected flea feces are rubbed into cuts or scrapes in the skin. In most areas of the world, rats are the main animal host for fleas infected with flea-borne typhus. Flea-borne typhus occurs in tropical and subtropical climates around the world where rats and their fleas live. Cat fleas found on domestic cats and opossums have been associated with cases of flea-borne typhus in the United States. Most cases of flea-borne typhus in the US are reported from California, Hawaii, and Texas. Symptoms of flea-borne typhus begin within two weeks after contact with infected fleas. Signs and symptoms may include fever and chills, body aches and muscle pain, loss of appetite, nausea, vomiting, stomach pain, cough, and rash. Most people will recover without treatment, but some cases may be severe. When left untreated, severe illness can cause damage to one or more organs including the liver, kidneys, heart, lungs, and brain.

There is no vaccine to prevent flea-borne typhus. The best way to reduce one's risk is by avoiding contact with infected fleas. It is important to keep rodents and animals away from one's home, workplace, and recreational areas. Additionally, remove brush, rock piles, junk, cluttered firewood, and food supplies, especially pet food. Always wear gloves when handling sick or dead animals. Use Environmental Protection Agency (EPA)-registered insect repellent labeled for use against fleas if exposed to fleas during activities such as camping, hiking, or working outdoors. One can treat clothing and gear with permethrin or purchase permethrin-treated items. Lastly, keep fleas off pets. Use veterinarian-approved flea control products for cats and dogs such as flea collars. Doxycycline is the treatment of choice for suspected scrub typhus in persons of all ages.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

- This year, the typhus, flea-borne disease incidence rate increased in LAC from 0.49 cases per 100,000 in 2016 to 0.69 cases per 100,000 (**Figure 1**).



- The greatest incidence of typhus, flea-borne was among the 35-44, 45-54, and 55-64-years-old groups (0.9 cases per 100,000) followed by those 15–34-years old (0.7 cases per 100,000) (**Table 1**. Data for **Table 1** is available online.[4]).
- Comparing race/ethnicity, the greatest incidence of typhus, flea-borne occurred among Whites (0.9 cases per 100,000) (**Table 1**).

[1]www.publichealth.lacounty.gov/acd/VectorTyphus.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Typhus.aspx
[3]www.cdc.gov/typhus/murine/index.html
[4]www.publichealth.lacounty.gov/acd/docs/2017Tables/Typhus.xlsx

- The highest typhus, flea-borne incidence rates were documented within SPA 4 (1.6 per 100,000) and SPA 6 had the second highest incidence of cases (1.1 per 100,000) (**Figure 2**).
- The number of cases peaked in May (**Figure 3**).

Figure 2. Incidence Rate of Flea-Borne Typhus by SPA
LAC, 2013–2017

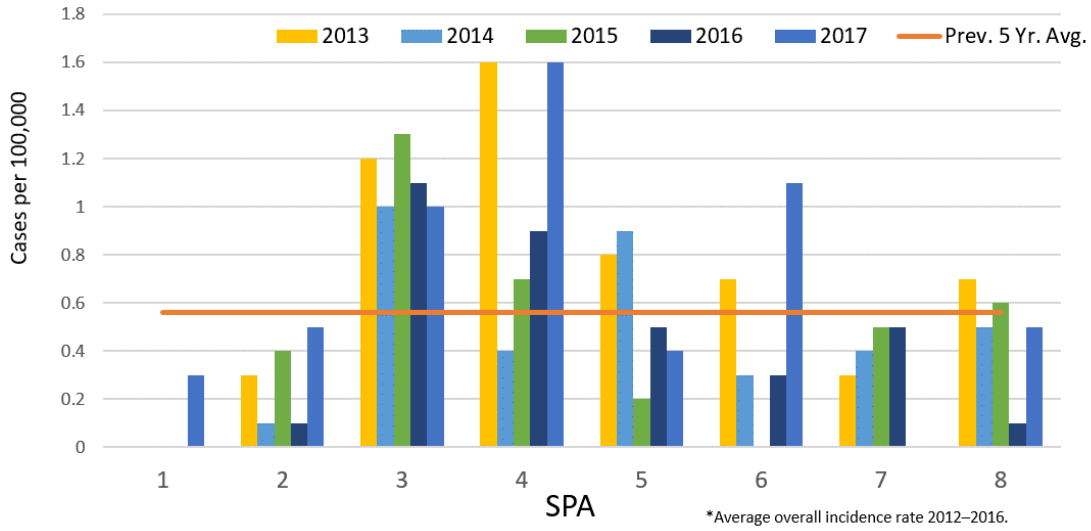


Figure 3. Reported Typhus, Flea-Borne, Cases by Month of Onset
LAC, 2017 (N=67)

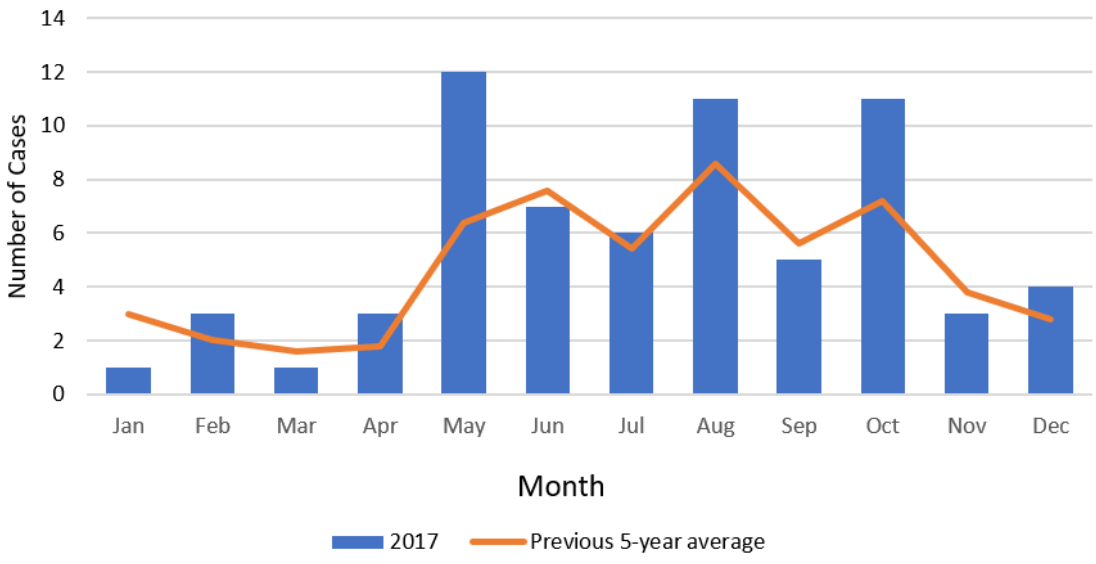


Table 1. Reported Flea-Borne Typhus Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**68**	**100.0**	**0.72**	**44**	**100.0**	**0.47**	**54**	**100.0**	**0.56**	**47**	**100.0**	**0.49**	**67**	**100.0**	**0.69**
Age Group															
<1	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
1–4	1	1.5	–	1	2.3	–	1	1.9	–	0	–	–	0	–	–
5–14	5	7.4	–	1	2.3	–	2	3.7	–	2	4.3	–	7	10.5	0.6
15–34	16	23.5	0.6	10	22.7	0.4	10	18.5	0.4	12	25.5	0.4	21	31.3	0.7
35–44	12	17.6	0.9	6	13.6	0.5	8	14.8	0.6	14	29.8	1.1	12	17.9	0.9
45–54	13	19.1	1.0	10	22.7	0.8	18	33.3	1.4	7	14.9	0.5	12	17.9	0.9
55–64	13	19.1	1.3	8	18.2	0.8	9	16.7	0.8	8	17.0	0.7	11	16.4	0.9
65+	8	11.8	0.7	8	18.2	0.7	6	11.1	0.5	4	8.5	–	4	6.0	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Asian	3	4.4	–	3	6.8	–	3	5.6	–	4	8.5	–	6	9.0	0.4
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–
Black	1	1.5	–	0	–	–	4	7.4	–	2	4.3	–	2	3.0	–
Hispanic	24	35.3	0.5	17	38.6	0.4	20	37.0	0.4	15	31.9	0.3	34	50.7	0.7
White	35	51.5	1.3	17	38.6	0.6	24	44.4	0.9	21	44.7	0.8	25	37.3	0.9
AI/AN‖	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–
Other	1	1.5	–	1	2.3	–	1	1.9	–	4	8.5	–	0	–	–
Unknown	4	5.9	–	6	13.6	–	2	3.7	–	1	2.1	–	0	–	–
SPA															
1	0	–	–	0	–	–	0	–	–	0	–	–	1	1.5	–
2	6	8.8	0.3	3	6.8	–	10	18.5	0.4	3	6.4	–	11	16.4	0.5
3	20	29.4	1.2	17	38.6	1.0	22	40.7	1.3	18	38.3	1.1	16	23.9	1.0
4	18	26.5	1.6	5	11.4	–	8	14.8	0.7	11	23.4	0.9	19	28.3	1.6
5	5	7.4	–	6	13.6	0.9	1	1.9	–	3	6.4	–	3	4.5	–
6	7	10.3	0.7	3	6.8	–	0	–	–	3	6.4	–	12	17.9	1.1
7	4	5.9	–	5	11.4	–	6	11.1	0.5	7	14.9	0.5	0	–	–
8	8	11.8	0.7	5	11.4	–	7	13.0	0.6	1	2.1	–	5	7.5	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
‖ American Indian or Alaskan Native.

VIBRIOSIS

SUMMARY DATA	
Number of Cases	53
Annual Incidence*	
LA County	0.6
California†	0.1
United States†	0.7
Age at Diagnosis	
Mean	48
Median	44
Range	18–86 years

* Cases per 100,000 population.
† CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017

DESCRIPTION

Vibriosis[1] is a disease caused by about a dozen different *Vibrio* bacteria species. The most common species causing human illness in the US are *Vibrio parahaemolyticus*, *Vibrio vulnificus*, and *Vibrio alginolyticus*. This disease is transmitted through raw or undercooked shellfish, particularly oysters. The main symptom of this disease is a skin infection when an open wound is exposed to salt or brackish water. Brackish water is a mixture of fresh and salt water.

People with compromised immune systems, especially those with chronic liver disease, are more likely to get vibriosis. Most people with a mild case of vibriosis recover after about three days with no lasting effects. However, people with a *Vibrio vulnificus* infection can get seriously ill and need intensive care or limb amputation. About 1 in 5 people with this type of infection die, sometimes within a day or two of becoming ill.

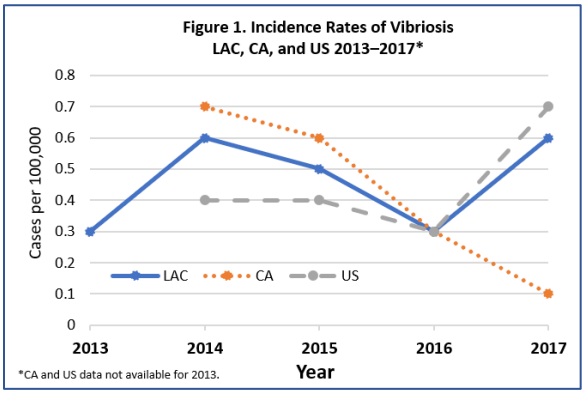
Vibriosis has been a nationally notifiable disease since 2007. Health departments report cases to the Cholera and Other *Vibrio* Illness Surveillance (COVIS) system. COVIS was initiated by the CDC, FDA, and four Gulf Coast states (Alabama, Florida, Louisiana, and Texas) in 1989. By the early 2000s, almost all states were voluntarily reporting. Because *Vibrio* bacteria are not easily identified with routine testing, many cases are not reported.

Prevention of vibriosis can be accomplished by not eating raw or undercooked oysters or other shellfish. These foods should be cooked thoroughly before eating. It is important to always wash hands with soap and water after handing raw shellfish. Additionally, avoid contaminating cooked shellfish with raw shellfish and its juices. Lastly, staying out of salt water or brackish water if one has a wound (including cuts and scrapes), or covering one's wounds with a waterproof bandage if there is a possibility it could come in contact with salt water or brackish water, raw seafood, or raw seafood juices is critical for prevention. Wash wounds and cuts thoroughly with soap and water if they have been exposed to seawater or raw seafood or its juices. It is helpful to wear clothes and shoes that can protect from cuts and scrapes when in salt water or brackish water. Also, wearing protective gloves when handling raw seafood is helpful for prevention.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

- This year, the vibriosis disease incidence rate increased in LAC from 0.34 cases per 100,000 in 2016 to 0.55 cases per 100,000 (**Figure 1**).



- The greatest incidence of vibriosis was among the 65+ age group (0.8 cases per 100,000) followed by those 35–44-years old (0.8 cases per

[1]www.publichealth.lacounty.gov/acd/Diseases/Vibrio.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/Vibriosis.aspx
[3]www.cdc.gov/vibrio/index.html

100,000) (**Table 1**. Data for **Table 1** is available online.[4]).

- Comparing race/ethnicity, the greatest incidence of vibriosis occurred among Asians (0.6 cases per 100,000) (**Table 1**).
- The highest vibriosis incidence rates were documented within SPA 2 (0.9 per 100,000) and SPA 3 had the second highest incidence of cases (0.5 per 100,000) (**Figure 2**).
- The number of cases peaked in July when water temperatures were warmer (**Figure 3**).

Figure 2. Incidence Rate of Vibriosis by SPA
LAC, 2013–2017

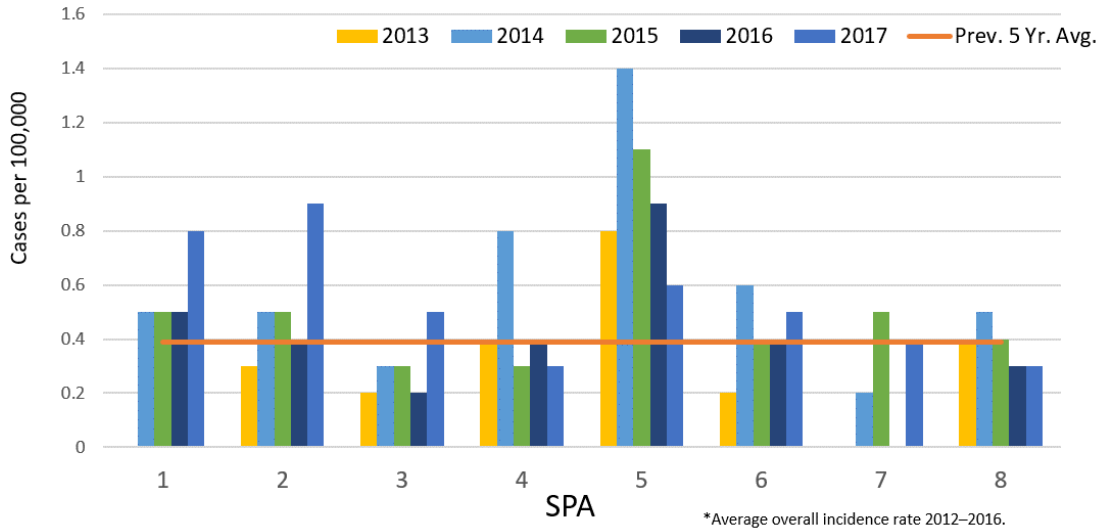
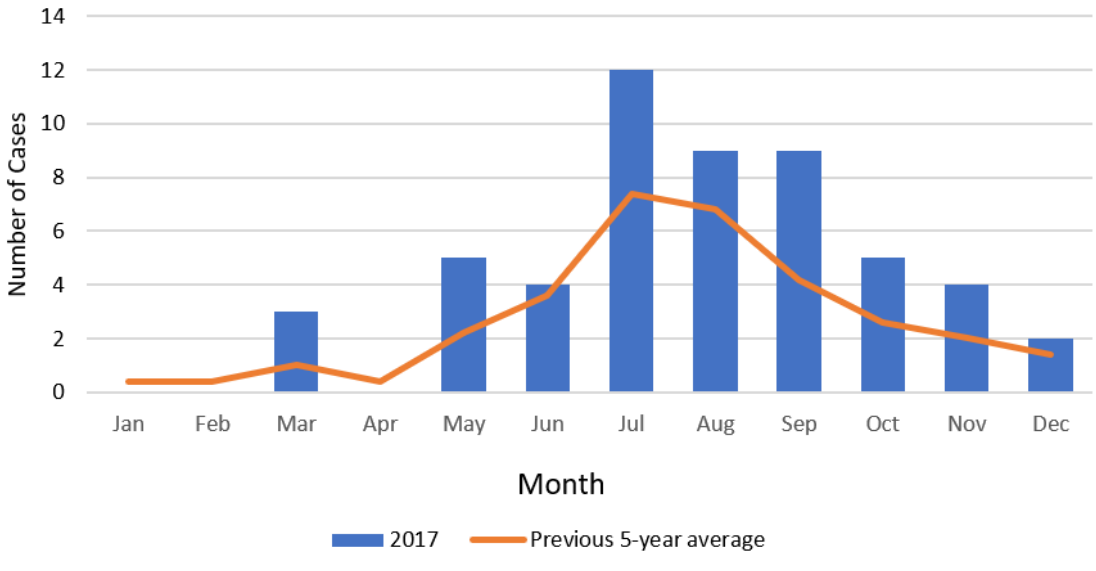


Figure 3. Reported Vibriosis Cases by Month of Onset
LAC, 2017 (N=53)



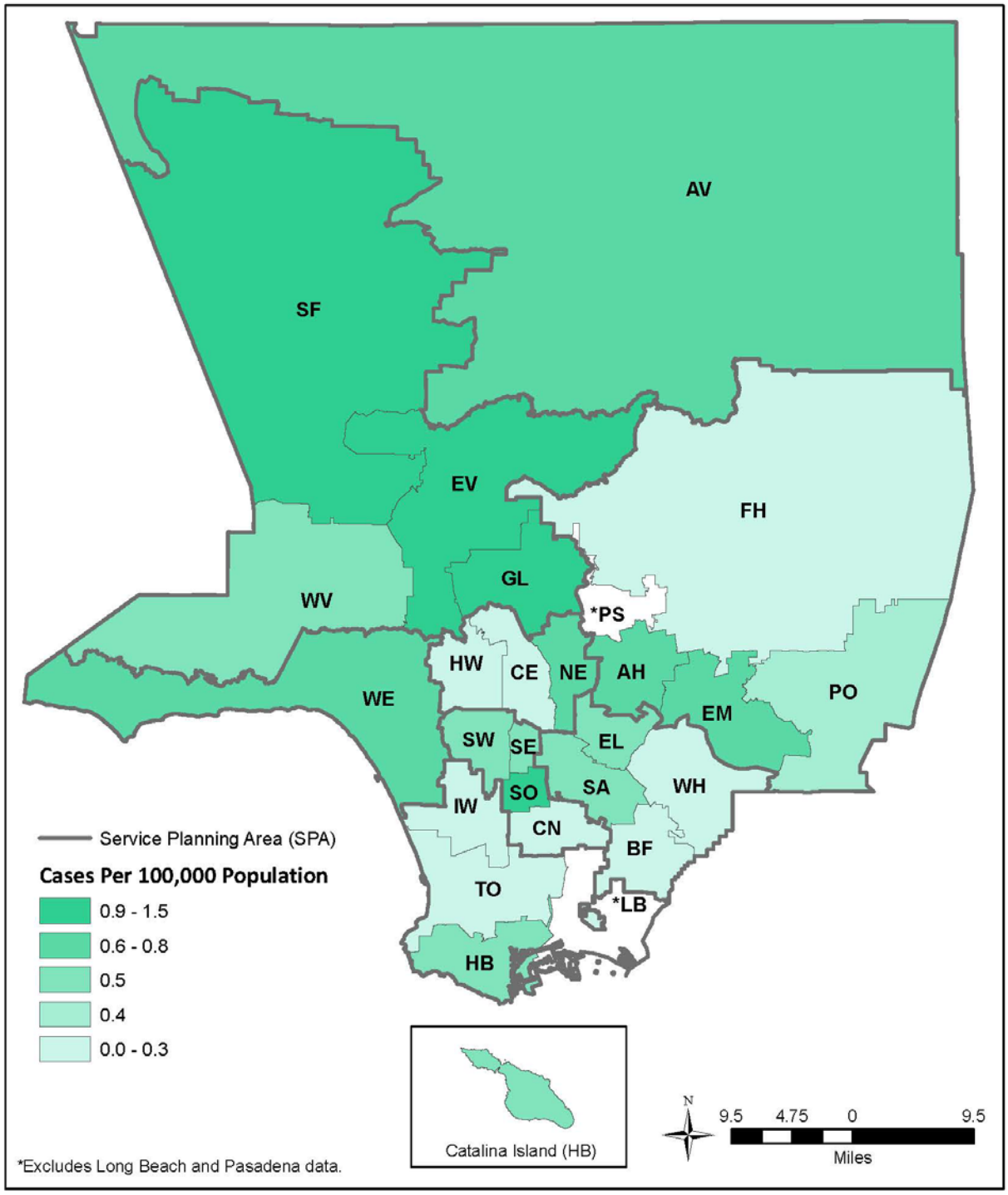
[4]www.publichealth.lacounty.gov/acd/docs/2017Tables/Vibriosis.xlsx

Table 1. Reported Vibriosis Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**26**	**100.0**	**0.28**	**52**	**100.0**	**0.55**	**43**	**100.0**	**0.45**	**33**	**100.0**	**0.34**	**53**	**100.0**	**0.55**
Age Group															
<1	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
1–4	0	–	–	0	–	–	0	–	–	1	3.0	–	0	–	–
5–14	3	11.5	–	2	3.8	–	1	2.3	–	2	6.1	–	0	–	–
15–34	4	15.4	–	18	34.6	0.6	18	41.9	0.6	6	18.2	0.2	17	32.0	0.6
35–44	7	26.9	0.5	13	25.0	1.0	7	16.3	0.5	5	15.2	–	10	18.9	0.8
45–54	6	23.1	0.5	6	11.5	0.5	6	14.0	0.5	9	27.3	0.7	8	26.7	0.6
55–64	2	7.7	–	7	13.5	0.7	4	9.3	–	7	21.2	0.6	5	15.1	–
65+	4	15.4	–	6	11.5	0.5	7	16.3	0.6	3	9.0	–	13	24.5	1.0
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Asian	3	11.5	–	4	7.7	–	2	4.7	–	2	6.1	–	9	17.0	0.6
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	0	–	–
Black	0	–	–	3	5.8	–	1	2.3	–	0	–	–	4	7.5	–
Hispanic	6	23.1	0.1	16	30.8	0.3	8	18.6	0.2	9	27.3	0.2	19	35.8	0.4
White	15	57.7	0.6	12	23.1	0.5	14	32.6	0.5	8	24.2	0.3	14	26.4	0.5
AI/AN‖	0	–	–	0	–	–	1	2.3	–	2	6.1	–	0	–	–
Other	2	7.7	–	17	32.7	–	17	39.5	–	12	36.3	–	7	13.2	–
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
SPA															
1	0	–	–	2	3.8	–	2	4.7	–	2	6.1	–	3	5.7	–
2	7	26.9	0.3	11	21.2	0.5	11	25.6	0.5	9	27.3	0.4	21	39.6	0.9
3	3	11.5	–	5	9.6	–	5	11.6	–	4	12.1	–	8	15.1	0.5
4	5	19.2	–	9	17.3	0.8	4	9.3	–	5	15.2	–	4	7.5	–
5	5	19.2	–	9	17.3	1.4	7	16.3	1.1	6	18.2	0.9	4	7.5	–
6	2	7.7	–	6	11.5	0.6	4	9.3	–	4	12.1	–	5	9.4	–
7	0	–	–	3	5.8	–	6	14.0	0.5	0	–	–	5	9.4	–
8	4	15.4	–	5	9.6	–	4	9.3	–	3	9.0	–	3	5.7	–
Unknown	0	–	–	2	3.8	–	0	–	–	0	–	–	0	–	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
‖ American Indian or Alaskan Native.

Map 16. Vibriosis
Rates by Health District, Los Angeles County, 2017*



WEST NILE VIRUS

SUMMARY DATA	
Number of Cases*	268
Annual Incidence†	
LA County*	2.8
California*,†,‡	0.7
United States*,†,‡	0.4
Age at Diagnosis	
Mean	59
Median	62
Range	7–96 years

* Includes asymptomatic infections
† Cases per 100,000 population. CA and US rates do not include asymptomatic infections
‡ CDC. Notional Notifiable Infectious Diseases and Conditions: Unites States 2017

DESCRIPTION

West Nile Virus[1] (WNV) is a disease caused by a virus that is spread to people by the bite of an infected mosquito. Mosquitoes become infected when they feed on infected birds. While most people infected with WNV do not develop symptoms, symptoms can include fever, headache, body aches, joint pains, vomiting, diarrhea, or rash. Most people with mild WNV disease recover completely, but fatigue and weakness can last for weeks or months. A few people develop a severe illness affecting the central nervous system such as encephalitis or meningitis. Symptoms of severe illness include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness, and paralysis.

Severe illness can occur in people of any age, but those 60-years and older are at greater risk. People with certain medical conditions such as cancer, diabetes, hypertension, kidney disease, and people who have received organ transplants are also at greater risk. Recovery from severe illness might take several weeks or months and some effects to the central nervous system might be permanent. Some with severe illness affecting the central nervous system die.

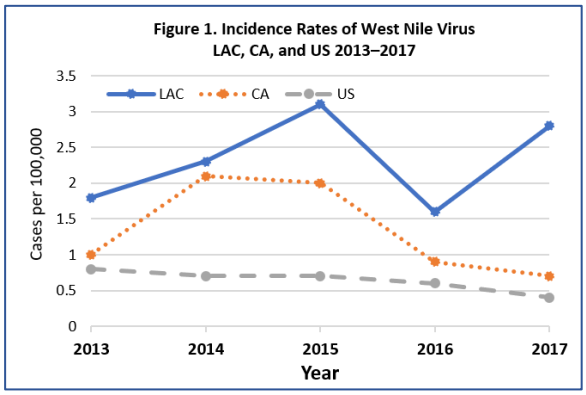
There is no vaccine or specific antiviral treatments for WNV infection. Over-the-counter pain relievers can be used to relieve some symptoms. Severe cases often need to be hospitalized to receive supportive treatment. The incubation period for WNV disease is typically 2 to 6 days but ranges from 2 to 14 days and can be several weeks in immunocompromised people. Avoiding mosquito bites is central to preventing infection.

WNV disease is a nationally-notifiable condition. Most cases are reported to public health authorities from public health or commercial laboratories. Healthcare providers also submit reports of suspected cases. State and local health departments are responsible for ensuring that reported human disease cases meet the national case definitions. All identified WNV disease cases and presumptive viremic blood donors should be investigated promptly. Jurisdictions may choose to interview the patient's health care provider, the patient, or both depending on information needs and resources.

For more information visit:
- LAC DPH[1]
- CDPH[2]
- CDC[3]

2017 TRENDS AND HIGHLIGHTS

- This year, the WNV disease incidence rate decreased in LAC from 3.13 cases per 100,000 in 2016 to 2.78 cases per 100,000 (**Figure 1**).



[1]www.publichealth.lacounty.gov/acd/VectorWestNile.htm
[2]www.cdph.ca.gov/Programs/CID/DCDC/Pages/WestNileVirus.aspx
[3]www.cdc.gov/westnile/

- The greatest incidence of WNV was among the 65+ age group (9.2 cases per 100,000) followed by those 55–64-years old (5.1 cases per 100,000) (**Table 1**. Data for **Table 1** is available online.[4]).
- Comparing race/ethnicity, the greatest incidence of WNV occurred among Whites (5.3 cases per 100,000) (**Table 1**).
- The highest WNV incidence rates were documented within SPA 4 (4.2 per 100,000) and SPA 2 had the second highest incidence of cases (4.1 per 100,000) (**Figure 2**).
- The number of cases peaked in September (**Figure 3**).

Figure 2. Incidence Rate of West Nile Virus Cases by SPA
LAC, 2013–2017

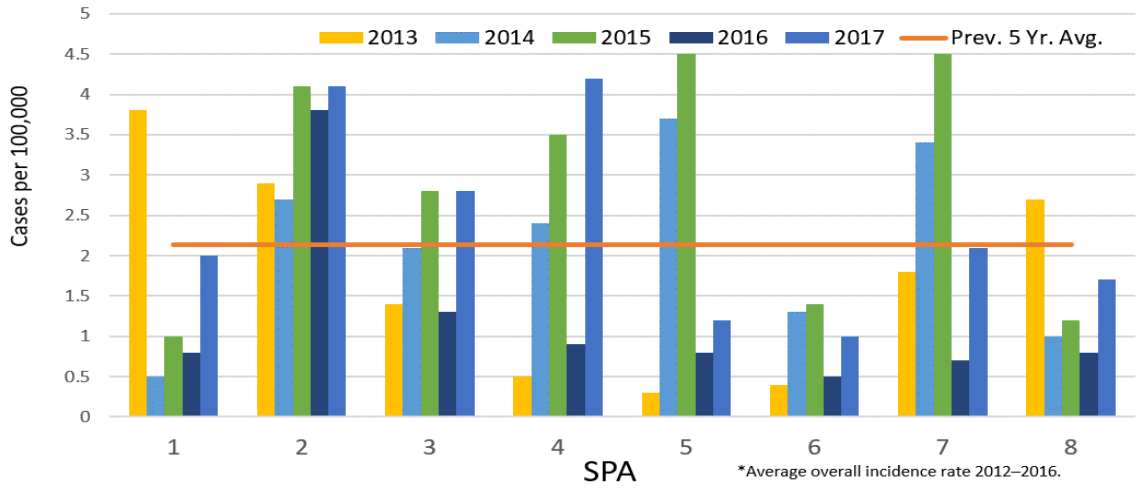
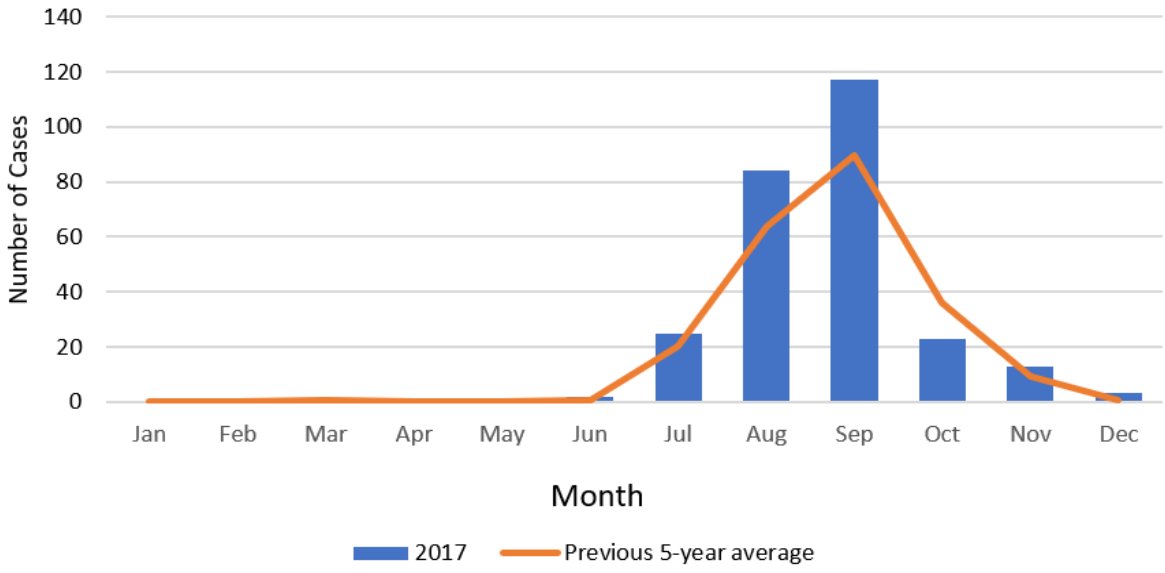


Figure 3. Reported West Nile Virus Cases by Month of Onset
LAC, 2017 (N=268)



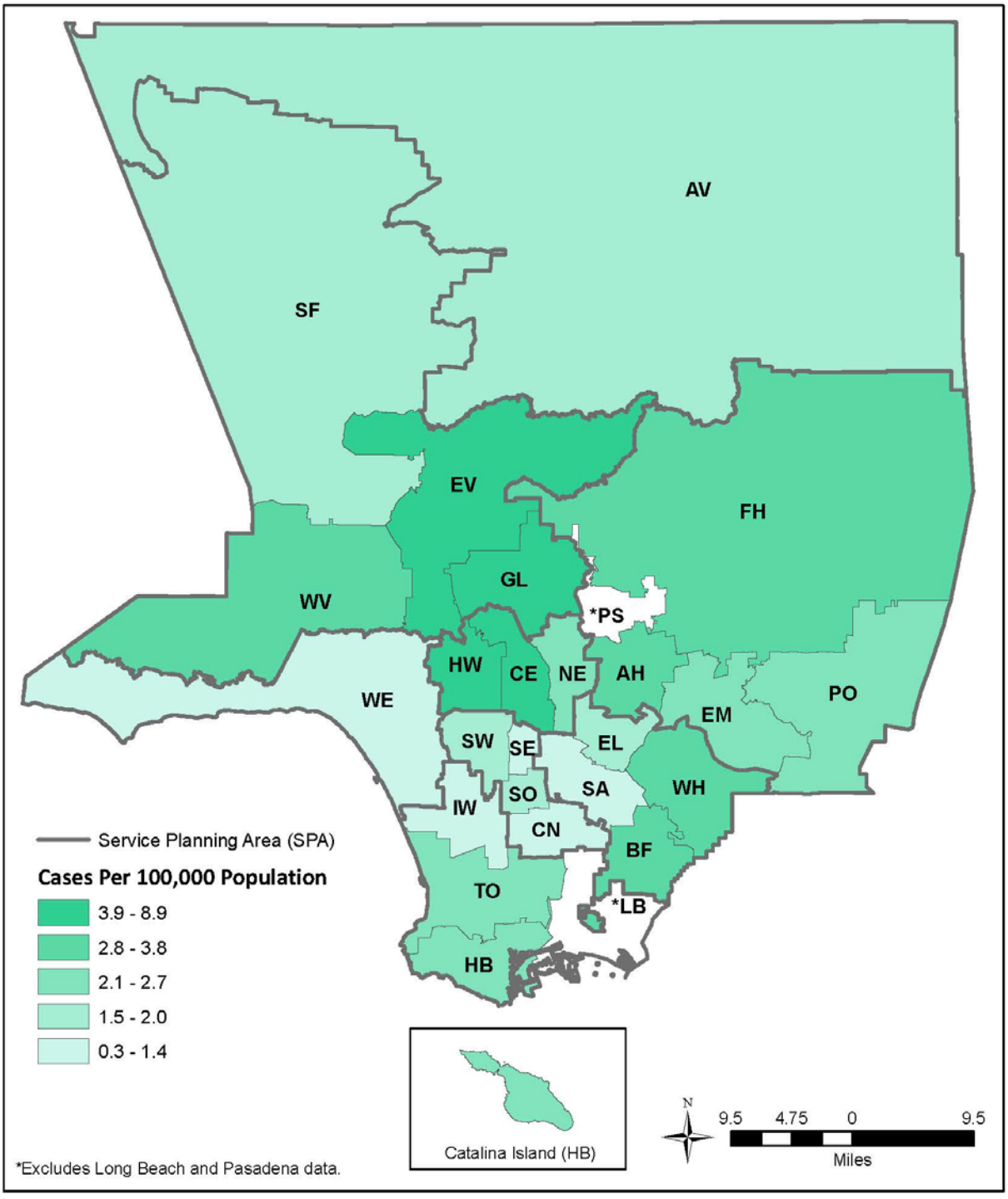
[4]www.publichealth.lacounty.gov/acd/docs/2017Tables/WNV.xlsx

Table 1. Reported West Nile Virus Cases* and Rates† per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2013–2017

	2013			2014			2015			2016			2017		
	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†	No.	%	Rate†
Year-End Total	**165**	**100.0**	**1.75**	**218**	**100.0**	**2.31**	**300**	**100.0**	**3.13**	**153**	**100.0**	**1.59**	**268**	**100.0**	**2.78**
Age Group															
<1	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
1–4	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
5–14	6	3.6	0.5	0	–	–	3	1.0	–	0	–	–	4	1.5	–
15–34	19	11.5	0.7	23	10.6	0.8	34	11.3	1.2	13	8.5	0.5	28	10.4	1.0
35–44	15	9.1	1.1	15	6.9	1.1	28	9.3	2.1	14	9.2	1.1	21	7.8	1.6
45–54	34	20.6	2.6	44	20.2	3.4	41	13.7	3.1	26	17.0	2.0	41	15.3	3.1
55–64	46	27.9	4.5	55	25.2	5.2	53	17.7	4.8	29	19.0	2.6	60	22.4	5.1
65+	45	27.3	4.1	81	37.2	7.2	141	47.0	11.8	71	46.4	5.8	114	42.5	9.2
Unknown	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
Race/Ethnicity‡															
Asian	6	3.6	0.4	11	5.0	0.8	7	2.3	0.5	8	5.2	0.6	10	4.0	0.7
NH/OPI§	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–
Black	3	1.8	–	3	1.4	–	5	1.7	–	2	1.3	–	6	2.2	0.8
Hispanic	50	30.3	1.1	73	33.5	1.6	110	36.7	2.3	40	26.1	0.8	97	36.2	2.0
White	80	48.5	3.0	97	44.5	3.6	142	47.3	5.3	77	50.3	2.9	141	53.0	5.3
AI/AN|	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–	N/A	–	–
Other	2	1.2	–	0	–	–	1	0.3	–	3	2.0	–	8	3.0	0.1
Unknown	24	14.5	–	34	15.6	–	35	11.7	–	23	15.0	–	6	2.2	0.1
SPA															
1	15	9.1	3.8	2	0.9	–	4	1.3	–	3	2.0	–	8	3.0	2.0
2	62	37.6	2.9	60	27.5	2.7	92	30.7	4.1	86	56.2	3.8	93	34.7	4.1
3	23	13.9	1.4	34	15.6	2.1	46	15.3	2.8	22	14.4	1.3	47	17.5	2.8
4	6	3.6	0.5	28	12.8	2.4	41	13.7	3.5	11	7.2	0.9	50	18.7	4.2
5	2	1.2	–	24	11.0	3.7	30	10.0	4.5	5	3.3	–	8	3.0	1.2
6	4	2.4	–	13	6.0	1.3	15	5.0	1.4	5	3.3	–	11	4.1	1.0
7	24	14.5	1.8	45	20.6	3.4	59	19.7	4.5	9	6.0	0.7	28	10.4	2.1
8	29	17.6	2.7	11	5.0	1.0	13	4.3	1.2	9	6.0	0.8	19	7.1	1.7
Unknown	0	–	–	1	0.5	–	0	–	–	3	2.0	–	0	–	–

* Data is suppressed for 5 or fewer cases.
† Rate calculations based on less than 19 cases or events are considered unreliable.
‡ Race/ethnicity categorization changed for 2017. See Overview.
§ Native Hawaiian or Other Pacific Islander. From 2013–2016, included within the category of Asian. For 2017, this category is provided separately.
| American Indian or Alaskan Native.

Map 17. West Nile Virus
Rates by Health District, Los Angeles County, 2017*



Disease Outbreak Summaries

FOODBORNE ILLNESS OUTBREAKS 2017

DESCRIPTION

Foodborne illness outbreaks are caused by a variety of bacterial, viral, parasitic pathogens, and toxic substances. To be considered a foodborne illness outbreak, both the California Department of Public Health (CDPH) and the Centers for Disease Control and Prevention (CDC) require the occurrence of two or more cases of a similar illness resulting from the ingestion of a common food.[1]

The surveillance system used by LAC DPH for detection of foodborne illness outbreaks typically begins with a Foodborne Illness Report (FBIR). FBIRs can be submitted by calling the LAC DPH Communicable Disease Reporting System Hotline (888-397-3993) or via the internet[1]. The FBIR system monitors complaints from residents, illness reports associated with commercial food facilities, and foodborne exposures uncovered during disease-specific case investigations such as salmonellosis, shigellosis, and toxigenic *E. coli* including shiga toxin-producing *E. coli* (STEC). LAC Environmental Health Service's (EHS) Wholesale Food and Safety Program (WFS) investigates each FBIR by contacting the reporting individual and assessing the public health importance and need for expanded follow-up. When warranted, a thorough inspection of the facility is conducted. This public health action is often sufficient to prevent additional foodborne illnesses.

ACDC's Food Safety Unit also reviews all FBIRs. Joint investigations are conducted on possible foodborne illness outbreaks of public health importance. Typically, an epidemiologic investigation will be initiated when there are illnesses in multiple households, multiple reports against the same establishment in a short period of time, or there are ill individuals who attended a large event with the potential for others to become ill. The objective of each investigation is to determine the extent of the outbreak, identify a food vehicle or processing error, determine the agent of infection, and take actions to protect the public's health.

RESULTS

A total of 2,348 FBIRs were received in 2017, which is a 14.2% increase in reports compared to the 2,056 FBIRs received in 2016. Public reporting via the web accounted for 54% of FBIRs this year. WFS contacted each person making the FBIR complaint. Nineteen percent of FBIR reports were deemed high priority and therefore inspected by a WFS inspector. The majority (66%) of the complaints were referred to district EHS offices for inspection, and 7% were referred to other EHS specialty programs (Vehicle Inspection, Street Vending Compliance, Drinking Water, etc.), other LAC departments (Department of Weights and Measures), or agencies outside LAC (other local health jurisdictions, state agencies, federal agencies). There were 217 FBIRs (9%) on which WFS did not take action or were duplicates.

The ACDC Food Safety Unit conducted 29 outbreak investigations this year. Of these, 27 outbreaks were initiated by FBIR complaints, and 2 were initiated through other surveillance activities. Of the 29 investigations, 3 (10%) were not considered to be foodborne because the evidence collected during the investigation did not support a foodborne source (Data not shown). These outbreaks were due to norovirus, which can easily be spread person-to-person in a food setting if one guest is sick when attending. Another reason for these investigations not being considered to be a foodborne illness outbreak were because the illness patterns (epidemic curve) were consistent with person-to-person spread rather than point source infection. Determining whether a food item was the source in such outbreaks can be challenging as well as time and resource consuming.

The 26 foodborne illness outbreaks are listed in Table 1 and summarized below. These foodborne illness outbreaks represent 292 cases of foodborne illness

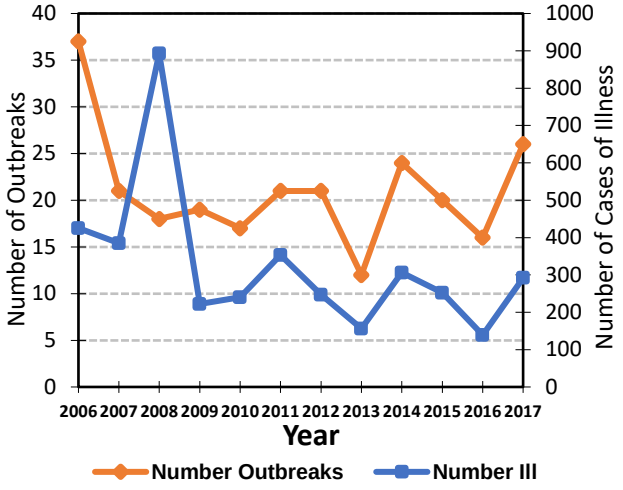
[1]www.visualcmr.net/webvcmr/pages/public/pub_FBI_Report.aspx

(Figure 1), 1 hospitalization, and no deaths. Outbreaks occurred throughout the year (Figure 2).

FOODBORNE ILLNESS OUTBREAK: ETIOLOGY

Cooked food items Of the eight outbreaks where a food item was found to be associated with illness, two involved a food item that contained primarily cooked ingredients. One of these (Outbreak 266) was a confimed *Campylobacter jejuni* outbreak. The implicated food item was undercooked chicken liver. The second (Outbreak 308) was a confirmed salmonella outbreak. The implicated food item, mango sticky rice, included cooked rice and raw mangoes. Although mangoes have been a cause of salmonellosis outbreaks, the serotype found in outbreak 308 has been more commonly associated with reptiles. It is possible that a food handler owns or had handled a reptile before showing up to work (Figure 1).

Figure 1. Foodborne Illness Outbreaks Number of Persons Affected, LAC, 2006–2017

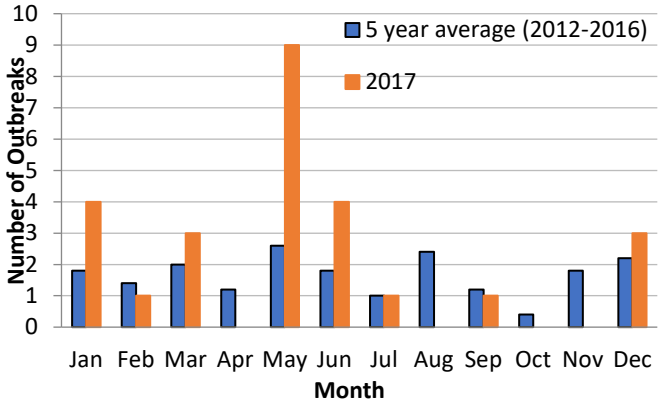


Uncooked food items

The other six outbreaks in which a food item was identified involved uncooked food items (Outbreaks 25, 92, 228, 248, 273, and 434). In four of these, the etiologic agent was caused by norovirus. This was confirmed in two (Outbreaks 92 and 434). The implicated food items were raw oysters (Outbreaks 228 and 434), fruit (Outbreak 92), and vegetable salad (Outbreak 273). For outbreaks 228 and 434, the oysters appeared to have been contaminated prior to retail. The mode of contamination is less clear with outbreaks 92 and 273. The most likely explanation is that a foodhandler contaminated the fruit and salads during preparation.

Another outbreak involving uncooked food items was outbreak 25. This outbreak was caused by intoxication due to ciguatera fish poisoning where the case ate raw mackerel at a sushi restaurant. The final outbreak involving uncooked food was outbreak 248. This was a confirmed outbreak of *Campylobacter jejuni*. Two events used the same caterer during the same weekend. The health inspector found multiple violations. It is most likely that the guacamole implicated in this outbreak was cross-contaminated during the food preparation.

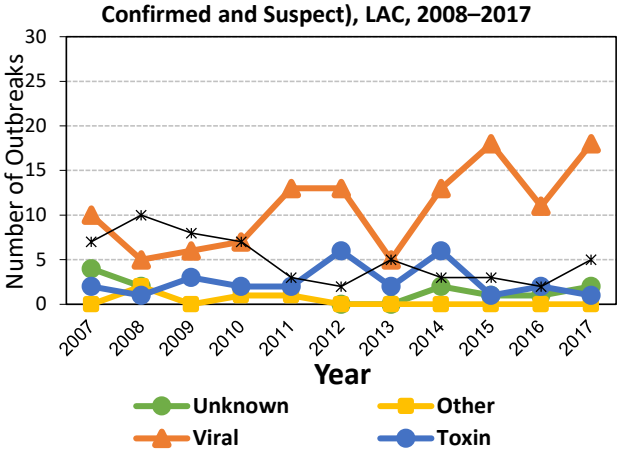
Figure 2. Number of Foodborne Illness Outbreak Investigations by Month of Onset, 5-Year Average, 2017



FOODBORNE AGENTS

An etiological agent was identified in 24 of the 26 outbreak investigations this year and confirmed in 38% (n=10) (Table 1). A viral agent was responsible for 18 outbreaks, bacterial agents for 5 outbreaks, and fish toxins for 1 outbreak (Figure 3).

Figure 3. Foodborne Illness Outbreaks by Etiologic Agent Category (Laboratory-Confirmed and Suspect), LAC, 2008–2017



NOROVIRUS OUTBREAKS

Norovirus was confirmed or suspected in 18 foodborne illness outbreaks this year (69%), which is the same proportion observed in 2016. The number of outbreaks is on the high end than for the past 10 years (range: 5-18).

There was one large, laboratory-confirmed foodborne norovirus outbreak this year. This outbreak (Outbreak 92) involved a hotel that sponsored a college-level sporting competition occurring over four days. The incubation times were consistent with a point-source outbreak, and fruit was significantly associated with illness. Four of seven cases tested were positive for norovirus.

BACTERIAL OUTBREAKS

Salmonella was confirmed in two outbreaks this year (Outbreaks 171 and 256). The first salmonellosis outbreak (Outbreak 171) was caused by *S.* Newport and occurred in persons eating at a restaurant that serves Chinese-style food. A total of five confirmed cases ate at the restaurant during the same time period. Two restaurant employees tested positive for *S.* Newport. However, it is unclear whether those employees are the source or are part of the outbreak. Unfortunately, no common food item was identified.

The second salmonellosis outbreak was due to *S.* Enteriditis. This outbreak occurred in employees of the same restaurant. No other employees were ill or tested positive for *S.* Enteriditis and no patrons reported illness after eating at this restaurant. No food item was implicated.

There were two outbreaks due to *Campylobacter jejuni*. Both were confirmed. In the first *C. jejuni* outbreak, the implicated food was guacamole. The guacamole was probably cross-contaminted as the caterer was cited for many violations upon its inspection. The second *C. jejuni* was caused by undercooked chicken liver. Per the chef, this preparation of chicken liver should not be served fully cooked.

OTHER FOODBORNE ILLNESS OUTBREAKS

There was one outbreak in which a fish toxin (Ciguatera) was identified as the likely etiology (Outbreak 25). In this outbreak three cases ate together at a sushi restaurant. The implicated food source was raw mackerel.

OUTBREAK LOCATIONS

Exposure locations for reported foodborne illness outbreaks included restaurants (16), hotels (4), banquet halls (2), schools (2), private homes (1), and an office. This year SPA 5 reported the largest number of outbreaks (27%) (Table 2). This is a change from SPA 2 reporting the largest proportion of foodborne illness outbreaks since 2010, except in 2014 and 2016.

STATE AND NATIONAL INVESTIGATIONS INVOLVING LAC

ACDC staff assisted state and federal investigators with 63 *Salmonella*, 5 STEC, and 1 *Listeria* cluster investigations that required additional investigation such as specialized interviews, product traceback, and extra laboratory testing.

Table 1. Foodborne Outbreak Investigation 2017 (N=26)

	Agent	Laboratory Confirmed*	OB#	Setting	# Cases	HD	Food Implicated
1	Ciguatera Fish Toxin	No	25	Restaurant	3	WEST	mackerel
2	Norovirus	Yes	30	Hotel	7	TORRANCE	none
3	Norovirus	No	37	Hotel	15	CENTRAL	none
4	Unknown	No	51	Restaurant	2	BELLFLOWER	none
5	Norovirus	Yes	92	Hotel	30	ALHAMBRA	fruit
6	Norovirus	Yes	151	Restaurant	8	WEST VALLEY	none
7	Norovirus	No	160	Restaurant	4	WEST	none
8	*Salmonella newport*	Yes	171	Restaurant	5	ALHAMBRA	none
9	Norovirus	Yes	202	School	19	WEST VALLEY	none
10	Norovirus	No	211	Private Home	12	BELLFLOWER	none
11	Norovirus	No	218	Hotel	8	WEST VALLEY	none
12	Norovirus	No	228	Banquet Hall	3	WHITTIER	oysters
13	Norovirus	No	231	Banquet Hall	29	WEST	none
14	Norovirus	No	238	Restaurant	6	WEST	none
15	Norovirus	No	242	Restaurant	3	SAN FERNANDO	none
16	Norovirus GII	No	246	Restaurant	5	MONROVIA/ FOOTHILL	none
17	*Campylobacter jejuni*	Yes	248	School	33	SAN FERNANDO	guacamole
18	*Salmonella enteriditis*	Yes	256	Restaurant	3	HOLLYWOOD/ WILSHIRE	none
19	Norovirus	No	258	Restaurant	9	WEST	none
20	*Campylobacter jejuni*	No	266	Restaurant	6	WEST	chicken liver
21	Norovirus	No	273	Office	27	CENTRAL	veggie salad
22	UNKNOWN	No	281	Restaurant	2	CENTRAL	none
23	*Salmonella* serotype IIb	Yes	308	Restaurant	19	WEST VALLEY	mango sticky rice
24	Norovirus GII	Yes	434	Restaurant	5	WEST	oysters
25	Norovirus	Yes	472	Restaurant	23	HOLLYWOOD/ WILSHIRE	none
26	Norovirus	No	2018-009	Restaurant	6	ANTELOPE VALLEY	none

*Etiology of the outbreak was confirmed with two or more patrons having positive laboratory results for the infectious agent.

Table 2. Frequency of Foodborne Illness Outbreaks by Service Planning Area or Location, LAC, 2017 (N=26)		
SPA	**Frequency**	**Percent**
1	1	4%
2	6	23%
3	3	12%
4	5	19%
5	7	26%
6	0	0%
7	3	12%
8	1	4%

ADDITIONAL RESOURCES

LAC Resources

- Communicable Disease Reporting System
  Hotline: (888) 397-3993
  Fax: (888) 397-3779

- For reporting and infection control procedures consult the LAC DPH ACDC website:
  www.publichealth.lacounty.gov/acd/index.htm

CDC

- Division of Foodborne, Waterborne, and Environmental Diseases (DFWED) www.cdc.gov/ncezid/dfwed/

- Outbreak Response and Surveillance Team
  www.cdc.gov/foodsafety/outbreaks/index.html

- FoodNet
  www.cdc.gov/foodnet

- Norovirus Information
  www.cdc.gov/norovirus/index.html

Other National Agencies

- FDA Center for Food Safety and Applied Nutrition
  www.fda.gov/AboutFDA/CentersOffices/OfficeofFoods/CFSAN/

- Gateway to Government Food Safety Information
  www.FoodSafety.gov

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1. Centers for Disease Control and Prevention. Surveillance for foodborne disease outbreaks - United States, 2006. *MMWR.* 2009;58(22):609-615.
2. Food and Drug Administration. Bad Bug Book, Foodborne Pathogenic Microorganisms and Natural Toxins. Second Edition. [*Bacillus cereus* and other *Bacillus* species, pp 96-99]. 2012. Accessible online at: www.fda.gov/downloads/Food/FoodborneIllnessContaminants/UCM297627.pdf

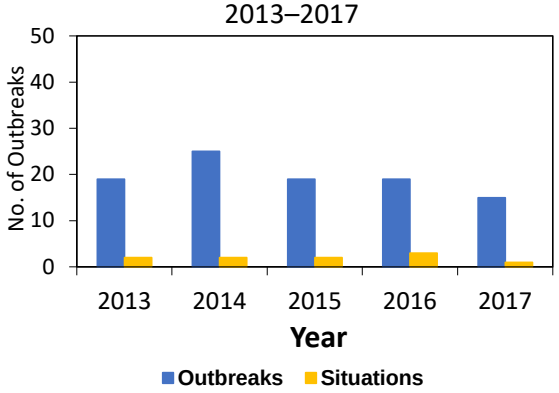
HEALTHCARE-ASSOCIATED OUTBREAKS
GENERAL ACUTE CARE HOSPITALS

DEFINITION

This chapter will discuss healthcare-associated outbreaks and situation events that occurred within the general acute care hospital setting on any patient unit, sub-acute, or specialty area within the facility (surgical suites or procedure rooms). An outbreak in such settings is defined as a cluster of infections or colonizations related in time and place or occurring above a baseline or threshold level for a defined area of a facility, including the entire facility, specific unit, or ward. Baseline is relative to what is normally observed in a particular setting.

A situation event is defined as a cluster of infections or colonizations in the setting of a general acute care hospital that may not clearly meet all outbreak criteria defined above or that requires additional information to determine if an outbreak has occurred (**Figure 1**).

Figure 1. General Acute Care Hospital Outbreaks and Situation Events, LAC 2013–2017



ABSTRACT

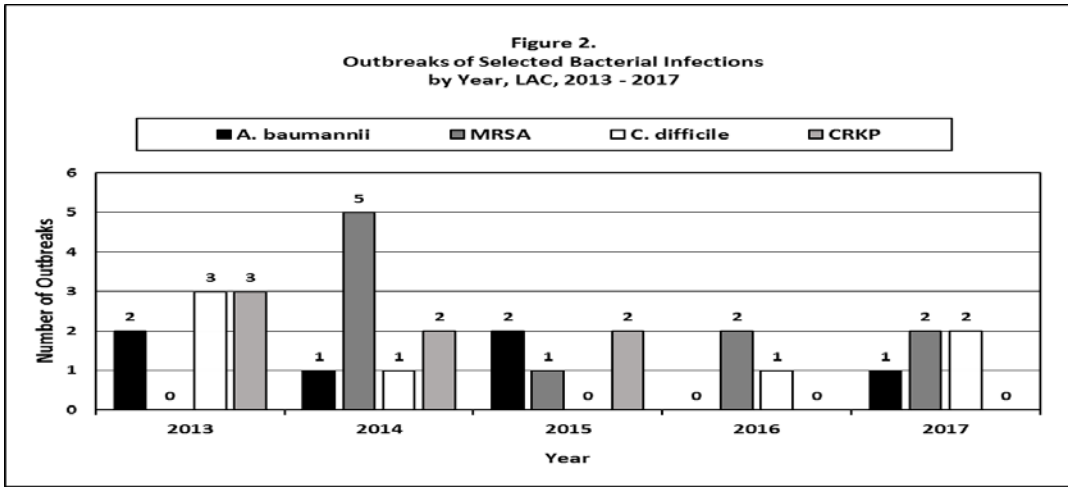
There were 15 confirmed outbreaks reported in acute care hospitals in 2017 (**Table 1**). Most (n= 10, 66.7%) occurred in a unit providing intensive or focused specialized care (long-term acute care, oncology, cardiology, and neonatal intensive care unit (NICU)). Two-thirds of acute care hospital outbreaks (n=12, 80.0%) were of bacterial etiology, often from a multi-drug-resistant organism (MDRO) (**Table 2, Figure 2**). Scabies accounted for the greatest number of outbreaks (n=3) followed by *Burkholderia cepacia* (n=2), *Clostridium difficile* (n=2), legionellosis (n=2) and MRSA (n=2). One situation event was investigated in acute care hospitals in 2017.

Table 1. General Acute Care Hospital Outbreaks by Unit, LAC, 2017 (N=17)

Outbreak Location	No. of Outbreaks
Bone Marrow Transplant/ Oncology	1
Critical Care	1
Emergency Room	1
Intensive Care – Adult	2
Intensive Care- Neonatal	4
Long-term Acute Care	2
Multiple Units	2
Sub-acute Unit	1
Telemetry	1
Total	**15**

Table 2. General Acute Care Hospital Outbreaks by Disease/Condition/Etiologic Agent, LAC, 2017

Disease/Condition/ Etiologic Agent	No. of Outbreaks	No. of Cases
Acinetobacter	1	8
Burkholderia cepacia	2	4
Clostridium difficile	2	9
Elizabethkingia anophelis	1	19
Legionellosis	2	8
Pseudomonas aeruginosa	1	6
Staphylococcus aureus	1	3
Methicillin-Resistant Staphylococcus aureus	2	20
Scabies	3	19
Total	**15**	**96**



COMMENTS

In 2017, four outbreaks occurred in the NICU. Three were caused by an MDRO, including MRSA (n=2) and *Pseudomonas aeruginosa* (n=1). Neonates in the NICU are uniquely vulnerable to colonization and infection with pathogens such as emerging multi-drug-resistant pathogens due to their immature immune system.[1] Infections among neonates continues to be a significant cause of morbidity and mortality, thus continued improvement and adherence to infection control practices is needed to increase patient safety.

Elizabethkingia anophelis (E. anophelis) was identified among 19 ventilator-dependent patients of a subacute long-term care unit, including 4 infected and 15 colonized patients. Multiple on-site investigations conducted by ACDC revealed significant lapses in infection control practices including insufficient reprocessing of reusable ventilator parts, cleaning and storage of ventilator machine, and hand hygiene during tracheostomy care. Test results of the water samples and swabs collected by ACDC did not identify Elizabethkingia but found a high burden of other pathogenic bacteria including *Pseudomonas*, *Acinetobacter*, and *Stenotrophomonas*. Research shows that Elizabethkingia is difficult to culture from the environment, however the high number of other bacteria likely further limited the recovery of the *E. anophelis* from the facility's water supply. Whole genome sequencing (WGS) performed by the CDC on nine available clinical isolates revealed that eight of the isolates strongly suggested a common source.

There were five reported waterborne pathogen outbreaks in acute care hospitals in 2017, including Acinetobacter (n=1), *E. anophelis* (n=1), legionellosis (n=2), and *Pseudomonas aeruginosa* (n=1). Patients with underlying conditions, immunosuppression, and the presence of invasive devices are at risk of waterborne infections, that may cause significant morbidity and mortality, due to several possible transmission pathways and sources of contamination of the water supply in a hospital.[2] It is better to prevent than to remediate the water supply of healthcare facilities, with adherence to optimal healthcare hygiene practices to decrease the risk of introducing waterborne pathogens to patients. [2] On June 2, 2017 the Centers for Medicare and Medicaid Services (CMS) released a policy memorandum mandating the development and adherence to water management policies and procedures that inhibit microbial growth in building water systems that reduce the risk of growth and spread of *Legionella* and other opportunistic pathogens in water.[3]

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2. Decker, B, Palmore, Tara. Hospital water and opportunities for infection prevention, 2014: vol. 16(10). Available at www.ncbi.nlm.nih.gov/pmc/articles/PMC5583638/
3. Center for Clinical Standards and Quality/Quality, Safety and Oversight Group. REVISED 07.06.2018. Ref: QSO-17-30-Hospitals/CAHs/NHs Available at CMS.GOV - Center for Medicare and Medicaid Services. Accessed November 19, 2018

HEALTHCARE-ASSOCIATED OUTBREAKS
SUB-ACUTE CARE FACILITIES

DEFINITION

Healthcare-associated outbreaks are defined as clusters of infections in healthcare settings that are related in time and place or occur above a baseline or threshold level for a facility, specific unit, or ward. Baseline is defined as what is normally observed in that specific setting.

Sub-acute care facilities include skilled nursing facilities (SNFs), intermediate care facilities, and psychiatric care facilities. SNFs provide continuous skilled nursing care and supportive care to patients whose primary need is for availability of expert nursing on an extended basis. Intermediate care facilities also provide inpatient care to patients who have need for adept nursing supervision and need supportive care, but who do not require continuous nursing care. Psychiatric care facilities provide 24-hour inpatient care for patients with psychiatric care needs.

ABSTRACT

- The total number of all confirmed sub-acute care associated outbreaks in 2017 increased by 37% (from 91 to 125 outbreaks) from the previous year.
- In 2017, the number of SNF-specific outbreaks reported in LAC increased by 43% (from 84 to 120 outbreaks) from the previous year (Table 1).

Table 1.
Number of Reported Outbreaks in Sub-Acute Healthcare Facilities
LAC, 2013–2017

	YEAR				
	2013	2014	2015	2016	2017
Intermediate Care Facilities	1	3	1	3	0
Psychiatric Care Facilities	1	0	1	4	5
Skilled Nursing Facilities	96	82	94	84	120
TOTAL	**98**	**85**	**96**	**91**	**125**

Intermediate Care Facilities (N=0): No outbreaks were reported by intermediate care facilities in 2017.

Psychiatric Care Facilities (N=5): During 2017, five outbreaks were reported by psychiatric care facilities. This included: two outbreaks of gastrointestinal illness, one influenza outbreak with five cases, one hepatitis A outbreak, and one head lice outbreak.

Skilled Nursing Facilities (N=120): A total of 120 SNF outbreaks were confirmed during 2017. Respiratory illness outbreaks were the most frequently reported and confirmed outbreak category, with 58 (46%) outbreaks affecting 1,186 cases. Rash illness outbreaks were the next most frequently confirmed with 34 (27%) outbreaks affecting 243 cases. Gastroenteritis Illness outbreaks were the third most frequently confirmed with 29 (23%) outbreaks affecting 587 cases. In 2017, two outbreaks of carbapenem-resistant *Enterobacteriaceae* (CRE) were reported by SNFs with 34 cases.

Table 2.
All Sub-Acute Healthcare Facilities
Outbreaks by Disease/Condition
LAC, 2017 (N=125)

Disease/Condition	No. of Outbreaks	No. of Cases
Gastroenteritis Illness	**(N=29)**	**(N=587)**
Norovirus	15	414
Clostridium difficile	3	13
Unspecified	11	160
Rash Illness	**(N=34)**	**(N=243)**
Atypical Scabies	10	50
Scabies	15	136
Ring worm	1	3
Unknown Rash	8	54
Respiratory Illness	**(N=58)**	**(N=1,186)**
Influenza	54	1117
Rhino Virus	1	16
Legionella	1	5
Unspecified	2	48
Other	**(N=4)**	**(N=55)**
CRE	2	34
Conjunctivitis	1	17
Hepatitis A	1	4
TOTAL	**125**	**2,071**

COMMENTS

In 2017, the total number of confirmed outbreaks within sub-acute care facilities increased by 37%, (from 91 to 125 outbreaks) as compared to the previous year. The majority (120 out of 125, 96%) of these outbreaks were reported from SNFs.

The total number of reported respiratory outbreaks increased by 53% (from 31 to 58 outbreaks) as compared to the previous year. In 2017, influenza A (H3N2) was the predominant viral strain, and this strain is especially likely to result in severe illness among those over 65 years old. Of the 58 outbreaks, 54 (93.2%) were caused by influenza virus, 2 (3.4%) were due to unknown etiologies, 1 (1.7%) was due to Rhino Virus, and 1 (1.7%) was caused by *Legionella*. Respiratory outbreaks were classified as influenza if there was at least one case of laboratory-confirmed influenza in the setting of a cluster of ILI within a 48 to 72-hour period. Service Planning Area (SPA) 3 reported the most number of respiratory illness outbreaks (15, 26%) in 2017, followed by SPA 2 (13, 22%).

The total number of reported rash illness outbreaks decreased by 5% in 2017 compared to 2016 from 36 to 34 outbreaks. Thirty-four rash illness outbreaks were investigated with a total of 243 cases. Of 34 rash illness outbreaks, 10 (29%) outbreaks were atypical scabies, 15 (44%) outbreaks were scabies, 8 (24%) outbreaks were unknown rash, and 1 (3%) outbreak was ring worms. SPA 2 reported the most

number of rash illness outbreaks (12, 35%), followed by SPA 3 (7, 21%).

The total number of reported GE illness outbreaks remained same (from 29 to 29 outbreaks) as compared to the previous year. Twenty-nine GE illness outbreaks were investigated causing 587 cases of outbreak-associated illness. Of the 29 outbreaks, 15 (52%) were caused by laboratory-confirmed norovirus, 11 (38%) unknown GE, and 3 (10%) *Clostridium difficile* outbreak. SPA 3 reported the most GE illness outbreaks of any Los Angeles County Department of Public Health (LAC DPH) SPA since 2008 with 11 (38%). Per the Centers for Disease Control and Prevention (CDC), health care facilities, including nursing homes and hospitals, are the most commonly reported settings for norovirus outbreaks in the US and other industrialized countries. Over half of all norovirus outbreaks reported in the US occur in long-term care facilities. The virus can be introduced into healthcare facilities by infected patients—who may or may not be showing symptoms—or by staff, visitors, or contaminated foods. The duration of outbreaks in these settings can be quite long, sometimes lasting months. Illness can be more severe, occasionally even fatal, in hospitalized or nursing home patients compared with otherwise healthy people [**1**].

Sub-acute facility outbreaks were investigated and documented from all LAC SPAs. The greatest proportion of outbreaks were investigated within SPA 2 with 34 (27%) followed by SPA 3 with 33 (26%).

PREVENTION

Most outbreaks in sub-acute care facilities are caused by agents spread by person-to-person contact. Thus, appropriate hand hygiene practice by staff and residents, and visitors is a crucial infection control measure.

The ACDC's Skilled Nursing Facility (SNF) Outreach Program (OP) continues to engage in collaborations with stakeholders and provide assistance and health education, and develop resources to prevent infections, strengthen outbreak detection and response, and address other acute communicable disease issues in SNFs. The ACDC's SNF OP created SNF webpage "Skilled Nursing Facilities: Infection Prevention Resources and Guidance central guide to education and events relevant to improving infection prevention at your SNF" (http://publichealth.lacounty.gov/acd/SNF.htm) at ACDC's website to provide resources on-line.

As part of influenza prevention efforts, ACDC SNF OP sent an annual reminder letter to SNFs prior to the 2016-2017 influenza season to comply with the Health Officer Order (HOO), issued October 2, 2013, which mandates that healthcare personnel in acute care hospitals, long term care facilities, and intermediate care facilities in LAC be vaccinated against influenza or wear a protective mask. In addition to influenza vaccination for sub-acute facility staff and residents, proper hand washing, administrative controls, utilization of appropriate antiviral treatment and prophylaxis for facility residents and staff, and isolation are essential for prevention of seasonal influenza.

A toolkit for influenza vaccination programs in SNFs (www.publichealth.lacounty.gov/acd/SNFToolKit.htm) and the *Influenza Outbreak Prevention and Control Guidelines for Skilled Nursing Facilities* (www.publichealth.lacounty.gov/acd/InfluenzaOBGuidelines.htm) are available to provide a standardized guidance for CHS when conducting influenza and respiratory outbreak investigations in SNFs, and to provide guidance to SNFs an effective approach to the prevention and control of influenza. The printed guidelines are available and they were distributed to Community Health Services (CHS) Public Health Nurses (PHNs), and staff at SNFs during outreach activities.

To assist sub-acute care facilities with management of scabies outbreaks, LAC DPH's *Scabies Prevention and Control Guidelines Acute and Long-Term Care Facilities* updated 2015 (www.publichealth.lacounty.gov/acd/Diseases/ScabiesToolkit.htm) is available to provide a rational approach to the prevention and control of scabies in LAC healthcare facilities. The printed guidelines are available and they were distributed to CHS PHNs and staff at SNFs during outreach activities.

The "Norovirus Outbreak Prevention Toolkit", which was developed in 2012 by ACDC in collaboration with CHS, Health Facilities Inspection Division, Licensing and Certification Program, and Environmental Health in response to an increasing number of GE outbreaks reported by sub-acute facilities. The printed guidelines were distributed to CHS PHNs and SNFs

during outreach activities and is available at: www.publichealth.lacounty.gov/acd/docs/Norovirus/NoroToolkit2012.pdf.

On September 27, 2017, the Los Angeles County Department of Public Health (LAC DPH) Acute Communicable Disease Control (ACDC) held a symposium for key LA County SNF staff responsible for infectious disease outbreak prevention and control. Representatives from SNFs included directors of nursing, administrators, and infection preventionists. The goals of the symposium were to improve partnerships between SNFs and LAC DPH as well as to improve prevention and control of infectious diseases in the SNF setting, antimicrobial stewardship programs, and management of MDROs. The course covered requirements for Antimicrobial Stewardship programs in SNFs and how to collaborate across the continuum of care. Other topics that will be covered in the symposium include: Immunizations recommendations for healthcare personnel and residents, reporting requirements for Carbapenem-resistant Enterobacteriaceae (CRE), and protecting employees from blood-borne pathogens and aerosol transmissible diseases.

In addition to presentations, each attendee received a folder with the following materials and APIC Infection Preventionist's Guide to Long-Term Care, 2013 book:

- Los Angeles County List of Reportable Diseases and Conditions
- CDPH Pneumococcal Vaccine Timing Flow Chart-For Adults
- LAC: INFECTION PREVENTION TRANSFER FORM
- Additional Resource Materials for Infection Prevention & Control
- Listing of Useful Resources and Websites
- Packets with
  - Influenza Outbreak Prevention and Control Guidelines
  - Scabies Prevention and Control Guidelines: Acute and Long-Term Care Facilities
  - Norovirus Outbreak Prevention Toolkit
  - Health Education Materials for Influenza and Scabies
- Antibiotic Stewardship materials – posters, educational brochures, and etc.
  - "Treat True Infections, Not Colonization" Poster (English)
  - "Reassess Antibiotics at 48 Hours" Poster (English)
  - "Cold or Flu. Antibiotics Don't Work for You." (English/Spanish)

REFERENCES

1. CDC. Norovirus U.S. Trends and Outbreaks www.cdc.gov/norovirus/trends-outbreaks.html

Program Details

ACUTE COMMUNICABLE DISEASE CONTROL PROGRAM UNIT LISTING 2017*

Communicable Disease Control Programs, Director ..... Robert Kim-Farley, MD, MPH

Acute Communicable Disease Control Program, Director ..... Sharon Balter, MD

- Epidemiology and Data Support Section, Chief Epidemiologist ..... Michael Tormey, MPH
- Disease Surveillance & Outbreak Investigation Section, Senior Physician ..... Benjamin Schwartz, MD
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    - Hospital Outreach, Program Specialist ..... Sharon Sakamoto, RN, PHN, MSN/MPH
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- Coccidioidomycosis ..... Merle Baron, BSN, RN, PHN
  Alicia Pucci, BSN, RN, PHN
- Cryptosporidiosis ..... Elizabeth Traub, MPH
- *Escherichia coli*—Shiga Toxin-Producing (STEC) ..... Leticia Martinez, RN, PHN, MPA
- Encephalitis ..... Karen Kuguru, MPA
- Giardiasis ..... Elizabeth Traub, MPH
- Hepatitis A ..... Susan Hathaway, PHN
- Hepatitis B, Acute (Nonperinatal) ..... Susan Hathaway, PHN
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- Hepatitis C ..... Susan Hathaway, PHN
- Legionellosis ..... Juliet Bugante, RN, PHN
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- Listeriosis, Perinatal ..... Michael Vasser, MPH
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Disease Outbreak Summaries

- Community-Acquired Disease Outbreaks ..... Claire Jarashow, PhD, MPH
- Foodborne Illness Outbreaks ..... Marifi Pulido, PhD, MPH
- Healthcare-Associated Outbreaks, General Acute Care Hospitals ..... L'Tanya English, RN, PHN, MPH
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ACUTE COMMUNICABLE DISEASE CONTROL PROGRAM PUBLICATIONS, PRESENTATIONS, AND AWARDS 2017

Awards

Emily Kajita, Monica Luarca, Han Wu, Bessie Hwang and Laurene Mascola. First Runner-up "Best Scientific Article Published in 2017" "Harnessing Syndromic Surveillance Emergency Department Data to Monitor Health Impacts During the 2015 Special Olympics World Games." DPH Science Summit.

Emily Kajita, Monica Luarca, Han Wu, Bessie Hwang and Laurene Mascola. Best (top ten) Scientific Articles of 2017 "Harnessing Syndromic Surveillance Emergency Department Data to Monitor Health Impacts During the 2015 Special Olympics World Games." DPH Science Summit.

IRIS Team. Innovation and Sustainability Award. 2017 Bureau of the Medical Director/Disease Control Employee Recognition Event.

James McKinnell. Cone Memorial Lectureship. 2017 Annenberg Center for Health Sciences at Eisenhower.

James McKinnell. High Infections in Older Adults Interest Group Abstract Award. 2017 IDWeek.

Michael Vasser. Call of Service Award for Exide Data Management. Community Health Outreach – Let's Talk About Exide.

Syndromic Unit. Meritorious Use of SAS Software Award. SAS Users Meeting and Awards Presentation.

Talar Kamali. Outstanding Public Health Nurse of the Year. 34th Annual Department of Public Health Nurse Practice Conference and Awards Luncheon.

Publications

Balsamo, G., Maxted, A.M., Midla, J.W., Murphy, J.M., Wohrle, R., Edling, T.M., Fish, P.H., Flammer, K., Hyde, D., Kutty, P.K., Kobayashi, M., Helm, B., Oiulfstad, B., Ritchie, B.W., Stobierski, M.G., Ehnert, K., Tully, T.N. (2017). Compendium of Measures to Control *Chlamydia psittaci* Infection Among Humans (Psittacosis) and Pet Birds (Avian Chlamydiosis), 2017. *Journal of Avian Medicine and Surgery.*

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Presentations

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Bhaurla, S., McKinnell, J. (2017). *Healthcare System Epidemiology and Stewardship: LTACs and Antimicrobial Stewardship*. LTAC Collaborative Meeting. [Presentation]

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Oyong, K. (2017). *Epidemiology and Surveillance.* 2-day Infection Prevention Basics Mini Course. [Presentation]

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Oyong, K. (2017). *Responsibility of Reporting Communicable Diseases.* California Ambulatory Surgery Association Infection Prevention Seminar. [Presentation]

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Richter, S., McKinnell, J., Bell, D., Uslan, D., Watson, K., Humphries, R., Miller, L.G. (2017). *Modeling Carbapenem Resistance Among Gram Negative Pathogens Using Commonly Available Clinical Data.* IDWeek. [Presentation]

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Terashita, D. (2017). *Antimicrobial Stewardship*. Mid-Year Provider Conference. [Presentation]

Terashita, D. (2017). *Antibiotic Stewardship in Skilled Nursing*. Generations Corporation. [Presentation]

Terashita, D. (2017). *Council for Outbreak Response: HAI and AR (CORHA).* NACCHO LINC Demonstration Site Meeting. [Presentation]

Terashita, D. (2017). *Public Disclosure of Healthcare Facility Outbreaks.* CACDC Annual Conference 2017. [Presentation]

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2017
Special Studies

Acute Communicable Disease Control Program

Special Studies Report

2017

Los Angeles County
Department of Public Health

Sharon Balter, MD
Director
Acute Communicable Disease Control

ACUTE COMMUNICABLE DISEASE CONTROL
SPECIAL STUDIES REPORT 2017

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Health Information Systems

THE FIRST YEAR OF MANDATED CARBAPENEM-RESISTANT *ENTEROBACTERIACEAE* AND ANTIBIOGRAM REPORTING IN LOS ANGELES COUNTY: 2017

BACKGROUND

Carbapenem-resistant *Enterobacteriaceae* (CRE)[1] are a family of gram-negative bacteria that can be resistant to most antibiotics including the carbapenem class of drugs which are used to treat severe infections. The majority of CRE infections are associated with patients in an acute care hospital or skilled nursing facility (SNF) who are immunocompromised or have invasive devices such as intravenous catheters or are ventilator dependent. The Centers for Disease Control and Prevention (CDC) is concerned about the rapid spread of CRE and has recommended aggressive approaches for identifying and preventing further spread [1].

Using data from 2010–2012, the Los Angeles County Department of Public Health (LAC DPH) assessed the prevalence of CRE in LAC[2] and received over 2,000 laboratory reports of carbapenem-resistant *Klebsiella pneumoniae*, one type of CRE. Prior work by the CDC suggested only sporadic cases of CRE were identified in LAC hospitals and prevalence was unknown. The large number of cases received was substantially higher than anticipated, providing justification for further surveillance.

CDC's National Healthcare Safety Network (NHSN)[3] is an electronic healthcare-associated infection (HAI) tracking system. In California, all acute care hospitals are mandated to report select HAIs to the California Department of Public Health via this system. The NHSN includes an option to report the three most common CRE infections (*Escherichia coli, Enterobacter sp., Klebsiella sp.)* as part of the system's LabID Event module. In April 2010, LAC DPH requested and received voluntary conferral of rights to the NHSN data submitted to California Department of Public Health. On January 19, 2017 a Health Officer Order (HOO)[4] was issued requiring all acute care hospitals and SNFs report CRE infections as well as a facility-specific annual antibiogram to LAC DPH. Antibiogram data provide a comprehensive summary of antimicrobial resistance organisms isolated in healthcare facilities. LAC DPH will use data submitted from healthcare facilities to compile a regional antibiogram to assess resistance and detect new trends in LAC.

METHODS

In California, general acute care hospitals (GACH) and long term acute care hospitals (LTACH) mandatorily report HAI data into NHSN. LAC DPH decided to build CRE reporting into this already established system and expand the data captured by creating a LAC CRE Group which added patient information and key variables needed to assess and describe the epidemiology of CRE in LAC. For surveillance purposes in this study, CRE infections were defined using the NHSN Safety Component Manual[5] as *Enterobacteriaceae* (*E. coli, Enterobacter sp., Klebsiella sp*.) resistant to carbapenem antibiotics or that produce carbapenemases.

[1] https://www.cdc.gov/hai/organisms/cre/definition.html
[2] http://publichealth.lacounty.gov/acd/docs/CRKP_ICHE.pdf
[3] https://www.cdc.gov/nhsn/index.html
[4] http://publichealth.lacounty.gov/acd/docs/CREorder.pdf
[5] https://www.cdc.gov/nhsn/pdfs/pscmanual/pcsmanual_current.pdf

LAC DPH sent detailed instructions for this new reporting requirement to all LAC facilities mandated to report. In addition, a webinar was created to provide step by step guidance on how to join the LAC CRE Group, as well as how to confer rights to LAC DPH and create custom variables. In contrast to GACHs and LTACHs, because most SNFs are not enrolled in the NHSN, a paper reporting form was created for these locations.

The NHSN LAC CRE group was used as the data source for analysis to calculate hospital and community onset rates as well as for descriptive epidemiology statistics. All SNF reports were submitted via paper case report forms and were entered into an Access database by ACDC staff.

For GACHs and LTACHs, CRE rates were analyzed using NHSN calculations of number of infections reported for the numerator and admissions for community-onset (CO) and patient days for healthcare-onset (HO) for the denominator. CO infections were identified within 3 days of admission and HO after 3 days of admission in both GACHs and LTACHs. Stratification of data by onset type in SNFs was not possible since most admission date information was either missing or filled out incorrectly.

According to the Centers for Medicare and Medicaid services (CMS) requirements, GACHs and LTACHs submitted final reports to NHSN by May 15, 2018. Data analysis was performed in May and June 2018. Additional analysis was done comparing CRE case counts between the two NHSN LAC groups; the general LAC group and the LAC CRE Group containing patient information and custom variables.

RESULTS

Out of 83 GACHs and 8 LTACHs in LAC, 72 (86.7%) GACHs and all LTACHs reported at least one CRE event. Pooled LTACH HO rates were higher than GACHs at 1.22 (range 0.50–2.18) infections compared to 0.66

Figure 1.
Boxplots of HO Infection Rate Distribution
GACHs and LTACHs
where >0 cases reported, LAC 2017

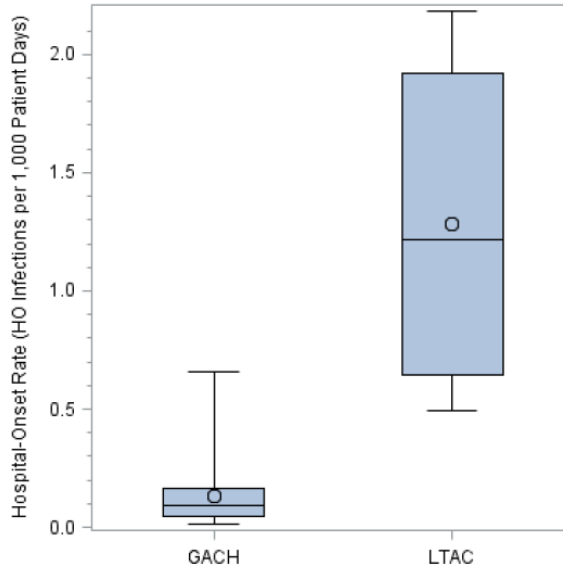
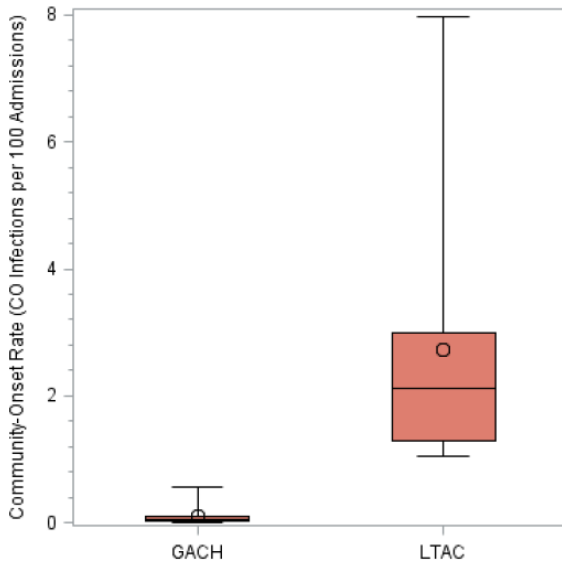


Figure 2.
Boxplots of CO Infection Rate Distribution
GACHs and LTACHs
where >0 cases reported, LAC 2017



(range 0.01–0.66) per 1,000 patient days respectively (**Figure 1**). The pooled CO CRE rates reported from LTACHs were also higher than GACHs, 2.11 (range 1.04–7.97) infections and 0.35 per 100 admissions, respectively (**Figure 2**).

GACH

In GACHs, the majority of healthcare-onset CRE reported was *Klebsiella* (64.9%), followed by *Enterobacter* (22.4%) and *E. coli* (12.7%) (**Table 1**). *Klebsiella* (75.6%) was also the most commonly reported community onset CRE followed by *E. coli* (13.5%) and *Enterobacter* (10.9%).

Table 1.
CRE Organism Type by Healthcare or Community Onset, GACH
LAC, 2017 (N=1280)

	HO		CO		
Organism Type	No.	%	No.	%	**TOTAL**
E. coli	63	12.7	106	13.5	169
Enterobacter	112	22.4	85	10.9	197
Klebsiella	323	64.9	591	75.6	914
TOTAL	**498**	**38.9**	**782**	**61.1**	**1280**

Across the three CRE organisms that were assessed, the most common type of CRE infections reported from GACH were CO genitourinary tract infections, followed by HO respiratory infections (**Table 2**).

Table 2.
CRE Organism by Specimen Source by Healthcare or Community Onset, GACH
LAC, 2017 (N=1280)

	E. coli				Enterobacter				Klebsiella			
	HO		CO		HO		CO		HO		CO	
Specimen Source	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Cardiovascular	7	11.1	10	9.4	6	5.4	3	3.5	38	11.8	43	7.3
Digestive System	7	11.1	1	0.9	6	5.4	3	3.5	7	2.2	25	4.2
Ear, Eye, Nose, Throat	0	0	0	0	0	0	0	0	0	0.0	2	0.3
Genitourinary	14	22.2	69	65.1	14	12.5	44	51.8	73	22.6	312	52.8
Musculoskeletal	0	0.0	0	0.0	0	0.0	2	2.4	1	0.3	0	0.0
Reproductive Male	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3	0	0.0
Respiratory	16	25.4	7	6.6	65	58.0	10	11.8	120	37.2	70	11.8
Skin/Soft tissue	11	17.5	11	10.4	14	12.5	17	20.0	67	20.7	122	20.6
Unspecified	8	12.7	8	7.6	7	6.3	6	7.1	16	5.0	17	2.9
TOTAL	**63**	**4.9**	**106**	**8.3**	**112**	**8.8**	**85**	**6.6**	**323**	**25.2**	**591**	**46.2**

The mean age of CRE HO and CO infections reported from GACH were 63.5 and 67.4 years respectively. Although data on race and ethnicity was collected, much of this data was missing (**Table 3**).

Table 3.
CRE Infections Demographic Data by Healthcare or Community Onset, GACH LAC, 2017 (N=1280)

	HO		CO	
Demographics	No.	%	No.	%
Gender				
Female	187	37.6	371	47.4
Male	311	62.4	411	52.6
Ethnicity* (N=176)				
Hispanic	19	29.2	33	29.7
Non-Hispanic	46	70.8	78	70.3
Mean Age (Median, Range)	63.5	(65, 0–97)	67.4	(70, 0–102)

* Missing 1104; not a required field.

Information on fatalities related to CRE infections was requested; however, a large proportion of these data were missing. Of the 283 CRE events where death data was completed, 38 reported a fatal outcome.

LTACH

In LTACHs, the majority of HO CRE reported was *Klebsiella* (93%), followed by *E. Coli* (4.5%) and *Enterobacter* (2.5%) (**Table 4**). *Klebsiella* (86.2%) was also the most commonly reported CO CRE followed by *Enterobacter* (7.6%) and *E. Coli* (6.3%).

Table 4.
CRE Organism Type by Healthcare or Community Onset, LATCH LAC, 2017 (N=517)

	HO		CO		
Organism Type	No.	%	No.	%	**TOTAL**
E. coli	16	4.5	10	6.3	26
Enterobacter	9	2.5	12	7.6	21
Klebsiella	333	93.0	137	86.2	470
TOTAL	**358**	**69.2**	**159**	**30.8**	**517**

The most common type of CO CRE infections across all three organisms and HO *E. Coli* reported from LTACHs were identified from urine specimens. HO *Enterobacter* and *Klebsiella* were most commonly reported from respiratory sources (**Table 5**).

Table 5.
CRE Specimen Source by Organism by Healthcare or Community Onset, LTACH
LAC, 2017 (N=517)

	E. coli				Enterobacter				Klebsiella			
	HO		CO		HO		CO		HO		CO	
Specimen Source	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Cardiovascular	0	0.0	0	0.0	2	22.2	1	8.3	28	8.4	1	0.7
Digestive System	0	0.0	0	0.0	0	0.0	2	16.7	5	1.5	39	28.5
Genitourinary	9	56.3	9	90.0	0	0.0	6	50.0	117	35.1	62	45.3
Respiratory	3	18.8	1	10.0	6	66.7	2	16.7	141	42.3	24	17.5
Skin/Soft tissue	4	25.0	0	0.0	1	11.1	0	0.0	38	11.4	9	6.6
Unspecified	0	0.0	0	0.0	0	0.0	1	8.3	4	1.2	2	1.5
TOTAL	**16**	**3.1**	**10**	**1.9**	**9**	**1.7**	**12**	**2.3**	**333**	**64.4**	**137**	**26.5**

The mean age of CRE HO and CO infections reported from LTACHs were 69.9 and 66.8 years respectively. Although data on race and ethnicity was collected, because this was not a required field, much of this data was missing and could not be analyzed and reported (**Table 6**).

Table 6.
CRE Infections Demographic Data by Healthcare or Community Onset, LTACH
LAC, 2017 (N=517)

	HO		CO	
Demographics	No.	%	No.	%
Gender				
Female	185	51.7	78	49.0
Male	173	48.3	81	51
Mean Age (Median, Range)	69.9	(72, 0–100)	66.8	(71, 0–96)

Information on fatalities at LTACH hospitals related to CRE infections, like the GACH, was requested, however a large proportion of these data were missing. Of the 59 CRE events where death data was completed, 15 reported a fatal outcome.

SNFs

A total of 56 CRE events were reported by 33 SNFs in 2017. No deaths were reported.

Table 7.
CRE Organism Type, SNF
LAC, 2017 (N=56)

	No.	%
E. coli	9	16.1
Enterobacter	7	12.5
Klebsiella	40	71.4
TOTAL	**56**	

The mean age of SNF CRE infections was 68.8 years, which was similar to both GACHs and LTACHs. CRE in females was more commonly reported from SNFs.

Table 8.
CRE Infections Demographic Data, SNF
LAC, 2017 (N=56)

Demographics	No.	%
Gender (N=56)		
Female	30	53.6
Male	26	46.4
Ethnicity* (N=32)		
Hispanic	14	43.8
Non-Hispanic	18	56.2
Race* (N=50)		
African American	8	16.0
Asian	11	22.0
White	31	62.0
Mean Age (Median, Range)	68.8	(69, 24–94)

* Missing data

The most common specimen source reported in *Klebsiella* and *E. Coli* infections was urine. Sputum was the most common specimen source for *Enterobacter* infections.

Table 9.
CRE Specimen Source by Organism, SNF
LAC, 2017 (N=56)

Specimen Source[1]	*E. coli*		Enterobacter		Klebsiella	
	No.	%	No.	%	No.	%
Blood	0	0.0	1	14.3	1	2.5
Sputum	1	11.1	5	71.4	7	17.5
Wound	3	33.3	0	0.0	0	0
Urine	5	55.6	0	0.0	24	60
Rectal	0	0.0	0	0.0	3	7.5
Other[2]	0	0.0	0	0.0	3	7.5
No Source	0	0.0	1	14.3	3	7.5
TOTAL[3]	**9**	**16.1**	**7**	**12.5**	**40**	**71.4**

1. Multiple specimen source listed for some cases.
2. Tracheal and gastrostomy tube.
3. No organism specified for 3 cases.

The majority of CRE events reported by SNFs list the patient was admitted from a GACH (60.7%).

Table 10.
Admissions from Facility Type, SNFs
LAC, 2017 (N=56)

Facility Type	Admissions	
	No.	%
Hospital	34	60.7
LTACH	5	8.9
SNF	2	3.6
Home	0	0
Missing	15	26.8
TOTAL	**56**	

Data Analysis

For GACHs and LTACHs, 19 hospitals were found to have reporting issues in the CRE Group including not joining or conferring rights, incorrect reporting plans, or a lag in data entry. Communication addressing the specific issue identified for each hospital was generated and sent via email to the hospital infection preventionist by the respective LAC DPH liaison public health nurse and an epidemiologist. If additional troubleshooting or technical assistance was required, the assigned epidemiologist would follow-up with the infection preventionist. By May 2018, all 19 with reporting issues had corrected the problems. In addition, 2018 reporting plans were checked to ensure the corrections had carried over to the new year.

Forty duplicates were identified within NHSN data. Efforts were made to reach out to NHSN to troubleshoot how this occurred and make appropriate corrections to avoid future duplicate event entry.

SNF data was merged with the GACH and LTACH data to check for duplicate reporting. Multiple errors were identified including CRE reported by a SNF that should have or had already been reported by the ordering acute care hospital, incorrect date of current admission to the SNF, reporting a history of CRE (no current lab), and reporting on different organisms (i.e. *Pseudomonas*) not covered by the HOO. Analysis of SNF reports resulted in identification of two CRE reports that should have been reported by the acute care hospital but were missed. Five cases had already been reported in NHSN by the acute care hospital. These errors were communicated to the appropriate facilities.

Antibiogram

All 92 acute care hospitals (including LTACHs) in LAC submitted antibiograms during the first year of the HOO. With this information, the first LAC regional antibiogram[6] was completed, published, and distributed in January 2018 and is posted on the ACDC website. Data entry and analysis is currently underway for 2017 data.

DISCUSSION

Overall the first year of CRE reporting in LAC generated valuable data and identified high rates of CRE in healthcare facilities, especially among LTACHs. This information will help guide targeted prevention efforts moving forward. Reporting errors were identified from GACHs, LTACHs, and SNFs and efforts have been made to correct discrepancies both retrospectively and going forward.

LIMITATIONS

All the custom variables that LAC DPH requested in NHSN reporting plans exhibited low response rates resulting in missing data. We plan to address these reporting gaps by identifying facilities that did not complete the custom variable fields and reaching out to them to notify them and provide additional assistance as needed.

There was no NHSN data validation done to ensure that hospitals are reporting CRE accurately and thoroughly. Historically, the California Department of Public Health has performed hospital data entry validation for other diseases, however this verification has not been conducted as CRE is not reportable at the state level. Currently, data validation in SNFs is not feasible as there are over 300 SNFs in LAC.

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[6] http://publichealth.lacounty.gov/acd/AntibiogramData.htm

ACTIVATING VITAL ADVANCES IN ANTIMICROBIAL RESISTANCE TESTING AMONG LOS ANGELES COUNTY HEALTHCARE FACILITIES

BACKGROUND

Antibiotic resistance (AR) and multi-drug resistant organisms (MDRO) are an intensifying public health threat. Carbapenem-resistant Enterobacteriaceae (CRE) are especially concerning. CRE mortality rates are often as high as 30-40% [1-5] due to limited treatment options. In addition, many CRE can spread AR to other bacteria via plasmid-encoded genetic resistance mechanisms, called carbapenemases [6]. Given this, it is not surprising that CRE has been classified as a critically important and urgent global threat by the Centers for Disease Control and Prevention (CDC) and the World Health Organization [7-8]. While CRE has been steadily increasing in the United States [9-10], Los Angeles County (LAC) has been identified as a hotspot for CRE infections because of its large number of healthcare facilities and its international patient population [11], which create a complex system within which CRE and other MDROs can readily spread.

Early administration of microbiologically active antimicrobial therapy can reduce morbidity and mortality from CRE infections [5, 12-14]. This depends on accurate determination of the minimum inhibitory concentration (MIC) of the infecting organism to antibiotics. Interpretation of the MIC results is conducted using breakpoints, which categorize whether an antibiotic is resistant or susceptible to any given antibiotic and determine the probability of treatment success. The Clinical Laboratory Standards Institute (CLSI) provides guidance on what methodologies clinical laboratories should use to detect CRE and other nosocomial pathogens.

The CLSI updated the carbapenem MIC breakpoints for Enterobacteriaceae in 2010 based on data from multiple clinical studies demonstrating that ongoing use of the previous breakpoints resulted in higher patient mortality [3, 4]. Failure to update breakpoints also impacted infection control measures, which is estimated to contribute to a 3-5% annual spread of CRE [15]. Ongoing use of outdated CLSI breakpoints will result in the failure to recognize clinically and epidemiologically concerning MDROs such as CRE.

It is thus imperative that clinical laboratories are up-to-date on their CRE detection methods. To assess CRE detection practices amongst clinical laboratories, the Acute Communicable Disease Control Healthcare Outreach Unit (HOU) partnered with California Department of Public Health and academic investigators to conduct the California Antimicrobial Resistance Laboratory Network Assessment (CARLA) survey in 2015. The CARLA survey identified that 42% of hospital laboratories in LAC used outdated carbapenem breakpoints for Enterobacteriaceae [16]. Furthermore, many laboratories did not perform carbapenemase testing, as recommended by CLSI to ensure detection of carbapenemase-producing Enterobacteriaceae with use of outdated breakpoints [16].

Clinical laboratories must take manual steps to ensure their antimicrobial susceptibility testing (AST) instruments are up-to-date. However, the HOU theorized that lack of awareness of the problems

surrounding use of outdated breakpoints and/or technical knowledge of how to update breakpoints caused the delayed uptake of revised breakpoints. This prompted our initiative to better understand why laboratories failed to update breakpoints and, in turn, assist them in implementing up-to-date CRE detection methods.

OBJECTIVE

This report describes the HOU's efforts to update carbapenem breakpoints amongst targeted clinical laboratories in LAC to improve detection of CRE.

METHODS

HOU established the antimicrobial resistance/antimicrobial stewardship (AR/AS) team, composed of five HOU liaison public health nurses (LPHNs), an epidemiologist, and an infectious disease physician serving as the HOU's AR expert. Targeted hospitals were chosen based upon their responses to the question of using outdated CRE breakpoints in the CARLA survey. To be included in our target list, the labs had to respond with i or ii to the following question: What breakpoints does your laboratory use for carbapenems when testing Enterobacteriaceae?

i. Pre-2010 breakpoints only ←
ii. Pre-2010 breakpoints combined with tests for carbapenemase production ←
iii. Current CLSI M100 S25 breakpoints
iv. Other

The AR/AS team collaborated with CDC and local microbiology experts to develop a protocol that guides clinical laboratories through the process of updating CRE detection methods, which includes:

1. ordering verification panels from the Food and Drug Administration (FDA)/CDC AR Isolate Bank;
2. updating breakpoints in the AST instrument, which may involve scheduling a visit with the local service technician of their AST device manufacturer; and
3. conducting a verification study to ensure accurate results.

The team first conducted in-person visits with each hospital's laboratory director, microbiology supervisor, antimicrobial stewardship chair, and infection preventionist to discuss unique issues that were impacting their CRE detection methods and provide initial recommendations. Following the initial visit, the AR/AS team provided each hospital with the CRE breakpoint update protocol, sample verification study protocol, and template to document the results of the verification studies.

During follow-up consultations, the AR expert provided additional support, which included facilitating communication with the CDC, FDA, and local laboratory equipment representatives. The AR/AS team also checked in with each hospital regularly to encourage progress, and that their methods were thoroughly implemented.

RESULTS

Between July to August 2017, the AR/AS team conducted outreach to 41 hospitals who responded with i or ii to the question above. The survey was sent out to all hospitals in California in 2015, including 97 in Los Angeles (at the time of the survey). All 41 laboratories had in person AR/AS team visits. At the time of

the initial AR/AS visit, 7 (17%) had updated to the current CLSI breakpoint following the CARLA survey, and were not targeted for further follow-up.

Of the remaining 34 laboratories, 27 (79.4%) assumed their AST instruments were using current breakpoints. Half of laboratories (17, 50%) were uncertain of how to approach changing breakpoints on their AST instrument, and 10 (29.4%) indicated they lacked the resources to perform a verification study. Only 7 (20.5%) facilities were familiar with the FDA/CDC AR Isolate Bank as a resource for verification studies. All 34 laboratories using historical breakpoints were accredited, most were accredited by the College of American Pathologists (29, 85%), the others by the Joint Commission (5, 15%). Laboratory staffing included dedicated microbiology staff in 28 (82%) laboratories, a laboratory director with a specialization in microbiology (MD or PhD) in 5 (15%), and a clinical laboratory scientist in 29 (85%).

All 34 hospital laboratories agreed to work toward updating carbapenem breakpoints following the AR/AS team visit. After one year of follow-up, 15 laboratories (47%) successfully updated breakpoints; 12 (35%) received isolates but did not update; and 6 (18%) are planning to complete the update in 2018. Common barriers for the 19 laboratories failing to update the breakpoint included: too much clinical work and/or not enough staffing (12, 63%) and inability to update the laboratory information systems or electronic medical record (5, 26%). Other less common reasons included waiting on new testing platforms (n=2) and changes in laboratory staff (n=3).

DISCUSSION

Ongoing use of outdated carbapenem breakpoints by clinical laboratories is a public health problem. Failure to update breakpoints hampers infection control initiatives, hinders CRE treatment success, and helps fuel spread of CRE [2-5, 15]. Prior to the AR/AS visit, most microbiology laboratory personnel did not feel empowered to make changes, even when they were aware of the problem. However, with the cooperation of antimicrobial stewardship and infection control leadership—in conjunction with ongoing follow-up by the AR/AS team—the laboratories gained vital support for the breakpoint update initiative.

The AR/AS team visits allowed HOU to use existing resources for targeted outreach to engage hospital laboratories in updating carbapenem breakpoints. The key to success of the project was developing a strong system of collaborations with our CDC partners, local experts, representatives of AST device manufacturers, and individual hospital staff—especially the clinical laboratory scientist who typically leads the laboratory methodology validation efforts. The process of verifying new MIC breakpoints is outside the scope of typical laboratory work-flow, so many facilities needed encouragement and administrative support to complete the process. Thanks to the AR/AS team visits, all (100%) of targeted hospitals began the process of updating breakpoints and nearly half of the hospital laboratories completed the update within one year.

Physicians and other healthcare staff depend on the assurance that the results provided by their laboratory are accurate, significant, and clinically relevant. By improving laboratory detection methods, CRE will now be correctly classified in LAC hospital laboratories. This will decrease inappropriate antibiotic therapy and in turn decrease the risk of death from CRE infection. Now that CRE can be accurately

detected and reported, HOU can also improve our efforts to contain the spread of CRE within LAC. In addition, because LAC has a large international patient population, this project likely will also decrease the spread of CRE globally.

There are several limitations to this intervention. While the AR/AS team was successful with improving updated carbapenem MIC breakpoint usage in LAC, the HOU experience may not be generalizable to other public health jurisdictions. The AR/AS team includes academic investigators in infectious disease and microbiology. However, we hope that making our resources available to other jurisdictions will make our initiative more widely adoptable. To date, the FDA—which dictates which breakpoints AST instruments must use—has officially recognized many but not all CLSI breakpoints, which complicates the process of updating AST systems in a timely manner. Additionally, HOU did not collect information on how the breakpoint initiative impacted patient outcomes, infection prevention practices, antimicrobial prescribing, or the incidence rate of CRE in LAC.

Despite the large number of hospital laboratories in LAC using outdated CRE detection methods and limited staff resources, this project was a success. The AR/AS team's findings informed a need to do further broad education to improve AR detection practices across LAC. This project also greatly improved HOU's rapport with hospital laboratories, which is critical to detect and contain CRE and other AR bacteria of epidemiological concern. Now that these partnerships have been established, HOU will be able to continue to improve laboratory capabilities in our jurisdiction in the global fight against AR.

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USING CDC'S CORE ELEMENTS OF OUTPATIENT STEWARDSHIP TO IMPROVE ANTIBIOTIC PRESCRIBING PRACTICES IN LOS ANGELES COUNTY

BACKGROUND

Inappropriate antibiotic use is the primary contributor to the spread of antibiotic resistance. To date, most efforts by the Los Angeles County Department of Public Health (LAC DPH) to build antimicrobial stewardship capacity has focused on inpatient settings. However, estimates are that more than 30 percent of antibiotics prescribed in outpatient settings are unnecessary [1]. Primary care clinics and clinicians prescribe approximately half of all outpatient antibiotics in the United States [2]. Outpatient antibiotic prescribing, in particular, has been demonstrated to be directly associated with antimicrobial resistance [3].

Antimicrobial stewardship efforts have been demonstrated to influence antimicrobial prescribing, microbial resistance, and costs. Antimicrobial stewardship has become a current standard of care in medical practice and interventions to improve antibiotic prescribing are supported by the California Medical Foundation, the Infectious Disease Society of America (IDSA), and the Centers for Disease Control and Prevention (CDC) [4]. Unfortunately, outpatient antimicrobial stewardship is neither uniform nor widely adopted across LAC.

The CDC Core Elements of Outpatient Antibiotic Stewardship note four key areas of stewardship: commitment, action for policy and practice, tracking and reporting, and education and expertise [5]. A review of the literature demonstrated that individual interventions targeting these four areas had varying degrees of effectiveness; however, no outpatient antimicrobial stewardship program meeting all Core Elements has been assessed for effectiveness nor implementation characteristics studied [6].

The objective of Targeting Appropriate Prescribing in Outpatient settings (TAP OUT) is to assist outpatient clinics to implement an antimicrobial stewardship program. The outcome of interest is inappropriate antibiotic prescribing for acute upper respiratory infections (URI).

METHODS

LAC DPH recruited 20 primary care and 3 urgent care clinics, representing 208 providers, to participate in the TAP OUT project. The clinics are all part of the same medical network. LAC DPH staff partnered with the clinics' stewardship team, which included the medical director, infection preventionist, and two physician stewardship champions, to develop an antimicrobial stewardship program that met all the CDC Core Elements of Outpatient Stewardship. The stewardship program implemented includes public commitment, communication skills training, clinical treatment education, and prescribing audits. LAC DPH and the clinic stewardship team adapted evidence-based strategies to meet the needs and preferences of the clinic providers and patients. To measure the effectiveness of the program, patient encounter data were analyzed for changes in inappropriate antibiotic prescribing for URI between the 2016–17 and 2017–18 influenza seasons. Inappropriate antibiotic prescribing was defined using California Medical

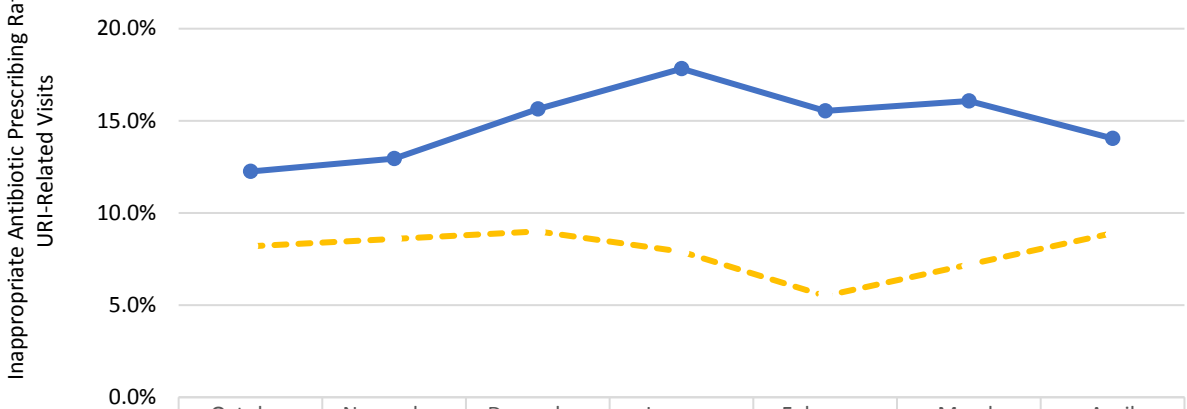
Association Foundation Alliance Working for Antibiotic Resistance Education[1] guidelines. The definition of URI was based on analysis of International Classification of Diseases[2] Tenth Edition encounter codes. Patients currently on immunomodulatory therapy were excluded from the analysis. To evaluate implementation process characteristics, a key informant interview was conducted.

RESULTS

A total of 20 primary care and 3 urgent care clinics, representing 208 providers, participated in TAP OUT (see Methods). The baseline estimated inappropriate antibiotic prescribing rate for URI was 15.5% amongst all prescribers (range: 0-100%). During the intervention period, the estimated inappropriate prescribing rate decreased to 7.6% (51% reduction, p<0.0001). Monthly rates during both periods are described in Figure 1.

Several key implementation elements of implementation were identified, such as leadership buy-in and on-site peer champions. Visible and recurring prescribing reminders were useful. To improve adoption, the ASP was integrated into existing workflow. Costs were limited and related to information technology resources to analyze prescribing data and create feedback reports.

Figure 1. Inappropriate Antibiotic Prescribing Rate for URI-Related Visits LAC, October–April 2016–2017 vs. 2017–2018



	October	November	December	January	February	March	April
2016-17	12.3%	13.0%	15.6%	17.8%	15.5%	16.1%	14.1%
2017-18	8.2%	8.6%	9.0%	7.9%	5.5%	7.2%	8.9%

DISCUSSION

The TAP OUT antimicrobial stewardship program was shown to successfully decrease inappropriate antibiotic prescribing for acute upper respiratory infection diagnoses. The program compiled low-cost, highly effective interventions into a program that met all CDC Core Elements of Outpatient Stewardship. Further, the program focused on interventions aimed at altering prescriber behavior, rather than patient

[1] Physicians for a Healthy California (PHC). Alliance Working for Antibiotic Resistance Education (AWARE). https://www.phcdocs.org/aware/

[2] World Health Organization (WHO). Family of International Classifications. http://www.who.int/classifications/en/

education or ordering restrictions in the electronic health records. Interventions targeting prescribing behavior change of healthcare providers have been demonstrated to be effective in decreasing overall and inappropriate antibiotic prescribing [7]. This project adds to the scant literature on how antibiotic stewardship programs can be implemented in outpatient settings.

When planning and implementing the stewardship program, many barriers were identified to changing healthcare providers' prescribing behaviors. Concerns regarding patient satisfaction and competing priorities were discussed with the clinics' medical director. In addition, obtaining patient encounter data to measure the effectiveness of the program involved lengthy discussions with the clinic information technology staff. However, buy-in from clinic champions was key in deciding which stewardship strategies would work in their unique setting. The clinics were motivated to lower their antibiotic prescribing rate for URI as it is tied to Centers for Medicare and Medicaid Services reimbursement.

There are some limitations of the project. First, all sites were part of the same medical network; thus, certain implementation results may not be generalizable to the general primary and urgent care population. Second, because each patient visit was de-identified, we could not link patient visits to understand the full medical history. It is possible that subsequent visits indicate a bacterial etiology, but this would not have been able to be assessed through a single visit record. Lastly, results were dependent on electronic health record and billing data, which are imperfect for performance measurement, though have demonstrated validity [8].

Having demonstrated effective implementation of the stewardship program, LAC DPH will disseminate best practices to outpatient providers county-wide. We hope to study the effects of the stewardship program on other infection types, including urinary tract infections.

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2017 SYMPOSIUM ON INFECTION PREVENTION CONTROL IN SKILLED NURSING FACILITIES

OVERVIEW

On September 28, 2017, the Los Angeles County Department of Public Health (LAC DPH) Acute Communicable Disease Control (ACDC) program held a symposium for key county skilled nursing facility (SNF) staff responsible for infectious disease outbreak prevention and control. This is the second annual SNF symposium ACDC has held. For information on the first symposium, see ACDC's 2016 Special Report.[1] Presentations and related materials for both the 2016 and 2017 symposiums are archived on the ACDC SNF webpage.[2]

During the 2017 symposium, representatives from local SNFs included directors of nursing, administrators, and infection preventionists. Due to the large number of SNFs in LAC, over 315, attendance was limited to two representatives per facility. The goals of the symposium were to improve partnerships between SNFs and LAC DPH as well as to improve prevention and control of infectious diseases in SNF settings. The symposium also strived to implement antimicrobial stewardship programs and better management of multidrug-resistant organisms (MDROs) in SNFs. Other topics covered included: immunization recommendations for healthcare personnel and residents, reporting requirements for Carbapenem-resistant Enterobacteriaceae (CRE), and how to protect employees from blood-borne pathogens and aerosol transmissible diseases.

SUMMARY

A total of 108 attendees from 65 local SNFs attended the day-long event. In addition, the event included 23 attendees from ACDC, the Association for Professionals in Infection Control and Epidemiology (APIC) Greater LA Chapter, representatives from several nursing home consulting companies, nursing home corporate consultants, laboratory serving SNFs, and partnering agencies.

The topics for the 2017 symposium focused primarily on the prevention and control of infectious diseases that are common in SNF settings and greatly impact the vulnerable population cared for in these settings. The presenters were representatives from ACDC, LAC DPH's Vaccine Preventable Disease Control (VPDC) Program, guest speakers from UCLA, and other organizations. The agenda was as follows:

[1] ACDC. 2016 Special Studies Report.
http://publichealth.lacounty.gov/acd/pubs/reports/2016SpecialStudiesReport.pdf
[2] ACDC. Skilled Nursing Facilities: Infection Prevention Resources and Guidelines.
http://publichealth.lacounty.gov/acd/SNF.htm

AGENDA	
8:00 am – 8:30 am	**Registration** Breakfast & Coffee
8:30 am – 8:50am	**Introduction & Welcome** *Harriett Pitt, RN, BSN, MS, CIC* - ***Moderator*** LAC DPH – Acute Communicable Disease Control *Sharon Balter, MD* Chief, LAC DPH Acute Communicable Control Program
8:50 am – 9:50 am	**Prevention and Management of Carbapenem-resistant Enterobacteriaceae and other Multi-Drug Resistant Organisms** *Dawn Terashita, MD, MPH* LAC DPH – Acute Communicable Disease Control
9:50 am – 10:00 am	**Break**
10:00 am – 11:00 am	**Immunization for Health Care Personnel and Residents at Skilled Nursing Facilities** *Melanie Barr, RN, MSN, CNS* LAC DPH – Vaccine Preventable Disease Control
11:00 am – 12:30 pm	**Protecting Skilled Nursing Facility Employees from Blood-borne Pathogens and Aerosol Transmissible Diseases** *Kevin Riley, PhD, MPH* UCLA Labor Occupational Safety and Health Program
12:30 pm – 1:15 pm	**Lunch**
1:15 pm – 2:30 pm	**Antimicrobial Stewardship: Doing Our Part to Help Solve the Problems in Healthcare** *James McKinnell, MD* LAC DPH – Acute Communicable Disease Control
2:30 pm – 2:40pm	**Break**
2:40 pm – 3:40 pm	**Progress and Outcome Metrics for a Collaborative Antibiotic Stewardship Program Between Cedars-Sinai and Local Skilled Nursing Facilities to Improve Management of UTIs** *Haoshu (Hali) Yang, Pharm D* Cedars Sinai Medical Center
3:40 pm – 4:00 pm	**Closing Remarks & Evaluations**

In addition to presentations, each attendee received a folder with *APIC Infection Prevention Guide to Long-Term Care* and the following materials:

- LAC List of Reportable Diseases and Conditions
- CDPH Pneumococcal Vaccine Timing Flow Chart- For Adults

- LAC DPH: Infection Prevention Transfer Form
- Additional Resource Materials for Infection Prevention & Control
- Listing of Useful Resources and Websites
- Packets with
    - Influenza Outbreak Prevention and Control Guidelines
    - Scabies Prevention and Control Guidelines: Acute and Long-Term Care Facilities
    - Norovirus Outbreak Prevention Toolkit
    - Health Education Materials for Influenza and Scabies
- Antibiotic Stewardship materials – posters, educational brochures, etc.
    - "Treat True Infections, Not Colonization" Poster (English)
    - "Reassess Antibiotics at 48 Hours" Poster (English)
    - "Cold or Flu. Antibiotics Don't Work for You." (English/Spanish)

Overall, the symposium was very well received, and the representatives from the SNFs urged LAC DPH to continue to hold additional trainings to provide further guidance on topics viral to SNFs. ACDC plans to hold another symposium in 2018 as these trainings have become an annual event.

OUTBREAK OF EPIDEMIC KERATOCONJUNCTIVITIS CAUSED BY HUMAN ADENOVIRUS TYPE D53 IN AN OPTOMETRY CLINIC, 2017

BACKGROUND

On June 22, 2017, the Los Angeles County Department of Public Health (LAC DPH) was notified by a medical epidemiologist at Hospital X of seven patients seen at an optometry clinic (Clinic A) on June 8, 2017 who later developed symptoms of epidemic keratoconjunctivitis (EKC).[1] This report prompted a cluster investigation by ACDC.

EKC is caused by adenovirus.[2] It is a contagious, severe form of conjunctivitis that can cause pain and blurry vision for up to four weeks [1]. EKC associated with adenovirus is a frequent cause of outbreaks in eye care settings. Adenovirus is concerning as a healthcare-associated infection due to its high transmission rate, significant ocular morbidity, and hardiness in healthcare environments [2]. Prior outbreaks have been associated with breakdowns in infection prevention practice, including eye drop administration, glove use, and instrument disinfection [3].

This report describes ACDC's outbreak investigation and the measures taken to prevent future infections and enhance patient safety.

METHODS

For this investigation, a ***case*** was defined as an individual who had symptom onset between June 5–July 3, 2017, and had either:

1) a diagnosis by an ophthalmologist or optometrist of EKC, adenoviral conjunctivitis, or viral conjunctivitis; or
2) laboratory confirmation of adenovirus from a specimen collected by conjunctival swab.

A ***healthcare-linked case*** was defined as a person with a diagnosis or laboratory confirmation (as described in 1 and 2 above) who had visited the optometry clinic (Clinic A) between June 5–July 3, 2017 and had symptom onset within ≤21 days of that visit.

A ***household case*** was defined as a household and/or family contact of another case, with a diagnosis or laboratory confirmation (as described in 1 and 2 above) and did not visit the clinic prior to symptom onset.

Case finding was conducted by phone and medical record review. Medical records from Clinic A were surveyed for all patients with an EKC diagnosis between June 7-July 3. To better understand if healthcare-linked transmission possibly occurred during the period when symptomatic EKC case patients presented at the clinic, all patients who visited the clinic during June 7-21 were called and asked if they were

[1] https://en.wikipedia.org/wiki/Keratoconjunctivitis
[2] https://www.cdc.gov/adenovirus/index.html

experiencing symptoms of EKC. Case characteristics and exposures were ascertained during medical record review.

On June 23rd, ACDC conducted an announced site visit to walk through the premises, observe infection prevention practices, interview staff members, and review infection prevention policies.

Cell culture isolates or conjunctival swab specimens from case patients were sent to the LAC DPH Public Health Laboratory (PHL) for conventional and shell vial culture and detection by fluorescent monoclonal antibody staining. Specimens from additional case patients were tested by viral culture at the laboratory of Hospital X. Specimens were then submitted to the California Department of Public Health Viral and Rickettsial Disease Laboratory (CDPH-VRDL) by PHL for adenovirus detection and molecular typing by sequence analysis of the hypervariable region of the adenovirus hexon gene and the adenovirus group-specific region of the fiber gene [4, 5].

RESULTS

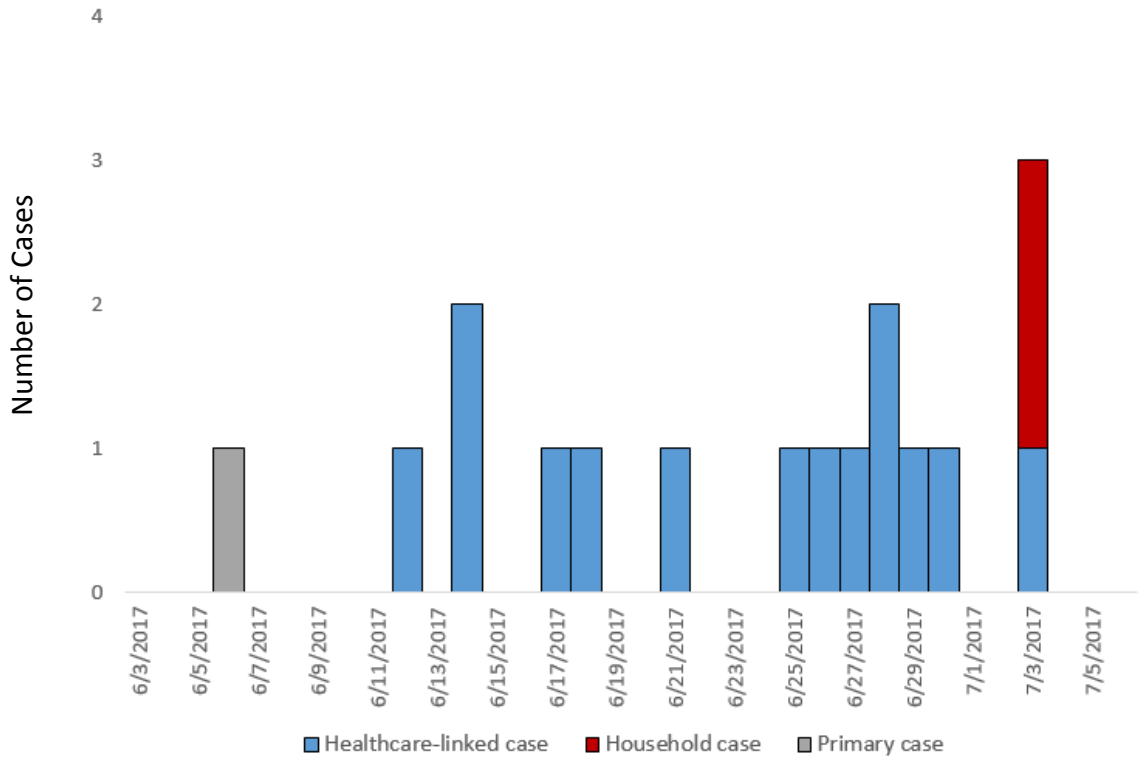
Medical record review identified 17 cases. Among 805 patients contacted by phone, none reported EKC symptoms. Fourteen patients met the case definition of a healthcare-linked case, and one patient appeared to be the source of introduction into the clinic (hereafter called the primary case). Two additional cases met the household case definition—both reported a symptomatic spouse prior to their illness.

The median patient age of cases was 62 years (range: 43–78 years), and 12 cases (70.6%) were women. No hospitalizations resulted from infection, though seven cases (41.2%) had more than one symptomatic visit to the clinic, a hospital emergency department, or an urgent care center. Cases presented with symptoms consistent with EKC, including redness (14, 82.3%) and discharge (13, 76.5%). The mean incubation period was 9 days (range: 5-19 days).

Review of healthcare-linked case-patient clinic visit dates prior to symptom onset revealed two apparent clusters. The primary case visited the clinic on June 7th with symptoms consistent with EKC, before the initial visits of seven additional case-patients on June 7th and June 8th. On June 20th, one of the case-patients from the first cluster visited the clinic with EKC symptoms. Another seven case-patients visited the clinic after this case-patient on June 20th and June 21st, prior to the onset of their EKC symptoms (**Figure 1**).

Medical chart review indicated common exposures among the 14 healthcare-linked case-patients—all were seen by the same optometrist in the same exam room following the primary case. No healthcare personnel reported EKC symptoms before or during the outbreak period. Among the 14 healthcare-linked case-patients, other exposures included slit lamp contact (13, 92.3%), tonometry (12, 85.7%), and multi-dose dilating eye drops (10, 66.7%). Use of multi-dose sodium fluorescein eye drops was noted for 6 (86%) cases in the first cluster and none in the second cluster. During the primary case's initial clinic visit on June 7th, the primary case received sodium fluorescein drops from a multi-use vial and had a slit lamp examination; the slit lamp is connected to the tonometer.

Figure 1.
Cases of Epidemic Keratoconjunctivitis by Date of Symptom Onset
Optometry Clinic, LAC, June 3–July 6, 2017
(N=17)



The clinic closed on June 22nd for intensive environmental cleaning of clinic surfaces and equipment, instrument cleaning and disinfection, and providing staff training on infection prevention. The clinic reopened the following day.

Several observations were made during the site visit to the clinic. Optometry Clinic A is part of Hospital X's medical network. Staff who provide care at the clinic include three optometrists, one ophthalmologist, and three optometric assistants. The clinic has three exam rooms and averages 1,300 patients per month. Clinic patients begin in the waiting area, then proceed to one of three exam rooms, each with its own slit lamp with tonometer. Site visit observations and staff interviews indicated gaps in infection prevention practices including: using multi-dose eye drops on multiple patients; occasionally touching the eye or surrounding area; and reprocessing tonometers with a 70% isopropyl alcohol wipe rather than the recommended 5-10-minute disinfecting soak with chlorine or ethyl alcohol [2].

Conjunctival swab specimens from four case patients, all symptomatic with conjunctivitis, were sent to the PHL culture—adenovirus was detected in two. Specimens from an additional 11 case-patients were tested at the laboratory of Hospital X, and adenovirus was identified in 6 by viral culture.

Of the eight case-patients positive upon culture, specimens were then submitted for human adenovirus (HAdV) detection and molecular typing—all 8 were positive for HAdV-D53. Subsequently, VRDL generated HAdV-D53 whole genome sequences (WGS) from one patient sample, which was nearly identical to a recently reported WGS of HAdV-D53 from Japan (GenBank sequence LC215428).

DISCUSSION

This report describes an investigation of a cluster of 17 patients in an optometry center infected with EKC. All cases had either visited the optometry clinic or were household contacts of clinic patients. In conjunction with ACDC's infection prevention assessments, analysis of the molecular testing for adenovirus indicate that a common source likely served as the mode of transmission between patients.

HAdV-D53 has been recognized as an agent of EKC outbreaks in Japan since 1980 [6, 7, 8] and in Germany since 2005 [9]. However, HAdV-D53 has not previously been reported to the United States National Adenovirus Type Reporting System and, to our knowledge, this is the first reported EKC outbreak associated with HAdV-D53 in the United States. We asked the index case about travel only. No travel was reported.

As the first documented EKC outbreak associated with HAdV-D53 in the United States, this outbreak highlights the need for rigorous implementation of recommended infection prevention practices in eye care settings. Based on our observations, we hypothesize that the virus was introduced to surfaces in the exam room by a symptomatic patient, and subsequent lapses in infection prevention practices led to transmission. Prior studies have demonstrated that adenoviruses may persist on environmental surfaces for several weeks [10]. Previous EKC outbreaks in eye care clinics have been linked to improper disinfection practices and lapses in hygienic protocols [3]. Observations found deficiencies in tonometer disinfection and multi-use eye drop administration. Enhanced infection prevention practices, including staff education on eye drop administration and longer slit lamp and tonometer disinfection times were implemented. No further cases were reported after July 3, 2017.

To prevent EKC transmission in eye care settings, recommended practices include the use of disposable tonometer tips, disinfectants efficacious against adenoviruses for tonometers and slit lamps, and single-use eye drops when available [2,11]. Adherence to recommended infection prevention practices is critical to avoid EKC and other healthcare-associated infections. LAC DPH plans to outreach to the optometry and ophthalmology provider community to educate regarding infection prevention.

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INVESTIGATION OF SURGICAL SITE INFECTIONS IN ORTHOPEDIC HIP AND KNEE REPLACEMENT POST-OPERATIVE AT AN ACUTE CARE HOSPITAL SETTING

BACKGROUND

Surgical site infections (SSIs) following orthopedic procedures, including joint replacement, are significantly rare since evidence-based infection prevention practices related to skin preparation, surgical technique, and prophylaxis of antibiotics are currently the standard of care in orthopedic surgery. In the most recent National Healthcare Safety Network[1] report which included data from 2006 to 2008, reported knee replacement postoperative infection rates ranged from 0.68% to 1.60% and hip replacement infection rates ranged from 0.67% to 2.4% [1]. While these infections are extremely uncommon, their impact can be significant. SSIs related to orthopedic surgical procedures are associated with increased healthcare costs, morbidity, and even mortality. Moreover, orthopedic SSIs can significantly impact a patient's quality of life including requiring a prolonged hospital stay and leading to physical limitations.

On December 15, 2016, a local hospital's infection preventionist (IP) notified the Los Angeles County Department of Public Health (LAC DPH) Morbidity Unit of a cluster of six cases of SSIs at an acute care hospital (Hospital A) occurring after orthopedic surgeries (knee and hip) from October to November 2016. The LAC DPH's Acute Communicable Disease Control Program (ACDC) reviewed the case information. Of the six SSIs, three resulted from knee surgeries and three from hip surgeries. Two of the six SSIs were classified as deep incisional and four were prosthetic joint infections. Onset of symptoms occurred between 24 to 41 days post-surgery. Cultures from wound sites grew different organisms for each patient. Subsequently, additional cases were reported to ACDC by the hospital's IP.

METHODS

Case Finding and Definition

For this investigation, a case was defined as a patient with an SSI following orthopedic surgery of knee or hip replacement at Hospital A from October 2016 through January 2017. ACDC reviewed patient medical records, including operating room (OR) records, as well as patient's laboratory and microbiology reports. In addition, the IP was instructed to call patients who had orthopedic surgery of the hip or knee within the time-period to inquire if they had experienced any signs and symptoms of infection or complications at their surgical site.

Investigation and Assessment of Risk Factors: Site Visits

Over the course of six months from February through June 2017, ACDC partnered with the California Department of Public Health (CDPH) Licensing and Certification program to conduct eight unannounced site visits at Hospital A. The site visits consisted of observations in the OR, OR storage area, and the central processing decontamination (CPD) room. During the visits, several significant lapses in infection control practices were noted and recommendations for control measures were provided.

[1] https://www.cdc.gov/nhsn/index.html

Case Control Study

A 1-to-3 matched case control study was conducted assessing a total of 8 cases and 24 controls. Cases were matched to controls by age and surgical site (hip or knee). Medical records were reviewed, including: preoperative history, nursing perioperative notes, the anesthesia report, operative notes, laboratory records, and discharge notes. Standardized chart abstractions were performed for all cases and controls.

RESULTS

Case Characterization

A total of eight patients met the case definition. Initially, there was a cluster of six cases of SSIs post-orthopedic surgery of knee and hip replacement that occurred between October 20, 2016 through November 23, 2016 based on the surgery date. During this time-period, the attack rate was up to 4.4%. Two additional cases occurred after procedures on January 10, 2017 and January 30, 2017.

Of the eight case patients, the average age was 68 years old (range: 54 to 86 years old); seven had multiple comorbidities, including history of osteoarthritis, hypertension, hyperlipidemia, diabetes, and obesity; five case patients had a BMI above 30. The case patients had an average American Society of Anesthesiologists score[2] of 3.1. The overall attack rate for this outbreak was 3.4% for the eight cases.

Of the eight SSIs, five were knee surgeries and three were hip surgeries. Cultures from wound sites grew different organisms for each patient, including methicillin-sensitive *Staphylococcus aureus*, methicillin-resistant *Staphylococcus aureus*, *Staphylococcus epidermis*, group G *Streptococcus*, *Staphylococcus capitis*, *Enterobacter* cloacae, and *Proteus mirabilis*.

The review of cases did not identify a single surgeon or staff member common to all cases. There was no single common skin preparation solution or irrigation solution identified.

Case Finding

All patients who underwent orthopedic surgery between October 2016 through January 2017 were either followed up at their post-operative appointment or contacted by the pre-operative staff to identify if they manifested signs and symptoms of infection at their surgical site. There were 181 patients with hip and knee surgeries between October to December 2016 who were followed up through post-op appointments or phone calls. From January to March 2017, 179 patients with hip and knee surgeries followed up through post-op appointments or phone calls. No additional cases were identified from the follow up post-op appointment or phone calls.

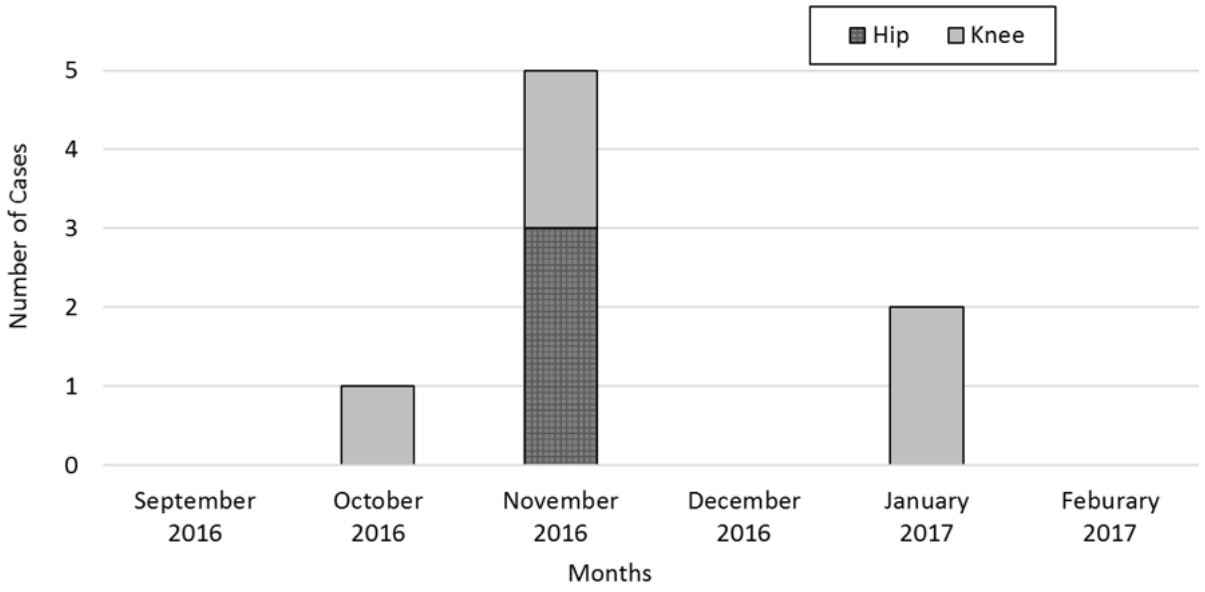
Background Surveillance Rate

In 2016, there were 2,073 surgeries performed at Hospital A and the total number of SSIs was 18 with an annual SSI rate of 0.86% (0.0086). There were 640 hip and knee orthopedic surgeries performed in 2016 with nine SSIs of knee and hip replacement an annual rate of 1.41% (0.0141). According to the National Healthcare Safety Network report with data from 2006 to 2008, knee replacement postoperative infection

[2] http://www.anzjsurg.com/view/0/ASAscore.html

rates range from 0.68% to 1.60% and hip replacement infection rates from 0.67% to 2.4%. During the peak of this investigation, there were six cases within 34 days (October 20, 2016 through November 23, 2016), with an attack rate of 4.4% and a total attack rate of 3.4% from October 2016 through January 2017 (**Figure 1**).

Figure 1.
Surgical Site Infections among Post-Orthopedic Surgery Patients
Hospital A, 2016–2017



Case Control Study

To identify possible risk factors associated with infection, ACDC conducted a case control study. A total of 24 controls were selected from patients who had undergone hip or knee arthroplasty during the outbreak period. A comprehensive medical record review was performed using a standardized chart abstraction tool, which included information on the patient's demographics, hospitalization, and surgical procedure.

The study found that patient demographics were similar between cases and controls. Cases and controls did not differ significantly with respect to American Society of Anesthesiologists score, length of hospitalization, day of week on which procedure was performed, anatomical site of procedure, or whether a tourniquet was placed. No significant commonalities among cases versus controls were found with respect to surgeon, other staff, instruments used, or prosthetics used.

Overall, we were unable to identify significant patient risk factors from the case control study. Scientific literature suggested that the utilization of immediate-use steam sterilization during a procedure may play a role in surgical site infections [2]. However, we were unable to inspect the role of immediate-use steam sterilization in this outbreak due to incomplete logs and printouts.

Final Recommendations

In addition to interim recommendations provided throughout this investigation, ACDC issued the following final recommendations to prevent or limit future infections:

- Ensure the early identification of new SSIs associated with hip and knee replacements through surveillance with immediate reporting of new cases to ACDC.
- Update policies and procedures in CPD and OR on an annual basis.
- Ensure the comprehensive documentation of immediate-use steam sterilization in the OR logs.
- Continue to monitor adherence to the policies and procedures in the CPD and ensure they are being followed by CPD staff.

DISCUSSION AND CONCLUSIONS

ACDC investigated eight cases of SSIs from multiple organisms following associated orthopedic (knee and hip replacement) surgeries. Cases were identified among patients during October 2016 through January 2017. The overall attack rate for this outbreak was 3.4% during this time-period. Despite multiple site visits by ACDC and CDPH Licensing and Certification as well as an outside consultant, we continued to observe lapses in infection control practices among the staff who worked in the CPD and OR core area. Following our recommendations, the facility improved competencies among their CPD staff by providing trainings on cleaning and sterilizing of the surgical instruments and documented the staff training. The overall cleanliness of the CPD and OR core area improved throughout the investigation and infection control practices also improved among the associated staff.

Based on our investigation, we hypothesized that multiple factors may have contributed to the outbreak of SSIs among the orthopedic patients, including improper cleaning and sterilization of the surgical instruments in the CPD and OR core area, use of immediate-use steam sterilization during procedures, staffing changes in CPD, and an increase in census of orthopedic surgeries. A case control study was conducted, but no significant risk factors were identified.

During the outbreak investigation, the facility's infection control staff, hospital administration, OR and CPD staff all contributed to the overall improvement of the conditions and infection control practices to reduce SSIs in the facility. The IP continued to be in contact with ACDC until December 1, 2017, to provide status on any new possible cases. No additional associated positive cultures reported since March 22, 2017.

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LOS ANGELES COUNTY HEPATITIS A OUTBREAK AMONG PERSONS EXPERIENCING HOMELESS OR USING ILLICIT DRUG

BACKGROUND

In 2017, Los Angeles County (LAC) experienced an outbreak of hepatitis A virus (HAV) occurring primarily among persons experiencing homelessness or with illicit drug use (IDU). This outbreak occurred in the context of several other large outbreaks in California[1] and nationally.[2] The largest hepatitis A outbreak in California occurred in San Diego County, where the outbreak began in March of 2017 and resulted in 582 confirmed cases by the time the local health emergency ended in January 2018 and mostly involved persons experiencing homelessness or IDU.

Given the proximity to San Diego County and the extensive travel between LAC and San Diego, the LAC Department of Public Health (DPH) closely monitored for potential HAV introduction and spread in LAC. In July 2017, hepatitis A illness was identified in two homeless persons in LAC who had lived in San Diego at the time of acquiring the virus. A health advisory was released to inform healthcare professionals.[3] In September 2017, HAV also was identified in two LAC residents experiencing homelessness who did not have any links to an outbreak-associated region. Because this possibly indicated local HAV transmission LAC DPH declared a local outbreak of hepatitis A and a health alert was issued.[4] Subsequently, LAC DPH held a webinar[5] in November and issued a health alert update in March 2018.[6]

The Incident Command System (ICS) was activated to coordinate the LAC DPH hepatitis A outbreak response. The ICS leadership identified 4 strategies for controlling the outbreak:

1. Enhancing surveillance and case containment
2. Increasing vaccination
3. Improving sanitation
4. Educating community and stakeholders

The primary objective of this report is to describe the epidemiology of the hepatitis A outbreak cases identified through enhanced surveillance in LAC in 2017. Secondarily, the report will briefly summarize results of the activities to increase vaccination, sanitation, and education.

METHODS

Enhanced Surveillance

The Acute Communicable Disease Control Program of LAC DPH initiated enhanced surveillance to identify acute HAV cases among the homeless and drug using populations from June through December 2017.

[1] https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Hepatitis-A-Outbreak.aspx
[2] https://www.cdc.gov/hepatitis/outbreaks/2017March-HepatitisA.htm
[3] http://publichealth.lacounty.gov/eprp/Health%20Alerts/DPH%20HAN%20Hep%20A%207.31.17%20LAHAN%20revised.pdf
[4] http://publichealth.lacounty.gov/eprp/Health%20Alerts/DPH%20HAN%20Hep%20A%20Outbreak%20091917.pdf
[5] http://publichealth.lacounty.gov/eprp/Health%20Alerts/Hep%20A%20enduring%20webinar%20flyer%20111417.pdf
[6] http://publichealth.lacounty.gov/eprp/Health%20Alerts/HAV%20outbreak%20update%203.15.18%20final.pdf

Case Definitions

- **Minimal Criteria**: Confirmed acute hepatitis A virus (HAV) infection meets the Counsel of State and Territorial Epidemiologists (CSTE) case definitions for an acute case of hepatitis A:[7] (1) discrete onset of any sign or symptom consistent with acute viral hepatitis (fever, headache, malaise, anorexia, nausea, vomiting, diarrhea, and abdominal pain), and (2) jaundice and/or elevated serum aminotransferase levels, and (3) immunoglobulin M (IgM) antibody to hepatitis A virus (anti-HAV) positive.
- **Confirmed Outbreak Case**: A person who meets the CSTE clinical case definition and is laboratory confirmed, OR, a case that meets the clinical case definition and occurs in a person who has an epidemiologic link with a person who has laboratory-confirmed hepatitis A. Cases were either identified as homeless, homeless and using illicit drugs, men who have sex with men (MSM) and using illicit drugs, using illicit drugs or homeless secondary cases. Cases were counted if they were exposed in another county but had onset in LAC.

Case Identification

The California Code of Regulations (Title 17, Section 2500) requires healthcare providers to report acute hepatitis A cases within one working day of identification.[8] In addition, most LAC clinical laboratories automatically report positive hepatitis A IgM antibody tests via the electronic laboratory reporting (ELR) system.

In response to the outbreak, providers were requested to immediately report suspected/confirmed hepatitis A in a person experiencing homeless to facilitate:

- timely interview by LAC DPH staff before cases are discharged to the street and potentially lost to follow-up,
- identification of contacts who could benefit from preventive therapy, and
- case placement in a recuperative care facility during the infectious period to prevent further disease transmission.

Case Investigation

A supplemental form was created for interviewing persons experiencing homelessness or using illicit drugs. It was expected that data from the supplemental forms could guide the ICS leadership response to the outbreak by better defining the epidemiology of outbreak-associated cases and characterizing risk factors for disease.

Laboratory Testing

Clinical laboratories were contacted to determine if serum samples were available for all confirmed cases identified as homeless and/or using illicit drugs. If available, specimens were submitted to the LAC Public Health Laboratory (PHL) for shipment to the California Viral and Rickettsial Disease Laboratory (VRDL) for confirmation and genetic sequencing of HAV.

[7] https://wwwn.cdc.gov/nndss/conditions/hepatitis-a-acute/case-definition/2012/
[8] http://publichealth.lacounty.gov/acd/docs/ReportableDiseaseListSept2018.pdf

Vaccination Outreach

Increasing the proportion of the at-risk population immune to hepatitis A through vaccination was identified as the best tool for preventing hepatitis A illness and decreasing HAV transmission. Vaccinations were included as a service provided by LAC DPH supported street outreach teams targeting homeless persons. Vaccination was also promoted to persons who had close frequent contact with homeless people including first responders, persons who serve food to the homeless, and sanitation personnel. The LAC jail systems offered vaccine to new inmates. LAC DPH community clinics offered vaccines at no charge to those at risk. Health insurance plans and community providers were engaged in the campaign, with the larger health plans offering hepatitis A vaccine to at-risk members at no charge through walk-in clinics. Vaccines were also distributed by LAC DPH to community providers that serve at-risk populations.

Hygiene and Sanitation Outreach

LAC includes 88 cities as well as large unincorporated areas. LAC DPH coordinated with all cities and other county departments such as the Departments of Public Works, Parks and Recreation, and the Sheriff to improve sanitation conditions for persons experiencing homelessness.

Many homeless persons in LAC have created makeshift structures and dwellings which serve as their homes, often creating these in clusters in a small area which is then recognized as a homeless encampment. Due to poor access to hygiene facilities, living in a homeless encampment can serve as a major risk factor to acquire and transmit HAV. LAC DPH, in partnership with Los Angeles Homeless Services Authority (LAHSA) and Department of Public Works, conducted surveys of homeless encampments throughout LAC to assess where additional toilets, showers, and hand washing facilities were most needed, and developed plans with cities to increase toilet, shower and hand washing facilities in these areas.

In close partnership with the LAHSA, LAC DPH Environmental Health (EH), inspected and provided educational materials to homeless shelters across LAC. The educational materials provided guidance on the proper cleaning of facilities and laundering of bedding to protect homeless residents from acquiring and transmitting HAV. A toolkit was developed with template resources and policies for staff at homeless shelters to support their efforts to improve sanitation conditions in their shelters. Additionally, teleconference calls were held to address real life questions and concerns among shelter providers.

Finally, since transmission of HAV among food handlers is of heightened concern, there was a concerted effort to assure that restaurants across LAC were aware of the outbreak and taking measures to reduce the risk of transmission among their workers.

Educational Outreach

The educational outreach efforts aimed to educate key community groups and stakeholders as quickly as possible. The outreaches consisted of holding in-person group meetings, sending informational letters, stakeholder targeted teleconferences, and targeted education of healthcare professionals. A major public awareness campaign was launched, including strategic engagement with the media to support broad dissemination of information, and print media advertisement throughout various public transportation

bus and rail lines to promote awareness, hand-washing and vaccination. The countywide 211 information line staff were trained, and the 211-line was used as a primary source for answering questions from the public. The engagement with media included various press briefings, teleconferences, and press releases. Educational materials targeting specific at-risk populations were prepared in English, Spanish, and other threshold languages. Examples of health education materials developed include those targeting first responders, employees with direct contact with homeless people, food handlers, and men who have sex with men. Our educational outreach materials were posted on our webpages.[9]

RESULTS

Epidemiology of Outbreak Cases

From May 1 to December 31, 2017, 17 total outbreak cases were identified that met the confirmed case definition (**Table 1**). The first identified outbreak-associated case had symptom onset during the week of May 28 and the last case had symptom onset during the week of December 17. Of the 17 outbreak-associated cases that developed symptoms while in LAC, 13 were LAC residents with three being secondary cases identified as part of outbreak at a mental health hospital (**Table 1**). Three IDU cases also identified as men who have sex with men (MSM). The median age of all cases was 36 years (minimum-maximum: 24-64 years); 15 (88%) were male; 14 (82%) cases were white (**Table 2**). Most cases were from SPA 4 (n=7, 41%) and SPA 7 (n=5, 29%), 11 (65%) cases were hospitalized, and there were no deaths.

Table 1. Confirmed Outbreak-Associated Hepatitis A Cases in LA County, May 1 to December 31, 2017 (N=17)

	LAC Residents, n	Non-LAC Residents, n	Total, n (%)
Homeless	4	1	5 (29%)
Homeless_IDU	2	3	5 (29%)
IDU	1	0	1 (6%)
IDU_MSM	3	0	3 (18%)
Secondary cases[a]	3	0	3 (18%)

Abbreviations: IDU, illicit drug use; MSM, men who have sex with men

[a] Associated with an outbreak-associated homeless case

[9] http://publichealth.lacounty.gov/acd/Diseases/HepA/Materials.htm

Table 2.
Demographics of Confirmed
Outbreak-Associated Hepatitis A Cases
LAC, May 1–December 31, 2017
(N=17)

Demographics	No.	%
Age group (years)		
15-34	6	35%
35-44	6	35%
45-54	3	18%
55-64	2	12%
Gender		
Female	15	88%
Male	2	12%
Race/Ethnicity		
Asian	0	0%
Black	0	0%
Hispanic	2	12%
White	14	82%
Unknown	1	6%

Laboratory Results

Of the 17 outbreak-associated cases, serologic specimens were available for 13 cases to send to VDRL for serologic confirmation and viral sequencing. Of the 13 cases with specimens provided to VDRL for testing, 10 cases had genotype 1b (the genotype associated with the San Diego outbreak), two cases were 1a, and virus was not detected for one case (specimen was drawn more than 4 weeks after onset). All ten genotype 1b genotype cases were homeless (**Table 3**).

Table 3.
Hepatitis A Outbreak Cases Among Homeless and Illicit Drug Users Genotype Results
LAC 2017
(N=17)

	Genotype Test Results			
Risk Group	Genotype 1b No.	Genotype 1A No.	Negative No.	No Specimen No.
Homeless	2	0	1	2
Homeless and IDU	5	0	0	0
IDU	0	1	0	0
IDU and MSM	0	1	0	2
Secondary Cases*	3	0	0	0
TOTAL	**10**	**2**	**1**	**4**

*Linked to an outbreak-associated homeless case.

Vaccination Outreach

LAC DPH conducted 486 vaccination outreaches, including 297 that targeted homeless populations, 28 at substance use treatment centers, 82 for first responders, and 14 at the jails. A total of 33,866 hepatitis A vaccine doses were either administered by LAC DPH (12,393 doses) or distributed to community partners (14,800 doses) to administer to at-risk persons. During the outbreak response, hepatitis A doses were administered for 7,395 for homeless persons, 777 for persons at substance use treatment centers, 10,964 for jail inmates and parolees, and 6,160 for first responders.

Hygiene and Sanitation Outreach

As part of the outbreak response, EH distributed hepatitis A educational flyers to over 37,000 food facilities. All homeless shelters are regularly inspected through the EH Housing and Institutions Program. A total of 52 homeless shelters were inspected during the outbreak and provided with information on hepatitis A including the importance of proper hand washing by food handlers.

Education Outreach

Immediately after declaring a local outbreak, LAC DPH engaged 17 distinct stakeholder groups, including city leaders, homeless service providers, healthcare providers, substance user disorder treatment providers, first responders including police and fire agencies, veteran's affairs agencies, schools and colleges, mental health service providers, and LGBTQ providers. Over 100,000 individual stakeholders received letters and educational information and were invited to participate in targeted teleconference calls. Additionally, over the course of the next 4 months, over 500 in-person educational training outreach sessions were conducted at various community settings, including with homeless service providers, substance use disorder providers, jails, and first responder agencies. Within the first two weeks of the response efforts, there were over 80 news print articles and 14 televised segments covering the Hepatitis A outbreak and response efforts in LAC.

DISCUSSION

The number of hepatitis A cases in persons experiencing homeless or using illicit drugs in LAC was substantially lower than the number of cases observed in San Diego. It is unclear why the hepatitis A outbreak remained contained in LAC, despite having a larger population of persons experiencing homelessness and a lower number of vaccines distributed compared with San Diego. One possible reason for the successful containment of the outbreak in LAC could be the activation of ICS early in the outbreak. The ICS structure facilitated improved coordination of the outbreak response across all relevant LAC DPH Programs, and it assisted with recruiting and targeting additional resources towards the outbreak control activities.

According to CDC, the incidence of hepatitis A among adults in the United States has increased since 2014. Paradoxically, the increased hepatitis A incidence might be a consequence of the US childhood vaccination policy. According to the National Health and Nutrition Examination Survey, the percentage of U.S. adults immune to hepatitis A infection has declined from 1999–2006 to 2009–2012. Prior to the licensure of the hepatitis A vaccine in 1995, there were regular large hepatitis A outbreaks that resulted in immunity among exposed adults. Those outbreaks ceased with universal vaccination of children for hepatitis A. As

a result, there is now a large population of adults who are not immune to hepatitis A because they were too old to benefit from the changes in childhood hepatitis A vaccine policy, but they are not old enough to have been exposed to the historic hepatitis A epidemics. The growing population of adults not immune to hepatitis A represents a population susceptible to future hepatitis A outbreaks.

Although the hepatitis A outbreak of 2017 appears to have ended, the conditions that predisposed the outbreak persist in LAC, such as the large population of persons experiencing homelessness who are not immune to hepatitis A and who do not have access adequate hygiene and sanitation services. Therefore, LAC DPH will remain vigilant for acute HAV cases and respond immediately to control potential outbreaks.

NOROVIRUS SUSPECT FOODBORNE OUTBREAK AT A LOS ANGELES COUNTY RESTAURANT

BACKGROUND

On December 18, 2017 the Los Angeles County Department of Public Health (LAC DPH) received a Foodborne Illness Report (FBIR)[1] from the Corporate Wellness Coordinator of a fast food chain restaurant. One of their restaurants, restaurant A (RA), identified gastrointestinal illness in 11 employees. Most of the cases occurred during the week of December 10, 2017 with symptoms including diarrhea, weakness, vomiting, and body aches. Between December 13th to December 21st, LAC DPH received 12 more FBIRs describing 17 additional persons with similar gastrointestinal illness. Three ill employees of RA were also employees of a neighboring restaurant, restaurant B (RB). The LAC DPH Acute Communicable Disease Control program (ACDC) launched an investigation to explore the scope of the outbreak, identify possible risk factors, and determine the necessary procedures to prevent further spread of illness.

METHODS

ACDC coordinated the investigation of illness at both restaurants. First, ACDC partnered with the Corporate Wellness Coordinator for RA to assemble a line list for all employees. ACDC then gathered information on menu items offered for consumption at RA and developed three types of questionnaires. The first was a standard questionnaire for patrons of RA to gather information on date and foods consumed at RA, plus symptom type, onset, and illness histories. These interviews were conducted by telephone and the contact information (for both cases and controls) was obtained from the multiple FBIRs submitted to ACDC. The second standard questionnaire was drafted for employees of RA to gather information on job duties, foods consumed during a typical work shift, symptom type, onset, and illness histories. These interviews were also conducted by telephone. The third standardized questionnaire was drafted for employees of RB to gather job duty, food and symptom histories. These questionnaires were emailed to the RB manager for distribution to all employees of that restaurant. In addition, ACDC staff conducted a site visit and dropped off stool collection kits to staff of RA.

The LAC DPH Environmental Health Services (EHS)[2] Wholesale Food and Safety (WFS) conducted an inspection of RA to observe food handling, cooking, and cleanliness practices. WFS contacted RB to collect employee illness information considering that there were employees that worked in both places.

Management from RA cooperated with the investigation, made employees available for interviews, and coordinated the distribution, pick-up, and recollection of stool kits from employees for delivery to Community Health Services (CHS).[3] Service Planning Area 4 served as the collection point for stool specimens collected from RA employees by RA management. These samples were then picked up by courier and delivered to the Public Health Laboratory (PHL). The PHL tested all submitted stool specimens

[1] http://www.publichealth.lacounty.gov/EH/SSE/FoodMilk/reportillness.htm
[2] http://publichealth.lacounty.gov/eh/index.htm
[3] http://www.publichealth.lacounty.gov/chs/index.htm

using a BioFire FilmArray™ Gastrointestinal Panel and a norovirus reverse transcription polymerase chain reaction (RT-PCR).[4]

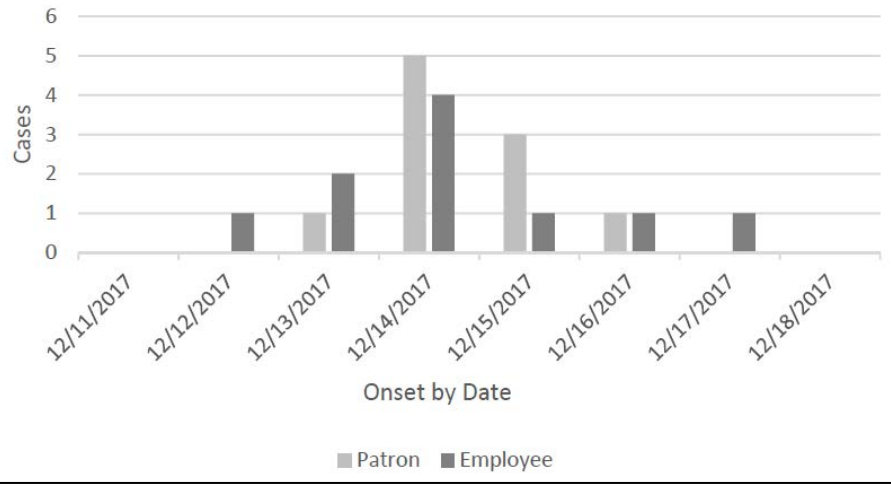
ACDC defined a case as any individual who ate at RA anytime between December 10–15, 2017 and: a) tested positive for norovirus, or b) was symptomatic with diarrhea and vomiting, or c) was symptomatic with diarrhea or vomiting plus two of the following symptoms: nausea, fatigue, headache, body aches, chills, and fever. If cases reported an incubation time of less than 12 hours or greater than 48 hours, they were excluded from analyses, as this did not fit the known incubation period for norovirus. A control was defined as any asymptomatic individual who ate at RA between December 10–15, 2017 and did not have a positive laboratory result for norovirus.

RESULTS

RA is a fast food establishment that prepares fresh food orders for the public in an assembly line fashion with each grouping of ingredients, chosen by the patron, placed into the meal by separate line staff, and are not heated after preparation. Food can be eaten in the restaurant or taken to-go. There is one restroom in the restaurant for both employees and restaurant patrons to share. ACDC interviewed all 29 RA employees, and stool was collected on 25 of the employees (86%). Three employees of RA also worked next door at RB. In view of this connection, the employees of RB were interviewed for illness history—16 of the 21 RB-only employees were interviewed (76%).

All told, ACDC interviewed 61 persons, which included employees from RA and RB, as well as RA patrons. Of these 61 interviews, 23 (38%) met the case definition, and 11 were included as controls. The remaining 27 were excluded from the analysis because they did not meet the case definition. The dates of onset for the 23 people who met case definition ranged from December 12–17, 2017 (Figure 1).

Figure 1.
Norovirus Epidemic Curve at Restaurant A by Onset Date
LAC, 2017
(n=20)



[4] https://www.medicinenet.com/script/main/art.asp?articlekey=22766

Cases

A total of 23 individuals met the case definition. This included 13 RA employees, 1 RB employee, and 9 RA patrons. Laboratory confirmation for norovirus was obtained for 16 of the 23 cases (69%). Of the 23 cases, 61% were female (Table 1). Case ages ranged from 14 to 48 years with a median of 23 years. Most cases were between the ages of 20 to 49 years. The three most common symptoms were: nausea (87%), vomiting (78%), and fatigue (74%). Only two cases had a fever ≥ 102° F (9%). The median incubation was 28 hours with a range of 12 to 48 hours. The median duration was 2 days with a range of 8 hours to 5 days (Table 2).

Table 1.
Case Demographics
(N=23)

	n	Percent
Male	9	39%
Female	14	61%
Age Group	0	0%
<1	0	0%
1-4	0	0%
5-9	0	0%
10-19	6	26%
20-49	17	74%
50-74	0	0%
>74	0	0%
Median Age	23 Years	Range: 14-48 Years

Table 2.
Cases Reported Symptoms
(N=23)

Symptom	n	Percent
Diarrhea	16	70%
Bloody Diarrhea	0	0%
Abdominal cramps	15	65%
Nausea	20	87%
Fatigue	17	74%
Chills	12	52%
Body Aches	13	57%
Headaches	13	57%
Fever	5	22%
Fever ≥ 102˚F	2	9%
Dizziness	10	43%
Vomiting	18	78%
Asymptomatic	3	15%
Median Duration=2 Days (Range: 8 hours-5 Days)		
Median Incubation=28.5 Hours (Range: 12 Hours to 48 Hours)		

Food Analysis

Statistical analyses of the food items eaten by restaurant patrons and employees are shown in Table 3. Foods from RA were analyzed by arrangement (i.e. burrito, bowl, quesadilla, taco) as well as by individual ingredients available for inclusion into these arrangements. No food items were statistically associated with illness at the $p \leq 0.05$ level.

Inspection

The EHS WFS inspection of RA revealed the following violations: 1) inadequate immersion times for sanitizing food use utensils, and 2) potentially hazardous foods held at unapproved temperatures. All violations were addressed and corrected immediately by restaurant management during the inspection. Food items held at unapproved temperatures were disposed of at the time of inspection.

Table 3.
Food Items Eaten

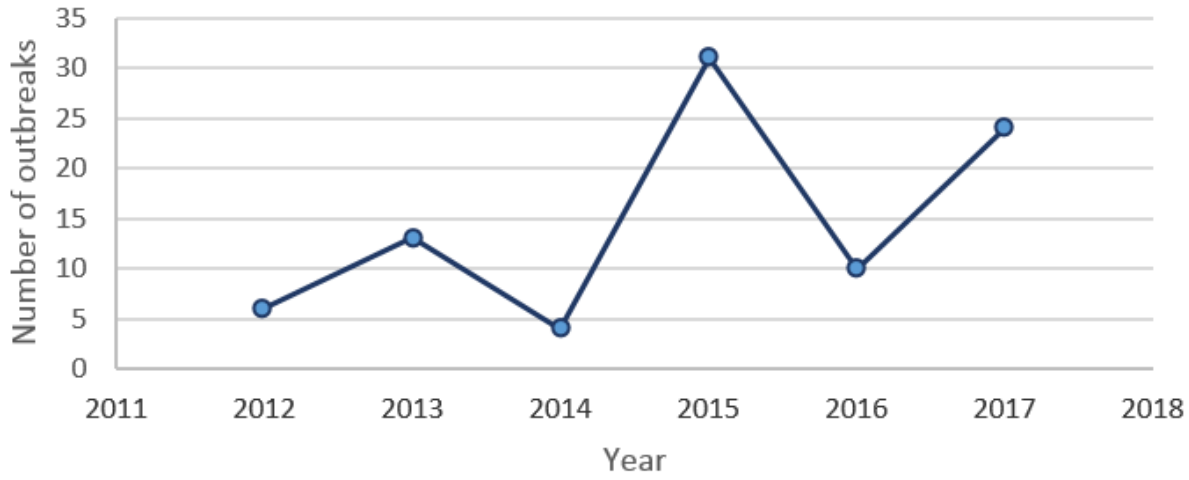
	Cases (N=23)			Controls (N=11)			
Food Item	**Percent**	**N**	**N**	**Percent**	**n**	**N**	**p-value**
Burrito	30%	7	23	27%	3	11	1.000
Bowl	39%	9	23	36%	4	11	1.000
Taco	9%	2	23	0%	0	11	1.000
Quesadilla	13%	3	23	9%	1	11	1.000
Queso Burrito	4%	1	23	0%	0	11	1.000
Flour Tortilla	30%	7	23	27%	3	11	1.000
Corn Tortilla	9%	2	23	0%	0	11	1.000
Chips	39%	9	23	36%	4	11	1.000
Steak	30%	7	23	18%	2	11	0.682
Carnitas	9%	2	23	0%	0	11	1.000
Chicken	57%	13	23	55%	6	11	1.000
Barbacoa	4%	1	23	27%	3	11	0.089
Sofritas	4%	1	23	9%	1	11	1.000
Brown Rice	39%	9	23	55%	6	11	0.475
White Rice	61%	14	23	64%	7	11	1.000
Black Beans	57%	13	23	45%	5	11	0.717
Pinto Beans	39%	9	23	18%	2	11	0.271
Fajita Veggies	57%	13	23	36%	4	11	0.465
Queso Dip	30%	7	23	18%	2	11	0.682
Tomato Salsa	70%	16	23	45%	5	11	0.262
Red Chili	30%	7	23	36%	4	11	1.000
Green Chili	26%	6	23	55%	6	11	0.138
Sour Cream	57%	13	23	27%	3	11	0.152
Corn Salsa	57%	13	23	36%	4	11	0.465
Lettuce	57%	13	23	36%	4	11	0.465
Monterey Jack Cheese	74%	17	23	91%	10	11	0.384
Guacamole	78%	18	23	64%	7	11	0.425

DISCUSSION

This is a laboratory confirmed outbreak of norovirus of unknown origin. The PHL reported that all the confirmed norovirus samples from this outbreak belong to the same genotype, GII.P16-GII.2. Norovirus is part of the family Caliciviridae. It is highly contagious and can transmit disease with as few as 18 viral particles [1]. Infected individuals can even shed the virus before they know they are ill [1]. Norovirus is most often transmitted via a fecal oral route with illness onset 12–48 hours after ingestion of contaminated food, direct person-to-person contact, or contact with contaminated surfaces. The virus can be spread to the environment via the stool or vomitus of infected people [1]. It is the most commonly

reported cause of gastrointestinal (GI) illness in the United States and worldwide [1]. Norovirus infections can occur year-round, but about half of all cases occur between December and February in the northern hemisphere [2]. CaliciNet, a database designed to collect surveillance data about this family of viruses, reported that California had the highest number of confirmed norovirus outbreaks (44) between the months of September 1, 2017 and December 31, 2017 [2]. Surveillance data collected by LAC DPH for non-foodborne GI illness in LAC showed that the month of December 2017 had the second highest occurrence of GI illness outbreaks in the community for the last six years (Figure 2).

Figure 2.
Number of Non-Food GI Outbreaks For the Month of December
LAC, 2012–2017



The method by which this outbreak spread is unclear. The most likely means of transmission is through a food item contaminated by an ill employee. This theory is supported by the finding that the first few persons to become symptomatic in this outbreak were food preparation employees for RA. Most RA employees reported eating at the restaurant during every shift. Another possibility is that this illness was passed from person to person as infected individuals could have touched potentially contaminated common surfaces while dining, working or living together, or sharing the same bathroom with infected individuals. This web of work, home, social, and public connections among RA and RB employees prevented ACDC from being able to identify a definitive source of this outbreak.

PREVENTION AND EDUCATION

To prevent the spread of illness in their facility, RA management implemented an in-house norovirus protocol which, in part, included: disposing of all ready to eat foods in the kitchen, enacting employee hand washing monitoring every 30 minutes, providing employee education on the spread of norovirus, and implementing a complete disinfection of the kitchen. RA also immediately removed ill employees

from work with three days paid leave per policy and called all other employees due to arrive at work to check for symptoms of illness.

ACDC provides education on norovirus during and/or after interviewing both patrons and employees. In addition to the inspection, EHS WFS provides the restaurant with literature about norovirus and how to prevent its spread in a restaurant setting.

LIMITATIONS

One limitation of this investigation was that all the RA employees reported eating at the restaurant during every shift worked. With norovirus having an incubation range of 12–48 hours, it was difficult to know which meal likely exposed individuals to norovirus. Employees reported when they last worked prior to illness, and this was verified by the electronic time-keeping report provided by RA. Some cases could recall exactly what they ate. Others had a more general recall, such as being able to name the types of foods they might typically eat during the work week; however, they were unable to specify which days specific food items were eaten. These limitations made it difficult to determine accurate incubation times as measured from specific meals consumed as well as the ability to ascertain which if any foods might be implicated in the outbreak.

CONCLUSION

This was an outbreak of norovirus with no specific source identified. There have been no further complaints against RA at this specific location beyond December 29, 2017. ACDC, in conjunction with EHS WFS, will continue to monitor for future reports of illnesses.

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FIRST PROBABLE LOCALLY-ACQUIRED CHAGAS DISEASE CASE LOS ANGELES COUNTY, 2017

INTRODUCTION

Chagas disease, or American trypanosomiasis,[1] is a parasitic infection that is caused by the protozoan *Trypanosoma cruzi* found only in the Americas where approximately 8 million people are infected [1]. The estimated 300,000 infections in the United States (US) are mainly attributed to residents who have migrated from Latin American countries [1–3]. Transmission is usually linked to poor housing conditions in which the insect vector, triatomine bugs,[2] thrives and is commonly associated with rural areas of Latin America [1]. Less than 50 locally transmitted human infections have been documented in the US since the first case was identified in 1955 [4,5]. Of the two known locally transmitted cases in California, only one experienced acute disease. This case was a resident of Tuolumne County who was diagnosed with Chagas disease in 1982 [6–8]. The other case was an asymptomatic infection in a resident of Ventura County. This report describes the first documented case of acute Chagas disease with probable local transmission in Los Angeles County (LAC).

BACKGROUND

Trypanosoma cruzi is transmitted to humans primarily through contact with the feces of infected blood-feeding triatomine bugs (family Reduviidae), also called "kissing" or "conenose" bugs. In California, the primary reservoir is the woodrat (*Neotoma sp*)[3] [9]. At least 23 additional species of mammalian wildlife also have been documented as animal reservoirs for the parasite in US [6]. Other modes of transmission include blood transfusion, organ transplantation, and vertical (mother-to-child) transmission [1]. Chagas disease has an acute and chronic phase. Acute disease can be mild or asymptomatic and parasites may be found in the circulating blood. Symptoms may consist of fever, malaise, and swelling around the site where the parasite entered the skin or mucous membranes. The chronic phase of Chagas disease may also be asymptomatic, and during this time few or no parasites are found in the blood. An estimated 20–30% of chronic cases will develop debilitating or life-threatening dysfunction of the heart and/or digestive

[1] https://www.cdc.gov/parasites/chagas/epi.html
[2] https://www.cdc.gov/parasites/chagas/gen_info/vectors/index.html
[3] https://www.britannica.com/animal/woodrat

tract. People who are immunosuppressed may experience reactivation of Chagas disease, with a corresponding resurgence of parasitemia [1].

CASE INVESTIGATION

In September 2017, a patient with travel history to a Latin American country approximately 18 months prior, was reported to the LAC Department of Public Health (DPH) with a positive rapid diagnostic test for malaria. The patient was admitted to an acute care hospital with ongoing fever and rash. Blood smears did not detect malaria parasites but instead revealed *T. cruzi* parasites. Commercially available IgG antibody testing for *T. cruzi* also returned positive. Smear review and molecular testing by polymerase chain reaction (PCR) performed at the US Centers of Disease Control and Prevention (CDC) confirmed *T. cruzi* infection. Though only one of two serological tests at CDC routinely performed for confirmation were initially reactive, additional testing by immunofluorescence assay (IFA) later confirmed the infection (**Table 1**).

Table 1.
Diagnostic Blood Tests of Chagas Case
LAC, 2017

Date of Collection	Type of Test	Result of Test	Laboratory
9/12/17	Parasite Blood Exam	Detected	Hospital
9/13/17	*T. cruzi* Immunoglobulin G (IgG) Immunoassay (IA)	Reactive	Commercial
9/12/17	PCR	Detected	CDC
9/13/17	*T. cruzi* Enzyme immunoassay (EIA)	Reactive	CDC
9/13/17	Trypomastigote excreted-secreted antigen (TESA)	Non-reactive	CDC
9/13/17	*T. cruzi* Immunofluoresence Assay (IFA)	Reactive (1:256)	CDC

The patient had no pertinent past medical history. Thirty-five days prior to admission he was treated with trimethoprim-sulfamethoxazole for a lesion on his shoulder, diagnosed as cellulitis. Five days later he developed fever to 39.4°C with an erythematous, non-pruritic rash over the trunk and limbs, headache, and a dry cough. He was seen by several physicians during multiple emergency room visits and was treated with antibiotics and steroids, including prednisone and hydroxychloroquine. Upon CDC confirmation of Chagas disease, the patient initiated benznidazole therapy that was provided as part of an expanded access investigational new drug (IND) protocol operated by the CDC. Results of PCR testing performed six weeks after completion of therapy were negative.

The patient was born and raised in southern California and had been residing in a rural area of western LAC for the past 17 years. The patient reported occasionally seeing triatomine bugs in his home in recent years. He also reported ticks on his pet dogs and a neighbor who kept sheep. He described a current rat infestation in his home and had been handling dead rodents to dispose of them after trapping. The patient also previously lived in other domestic and international locations where Chagas disease is not endemic. Approximately 20 to 25 years prior, he took frequent short trips to Baja California, Mexico. Earlier in 2017, he traveled to other parts of California, but reported staying in well-built structures and denied insect exposures. His most recent foreign travel occurred 18 months prior to admission. On this trip, he visited a Latin American country in which Chagas disease is endemic, but stayed in an enclosed, air-conditioned dwelling with doors and screens. He denied insect bites or exposures there and was well between the time of his return and the presenting illness.

The LAC DPH and California Department of Public Health (CDPH) conducted an environmental investigation at the patient's residence and surrounding areas. Inspection of the property revealed evidence of rodents inside the home (i.e., droppings) and openings on the exterior that were large enough to allow rodent entry into the walls of the house. Rockwork around the house and climbing ivy provided attractive harborage for triatomines. An attempt to collect triatomine bugs in late September was unsuccessful. However, CDPH investigators were able to trap five rodents in late October: two *Peromyscus boylii* (brush mice) and three *Neotoma macrotis* (woodrats). Rodent blood and tissue specimens that were sent to the University of Georgia for analysis did not yield positive results for *T. cruzi* infection.

DISCUSSION

This is the first confirmed case of Chagas disease documented in LAC that was acquired via probable local vector transmission. The diagnosis was confirmed by a positive blood smear and PCR indicative of acute infection with *T. cruzi* and supported by an appropriate clinical presentation. The rural environmental setting of the patient's home residence, where triatomine bugs are common, in addition to the patient's recollection of triatomine bugs inside his home, support the plausibility of vector-borne transmission. Environmental studies have shown that up to 36% of *Triatoma protracta*, California's most widespread and common triatomine bug, collected in LAC are infected with *T. cruzi* [10,11]. In homes, the bugs can find refuge in beds, upholstered furniture, and animal bedding, emerging nightly to feed upon people and their pets [12].

Confirmation of the location where the patient acquired his infection, either locally or abroad, is complicated by his travel history, medical history, and ambiguous serological testing results conducted at CDC. Because Chagas disease is often asymptomatic, it can be many years before the infection is recognized or chronic symptoms manifest. Recrudescence of a previously acquired infection is possible in the setting of steroid therapy. However, experts at the CDC believe that the level of immunosuppression that the patient received likely was not sufficient for such a response. Additional serological testing that was performed at the conclusion of the case investigation could not definitively define the timing of his infection. Additional serological testing in the following years may provide that evidence; however, even that is uncertain.

Locally transmitted vector-borne transmission of Chagas disease in the US is rare. However, human cases may not be well documented given variability in patient testing and reporting to local and state health departments. Only six states in the US mandate Chagas disease reporting, and it is not a reportable condition in California [13]. Without comprehensive human case surveillance, epidemiology and transmission risk of Chagas disease in LAC is not well known or defined. Though this is the first documented case of probable locally transmitted Chagas disease in LAC, there may have been prior cases that were missed due to underdetection of Chagas disease.

Experts have postulated that the low incidence of vector-borne transmission in the US may be explained by delayed defecation exhibited by local triatomine bugs (which would reduce transmission efficacy), by limited exposure to the vectors, and by low *T. cruzi* infection rates among triatomine bugs [11]. However, experimental studies have demonstrated that some triatomine bugs may defecate immediately upon feeding [14]. As construction, development, and suburbanization in LAC and the US encroaches upon woodrat and triatomine bug habitat, there will be increasing opportunities for residents to become exposed to *T. cruzi* and local prevalence studies indicate that vector infection rates are not insignificant in southern California [10,11]. Additionally, molecular studies show that local strains of *T. cruzi* are genetically similar to those in Latin America, suggesting that no differences in infectivity or virulence should be observed [10].

This case serves as an important reminder that local transmission of Chagas disease may occur more frequently than presumed in LAC. Local providers should include acute *T. cruzi* infection in the differential

diagnosis of fever of unknown origin in patients with appropriate environmental exposure, even without travel to traditionally endemic areas. Similarly, providers should consider chronic Chagas infection in rural area residents of LAC with unexplained heart disease or symptoms consistent with gastrointestinal Chagas disease.

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BOTULISM CASE REPORT SUMMARY
LOS ANGELES COUNTY, 2017

Botulism is a rare but serious and potentially fatal paralytic illness caused by a nerve toxin produced by the bacterium *Clostridium botulinum*. The bacterial spores that cause botulism are common in both soil and water and produce botulinum toxin when exposed to low oxygen levels and certain temperatures. There are five main kinds of botulism: 1) Foodborne botulism can be triggered by eating foods that have been contaminated with botulinum toxin. Common sources of foodborne botulism are homemade foods that have been improperly canned, preserved, or fermented. Though uncommon, store-bought foods also can be contaminated with botulinum toxin; 2) Wound botulism can be triggered by spores of the bacteria getting into a wound and making toxin. People who inject drugs have a greater chance of getting wound botulism in Los Angeles County (LAC). Wound botulism has also occurred in people after a traumatic injury such as a motorcycle accident or surgery; 3) Infant botulism can be triggered by the spores of the bacteria getting into an infant's intestines. The spores grow and produce the toxin, which causes illness; 4) Adult intestinal toxemia (also known as adult intestinal toxemia) botulism is a very rare kind of botulism that can be triggered by spores of the bacteria getting into an adult's intestines, growing, and producing the toxin (similar to infant botulism). Although the cause of this kind of botulism is unknown, people who have serious health conditions that affect the gut may be more likely to get sick; 5) Latrogenic botulism can occur if too much botulinum toxin is injected for cosmetic reasons such as for wrinkles or medical reasons such as for migraine headaches or cervical dystonia.

Because botulism infections may be fatal, they are considered medical emergencies; accordingly, reporting of suspected cases is mandated by the LAC Department of Public Health (DPH) immediately by telephone. Specialized antitoxin is used to treat botulism, which can only be released when authorized by LAC DPH or the California Department of Public Health (CDPH). Testing for case confirmation by mouse bioassay can be conducted at the LAC DPH Public Health Laboratory and matrix-assisted laser desorption/ionization time-of-flight (MALDI-TOF) is conducted by the Centers for Disease Control and Prevention (CDC). Clinically compatible cases with botulinum toxin detected by either mouse bioassay or MALDI-TOF are considered confirmed cases. The CDPH Division of Communicable Disease Control is responsible for the investigation and surveillance of infant botulism cases identified in the county and across the state. LAC DPH is responsible for reporting suspected cases of infant botulism to CDPH's Infant Botulism Treatment and Prevention Program[1] for their investigation.

The number of confirmed botulism cases (non-infant botulism) in LAC fluctuates from year to year. For the past five years, an average of three cases were confirmed annually. The botulism cases in LAC usually have injection drug use as a risk factor. Foodborne botulism in LAC is rare, in the past 10 years only one instance of foodborne botulism was reported with two associated cases confirmed (2012).

[1] https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/InfantBotulism.aspx

In 2017, nine cases of suspected botulism were reported in LAC including four out-of-county cases who received medical care at hospitals in LAC. These four out-of-county suspected cases were referred to the health department in the patient's county of residence. Upon notification and review of case history and symptoms, ACDC physicians authorized the release and use of botulism antitoxin for six suspected botulism cases, and the state released three antitoxins. Ultimately, two were classified as confirmed cases (laboratory-confirmed by MALDI-TOF, with negative mouse bioassay), and one was classified as a probable case (due to negative laboratory testing but with clinically compatible findings and history of injection drug use). Only two suspected cases were determined not to be botulism based on absence of risk factors, negative botulism testing, and an alternate diagnosis of acute flaccid myelitis and lithium toxicity.

A botulism outbreak was also investigated during 2017. In April 2017, public health authorities at the LAC DPH, the Orange County Healthcare Agency, and CDPH investigated an outbreak of botulism consisting of two cases, both adult residents of Orange County, and associated with an herbal tea product produced by a facility in LAC. LAC DPH released a press release,[2] health alerts[3] were disseminated to healthcare providers, warnings were issued to consumers in LAC, Orange County, and California, and the product was recalled.[4]

[2] http://publichealth.lacounty.gov/phcommon/public/media/mediapubhpdetail.cfm?prid=1652
[3] http://publichealth.lacounty.gov/hccp/alerts.htm
[4] http://publichealth.lacounty.gov/eh/recall/2017/recallList_May.htm

INFLUENZA SURVEILLANCE OVERVIEW: 2017–2018 SEASON SUMMARY

OVERVIEW

The traditional influenza surveillance season begins in October and ends mid-May of the following year, covering a 32-week period. Los Angeles County (LAC) uses the Centers for Disease Control and Prevention (CDC) Morbidity and Mortality Weekly Report (MMWR)[1] weeks to refer to surveillance weeks, with week 1 corresponding to the first week in January. The 2017–18 season (October 1, 2017–May 13, 2018) in LAC had higher influenza activity than the previous 5 influenza seasons. Peak activity occurred during week 52 (December 24–30, 2017) when 50% of respiratory specimens tested by sentinel labs were positive for influenza (**Table 1**). In addition, syndromic surveillance detected the highest proportion of visits to emergency departments for influenza-like-illness (ILI) during that same week (**Figure 1**). This season also saw the greatest number of influenza-associated deaths reported since these deaths became reportable in LAC in 2010. The greatest weekly number of influenza-associated deaths (N=54) occurred during week 1 (December 31, 2017–January 6, 2018). Of confirmed deaths with positive influenza test results received during the 2017–18 season, 66% were influenza A viruses (**Table 1**).

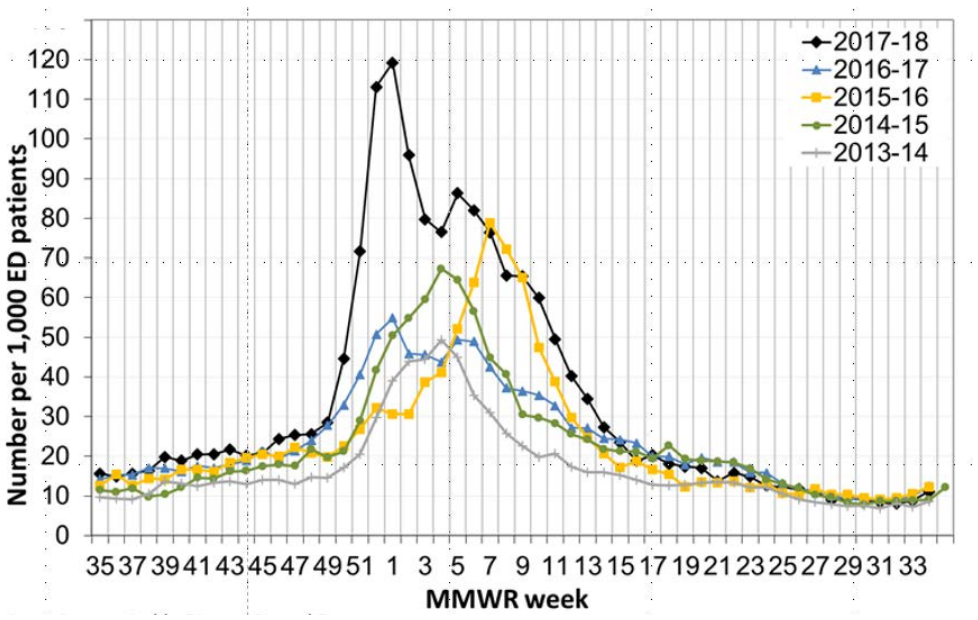
Table 1. Los Angeles County Influenza Surveillance Summary

	2017-18		2016-17
	Peak Week 52*	YTD**	
Sentinel Laboratory Data			
Positive Flu Tests/Total Tests	2971/5926	6,855/107,199	6,855/68,732
(Percent Positive Flu Tests)	0.501	0.172	0.1
Percent Flu A/B	87/13	66/34	92/8
Outbreaks†			
Community Respiratory Outbreaks	6	67	35
Influenza Confirmed Outbreaks	5	77	30
Total	11	144	65
Influenza-Associated Deaths †‡			
Pediatric Flu Deaths	0	2	1
Adult Flu Deaths	61	276	76
Total	61	278	77

*Week 52 corresponds to December 24-30, 2017.
The influenza surveillance year spans** (surveillance weeks 40-20)
†Numbers are provisional and subject to change
‡Confirmed influenza death is defined by a positive lab test, ILI symptoms, and clear progression from illness to death

[1] CDC. MMWR. www.cdc.gov/mmwr/index.html

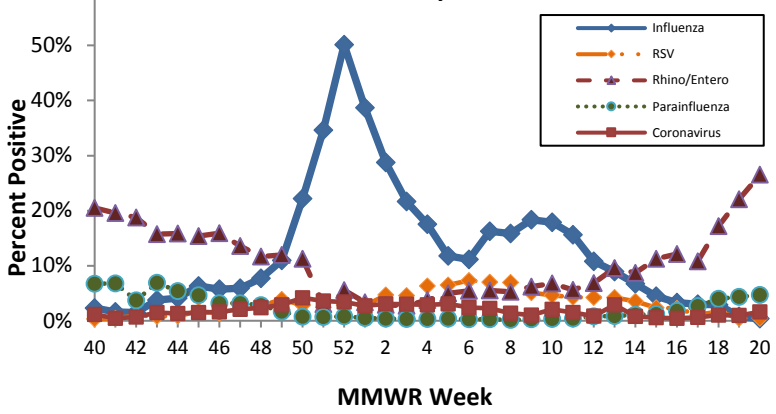
Figure 1.
Proportion of ILI Emergency Department Visits by MMWR Week
LAC, 2013–2018



SENTINEL LABORATORY DATA

Nine sentinel laboratories serving healthcare providers and institutions across LAC reported weekly influenza and other respiratory virus data to the LAC Department of Public Health (DPH) this season (**Figure 2**). Although individual cases of influenza are not reportable to LAC DPH, analyzing data from these sentinel labs provides information on influenza and other respiratory viruses circulating in the county. This season, a total of 107,199 respiratory isolate tests were reported to LAC DPH (**Table 1**). This season, influenza activity began to increase at the beginning of December, peaked at the during Week 52 (Dec 24–30, 2017) and stayed high through March. There was a decline in influenza activity in January and February, but activity trended upwards again in March corresponding with increased influenza B activity. Other viruses co-circulated with influenza, contributing to the overall impact of respiratory illness in LAC. During this season, the majority of influenza positive specimens were influenza A (66%).

Figure 2. Respiratory Viruses, LAC, 2016-17
Percent Positive Cases by MMWR Week

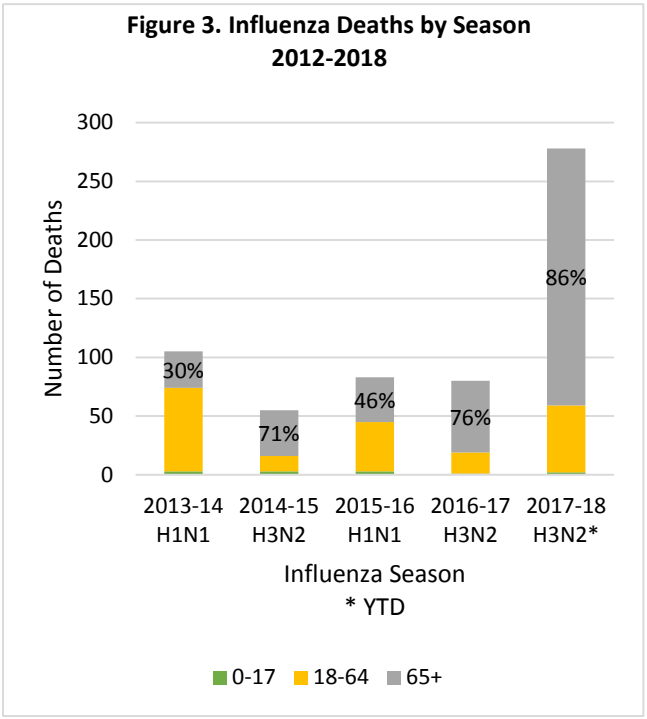


INFLUENZA-ASSOCIATED DEATHS

Since October 15, 2010, laboratory confirmed influenza fatalities of all ages and due to any strain are required to be reported to the ACDC within 7 calendar days.[2] Cases are reported to ACDC from physicians, infection prevention specialists at hospitals, the coroner's office, and via death certificate. A total of 278 influenza-associated deaths (IADs) have been confirmed in LAC this season.[3] There were more deaths reported this season than any season since LAC DPH initiated mandatory reporting.

The majority of deaths (79%) occurred in those 65 years of age and older (N=219), which is consistent with other influenza A H3N2 predominant seasons that more severely affect the 65 and older population (**Figure 3**). During influenza A H3N2 seasons, the 65+ age group accounts for a greater proportion of IADs compared to influenza A H1N1 predominant seasons (**Table 2**).

Figure 3. Influenza Deaths by Season 2012-2018



[2] LAC DPH. Reportable Diseases and Conditions. Title 17, California Code of Regulations, Section 2500 http://publichealth.lacounty.gov/acd/docs/ReportableDiseaseListSept2018.pdf

[3] This total is as of September 10, 2018 and is provisional and can change. The most up-to-date total is available at: http://publichealth.lacounty.gov/acd/FluData.htm

Table 2. Demographic Characteristics of Influenza Fatalities LAC 2012-2018							
		2017-18 N (%)	**2016-17 N (%)**	**2015-16 N (%)**	**2014-15 N (%)**	**2013-14 N(%)**	**2012-13 N (%)**
Age (years)	Median	75.7	82.5	62	81	56	68
	Range	9-105	4-102	1-103	1-101	0-89	0-100
	0-5	0	1 (1)	2 (2)	1 (2)	1 (1)	5 (7)
	6-17	2 (1)	0	1 (1)	3 (5)	3 (3)	3 (4)
	18-40	10 (4)	2 (3)	10 (12)	5 (9)	13 (12)	4 (6)
	41-64	47 (17)	16 (20)	31 (38)	8 (14)	59 (56)	22 (31)
	65+	219 (79)	61 (76)	38 (46)	39 (69)	30 (28)	36 (52)
Gender	Male	127 (46)	35 (44)	44 (54)	30 (54)	67 (64)	35 (50)
	Female	151 (54)	47 (56)	38 (46)	26 (46)	38 (36)	35 (50)
Race	Hispanic	66 (24)	16 (20)	27 (33)	16	48 (46)	29 (42)
	White Non-Hispanic	118 (42)	39 (49)	24 (29)	26	41 (39)	25 (37)
	Asian/Pacifc Islander	40 (14)	4 (5)	14 (17)	8	7 (7)	6 (9)
	Black	30 (11)	5 (6)	9 (11)	4	9 (8)	8 (12)
	Native American	0	0	1 (1)	1 (2)	0	0
	Unknown	24 (9)	14 (18)	6 (7)	1 (2)	0	2 (3)
Total Fatalities		**278**	**80**	**82**	**56**	**105**	**70**

RESPIRATORY OUTBREAKS

The total number of respiratory outbreaks confirmed in LAC decreased to 48, compared with 58 during the previous season. The majority of respiratory outbreaks this season occurred in schools or pre-schools (46%), followed by skilled nursing facilities (SNFs) (29%) (Table 3). Respiratory outbreak definitions vary by setting; however, in general, clusters of ILI (fever >100° F with cough and/or sore throat) is cause for investigation. Thirty-two respiratory outbreaks were confirmed in schools, daycare, and assisted living facilities. Of those, influenza was identified as the responsible pathogen in 11 outbreaks, with flu B accounting for the majority of them. In SNFs, influenza was identified in 11 of 14 respiratory outbreaks.

SYNDROMIC SURVEILLANCE

ACDC's Syndromic Surveillance Project monitors initial self-reported symptoms from patients presenting to participating emergency departments throughout LAC. These symptoms are categorized into different clinical syndromes according to specific code words. LAC's influenza surveillance looks at the syndrome of Influenza-like illness and includes symptoms such as: fever, congestion, sneezing, sore throat, runny nose, and cough. Similar to other indicators, there were more ILI emergency department visits this season than were reported in any of the last 5 seasons.

Table 3. Characteristics of Confirmed Community Respiratory Outbreaks, LAC 2012-2017						
	2017-18 N (%)	**2016-17 N (%)**	**2015-16 N (%)**	**2014-15 N (%)**	**2013-14 N (%)**	**2012-13 N (%)**
Total	**144**	**72**	**48**	**58**	**29**	**73**
Location						
Skilled Nursing Facility (SNF)	77 (53)	32 (44)	14 (29)	25 (43)	12 (41)	23 (32)
School or Pre-School	33 (23)	22 (31)	22 (46)	20 (34)	11 (38)	41 (56)
Assisted Living	28 (20)	15 (21)	8 (17)	12 (21)	3 (10)	6 (8)
Daycare/child care	3 (2)	2 (3)	2 (4)	1 (2)	1 (3)	3 (4)
Other	3 (2)	1 (1)	2 (4)	0	2† (7)	0
Etiology						
Influenza	113 (78)	37 (51)	22 (46)	37 (64)	7 (24)	17 (23)
Other Respiratory	1 (1)	8 (11)	2 (4)	1 (2)	0	1 (1)
Respiratory unknown etiology	30 (21)	27 (38)	24 (50)	20 (34)	22 (76)	55 (76)

MOBILIZING THE LARGEST COMMUNITY OUTREACH TO FIGHT MOSQUITO-BORNE DISEASES—LOS ANGELES COUNTY, 2017

BACKGROUND

According to the Centers for Disease Control and Prevention (CDC), Los Angeles County was one of the seven highest jurisdictions for potential Zika outbreak based on the extent of *Aedes* infestations, close proximity to the Mexico border, and high population density. LAC has also had a high number of West Nile Virus (WNV) cases compared to the population and relative to the United States over the past six years. Over the last 5 years, LAC has experienced yearly outbreaks of WNV[1] with an average of 221 cases per year, approximately 10% of the national burden (Table 1). Additionally, the significant spread and increased detection of *Aedes* mosquitoes in new local areas, coupled with the high volume of international travel and our dense population, provide the ideal elements for a potential local outbreak of dengue, Chikungunya, or Zika if these viruses are introduced into the environment by an infected traveler (Map 1). Despite these significant health risks, mosquito-borne disease knowledge, perceived risk, and prevention behaviors are low among residents in the county. In September 2017, the LAC Department of Public Health (DPH) organized and coordinated an unprecedented weeklong county-wide boots-on-the-ground outreach campaign (titled: It's Not Just a Bite!)[2] to distribute educational materials aimed to increase WNV and Zika awareness and knowledge as well as promote preventive action. This campaign was the largest door-to-door campaign ever implemented by LAC DPH to fight a communicable disease.

Map 1. Locations of Zika Cases & Aedes Mosquitoes

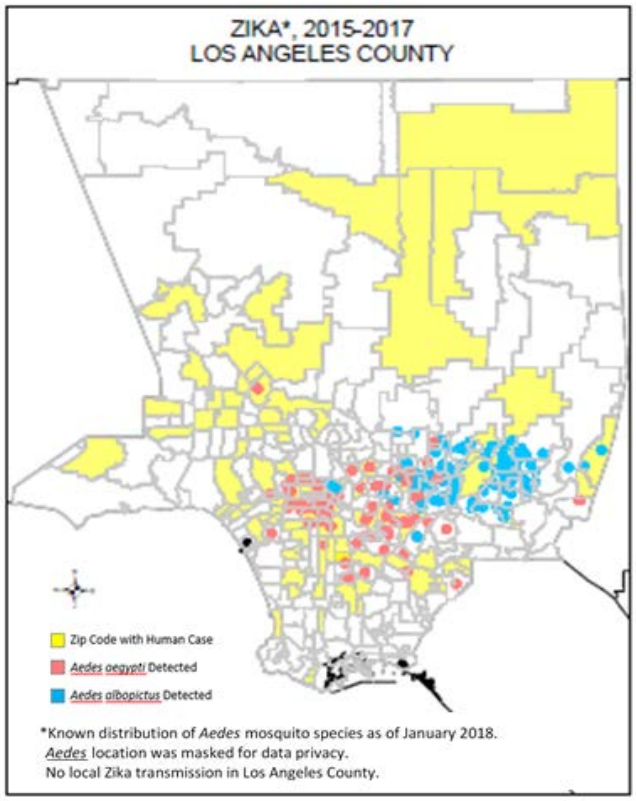


Table 1.
Number of WNV Cases in the United States and LAC, 2013-2017

Total Cases	U.S.	LAC
2013	2900	165
2014	2549	218
2015	2520	300
2016	2437	153
2017	2249	268

[1] LAC DPH. ACDC. West Nile virus data LAC. http://publichealth.lacounty.gov/acd/WNVData.htm
[2] LAC DPH. ACDC. *It's Not Just a Bite*: Mosquito abatement and education campaign 2017. http://publichealth.lacounty.gov/acd/WNVBite.htm

METHODS

Under the emergency response structure, a central command center was organized with four area command centers to coordinate and monitor the event. Several materials were developed including: 1) educational materials for WNV, Zika, and general mosquito-borne disease knowledge, which were translated into multiple languages (English, Spanish, Chinese, Tagalog, and Korean); 2) just-in-time training materials; and 3) scripts for outreach volunteers as well as staff answering the phones. Over 300 County of Los Angeles staff volunteers were recruited from all departments and programs, most of whom did not routinely work with arboviral diseases. DPH deployed 100 two-person teams for 5 days to distribute posters and flyers to public venues across the county including city council halls, libraries, schools, parks and places of worship. The campaign led to the distribution of approximately 55,000 educational materials to over 14,000 venues (Table 2). Environmental Health inspectors further distributed materials during routine site visits at permitted facilities. A digital tool kit was disseminated to city contacts and partners throughout LAC to be used, distributed and printed according to local needs and resources. The on-the-ground effort was complemented by a social media campaign through online platforms such as Twitter, Instagram, and Facebook, which further increased reach of campaign and engaged residents online. The campaign attracted considerable press coverage and media attention which also amplified the reach of these important messages.

Table 2. Venues Reached in Countywide Campaign

Venue	Number
City council/District Office	233
Chamber of Commerce	85
Places of Worship	955
Schools	1,374
Parks	342
Libraries	233
Senior Centers & Residential Facilities	515
Organizations for Pregnant Women	318
Theaters & Outdoor Concert Venues	70
Stores, Pharmacies & Other	9,989
Total	**14,114**

RESULTS

To assess the reach and impact of the outreach campaign, in November 2017, DPH conducted a 27-question two-stage cluster community survey in four LAC cities. This was enacted in partnership with Department of Mental Health Promotores and public health students from the University of California Los Angeles Fielding School of Public Health, California State University Northridge, and University of Southern California. The survey questions assessed exposure to and recall of campaign messages and attempted to identify attitudes and behaviors regarding mosquitoes and mosquito-borne diseases. A total of 464 surveys were completed over two days. Approximately 60% of respondents reported exposure to the campaign through at least one of the following: posters, flyers, community meetings, social media, or news articles. Analyses showed that exposure to the materials was associated with a significant increase in awareness and knowledge of both WNV and Zika (Table 3). Table 4 shows modes of exposure that were significantly associated with increased awareness and/or knowledge of WNV and Zika. Those who

reported exposure to campaign through posters, social media, or news articles had increased Zika awareness and/or knowledge. However, exposure to flyers or community meetings was not found to be associated with a similar increase. Exposure to posters was associated with increased WNV awareness and knowledge, but exposure to flyers, social media, news articles, and community meetings was not. The data did not reveal an increase in mosquito prevention behavior linked to the campaign among those surveyed. Multiple interventions sustained over time, particularly in specific types of materials, may be required to change habits, beliefs and actions regarding prevention of mosquito-borne diseases.

Table 3. Impact of exposure to the campaign

	Exposed	Non-exposed	P-value
Zika			
Awareness	213 (65%)	116 (35%)	<0.001
Knowledge	212 (64%)	118 (36%)	<0.001
Concern	160 (66%)	81 (34%)	0.300
WNV			
Awareness	210 (63%)	126 (38%)	0.002
Knowledge	207 (62%)	127 (38%)	0.008
Concern	129 (62%)	79 (38%)	0.817
Engaged in mosquito prevention	222 (60%)	151 (40%)	0.240

Table 4. Impact of campaign by exposure types

Zika awareness	**OR**	**95% CI**	
Social media	2.61	1.47	4.65
Poster	2.29	1.32	3.96
Zika knowledge			
News articles	1.90	1.22	2.95
Social media	1.84	1.16	2.92
Poster	1.73	1.09	2.74
WNV awareness			
Poster	1.96	1.14	3.38
WNV knowledge			
Poster	1.82	1.17	2.84

DISCUSSION

Overall, the It's Not Just a Bite! campaign was an extraordinary effort to reach and engage the diverse communities in LAC about mosquito-borne disease prevention. In an era where emerging and re-emerging pathogens are increasingly being identified and can spread at record speed through global trade and travel, it is essential for health departments to not only be able to detect these threats but to also be able to rapidly organize and mobilize staff to communicate and engage with the community. The LAC DPH

mosquito-borne disease outreach campaign proved that extensive and rapid community outreach can be successfully accomplished through the mobilization of diverse public health staff and was a valuable learning exercise that can be adapted and quickly deployed for other emergency large-scale responses in the future.

BEYOND CASE COUNTS—CAPTURING A RECORD NUMBER OF DEATHS DUE TO WEST NILE VIRUS IN LOS ANGELES COUNTY BY ENHANCING MONITORING OF PATIENTS

BACKGROUND

In 2017, Los Angeles County (LAC) experienced a record-breaking 27 deaths due to West Nile virus (WNV).[1] That year 11% of the 254 known symptomatic patients stricken with this disease died. Even during the five previous years with unusually high average case counts of 202 cases per year, the number of deaths from WNV peaked at 24 (5-year average of 10.4 deaths per year, 5.3% of those ill).[2] The deaths occurred across racial and geographic boundaries, and had an age range of 59 to 96 years with half being above 75 years of age. Because WNV can often lead to long-term illness or death after a patient leaves the hospital, deaths from WNV infection can be missed with routine monitoring leading to an underestimate of the true impact of this disease.

In the last five years, LAC Department of Public Health (DPH) has received an average of 670 mosquito-borne disease reports per year. The LAC DPH had previously relied upon one investigator to follow up on these reports. Investigations were usually completed before discharge from hospitals and deaths were only captured through informal reporting from providers and family members. Without evidence of death, patients with unknown outcomes were assumed to have survived the disease. Through enhanced monitoring of patients, LAC DPH was able to identify a more accurate number of deaths, and a record number of fatalities from WNV therefore was identified in 2017.

FINDINGS

Grant funding for a new position enabled LAC DPH to conduct additional follow-up of WNV patients where survival was not known. From June through December 2017, a mosquito-borne disease investigator worked with hospital staff to ensure all (100%) discharge information reporting death or survival for hospitalized patients were reported and documented. If discharge information was not available due to prolonged hospital stays, the patient was flagged for additional follow-up in two weeks, at which time, the investigator again requested and reviewed patient discharge information. Repeated requests were often necessary due to lengthy hospitalizations that frequently occur with WNV. This process took a substantial amount of time and effort and increased the estimated hour that is required per case for initial review and confirmation by another hour, essentially doubling the work time for flagged cases. The investigator took on this additional workload while managing the investigations of over 30 cases of WNV a week, which resulted in the addition of 9 reported deaths out of approximately 80 patients. Without grant funding to support another investigator for Zika monitoring, it would have been necessary for the existing investigator to take on Zika investigation responsibilities and we might not have been able to identify the additional fatalities due to this disease. Additional follow-up of WNV survival would have become a lower priority, as it has been in the past, and could not have been completed.

[1] LAC DPH. ACDC. West Nile Virus and Other Arboviral Diseases: 2017. Los Angeles County Epidemiology Final Report. http://publichealth.lacounty.gov/acd/docs/Arbo2017.pdf
[2] LAC DPH. ACDC. West Nile virus data LAC. http://publichealth.lacounty.gov/acd/WNVData.htm

DISCUSSION

The enhanced monitoring of deaths carried out in 2017 highlights the health impact of WNV that was previously under-estimated in LAC. Many residents of our county become severely sick with WNV disease every year since LAC DPH first discovered the virus in the area in 2002. It has been difficult to bring attention and resources to a public health issue that is no longer a new problem and has been portrayed as mild to the majority of those infected, a perception that was supported by lower numbers of deaths. The high number of deaths in the 2017 season brought much needed attention to the severity of WNV and broader recognition that this disease is a dangerous and significant threat in LAC. Awareness has increased not only among public health officials but also among local governments and policy makers. Continuation of improved investigation procedures for WNV deaths will raise the level of concern, provoke new conversations on prevention and promote coordinated action to address the persistent threat of WNV in LAC.

LESSONS LEARNED

Considering the impact of a high number of deaths on the perception of WNV among health officials and the public, LAC DPH is prioritizing the thorough investigation of WNV survival. While LAC DPH still retains the additional investigator supported by grant funding for Zika and other infections for the 2018 season, we will continue to conduct follow-up of our WNV patients without known hospital discharge information and report deaths in a timely manner to boost awareness and promote WNV prevention and control efforts.

It was challenging for a single investigator to conduct enhanced monitoring of patients while conducting routine case investigations of over 250 WNV cases over the six-month WNV season in LAC. As this was the first time this follow up was conducted, there was no precedent and no estimate of additional workload this would entail. Going forward, it will be helpful to establish a protocol for follow up that others can easily follow step by step. In addition, we can explore documenting and reporting other serious effects of WNV illness such as long hospitalization stays and the need for rehabilitation. Without the support of the grant funding source, improved investigations of the effects of WNV could not be carried out and the additional vital information about the true and serious impact of this disease would not be fully recognized.

THE EXPANSION OF THE LOS ANGELES COUNTY WEB-BASED DISEASE SURVEILLANCE SYSTEM TO AN ENTERPRISE INTEGRATED REPORTING, INVESTIGATION, AND SURVEILLANCE SYSTEM

BACKGROUND

Brief History of web-Visual Confidential Morbidity Reporting System

Prior to 1999, the Los Angeles County Department of Public Health (LAC DPH) Acute Communicable Disease Control (ACDC) Program relied on telephone reports or paper-based reporting, via fax and mail. These reports were then subsequently manually entered for data collection of disease incidents. This low-technology reporting and tracking method required a significant amount of paperwork and person hours and potentially could cause reporting delays and quality control issues. Beginning in 2000, ACDC enacted a web-based, centralized repository for disease reports, laboratory reports, foodborne illness reports and outbreaks. The system is called the visual Confidential Morbidity Reporting (vCMR)[1] system.

vCMR serves as primary disease surveillance system for ACDC and as a disease repository for several LAC DPH programs. vCMR supports the rapid exchange of electronic public health information between community practitioners (through the web Community Reporting Module) and electronic laboratory reporting (ELR). The system provides ACDC with a cohesive surveillance system to rapidly detect, identify, and investigate reportable communicable diseases. Over the years, ACDC implemented key configurations and modifications to support LAC DPH's unique needs including maintenance of historical data and images, electronic laboratory reporting of national, state, and local disease. vCMR also capably supports various workflows which allow public health nurses, investigators, and health services to cooperatively share information and manage cases and outbreaks. LAC DPH's ability to develop vCMR with differing key configurations and modifications is reflective of the unique needs of a large local jurisdiction. Although vCMR supported some of the data management needs of these programs, there are several other LAC DPH programs that primarily use respective legacy database systems and paper-based forms. These programs include the Division of STD and HIV Programs (DHSP)[2], the Tuberculosis Control Program (TBCP)[3], and Veterinary Public Health (VPH)[4].

LAC DPH Evaluates an Electronic Enterprise Solution for Disease Surveillance and Investigation

In November 2013, an LAC DPH Executive Team formed the Share Disease Surveillance and Control System (SDSCD) Project. Participants collaborated with the LAC DPH Chief Information Office to develop a strategy and approach to implement a shared system for disease surveillance for DPH. Subsequently, in 2014, SDSCS Staff Committee evaluated health information and operational needs across DPH programs. From both a local and national perspective, it was determined that LAC DPH needed to unify its disease programs and provide an integrated enterprise solution that promotes information sharing and digitizing paper-based workflows.

[1] http://www.publichealth.lacounty.gov/acd/vcmr/Index.htm
[2] http://publichealth.lacounty.gov/dhsp/
[3] http://publichealth.lacounty.gov/tb/index.htm
[4] http://publichealth.lacounty.gov/vet/index.htm

LAC DPH programs including Community Health Services (CHS)[5], DHSP, Public Health Nursing Administration (NA)[6], Public Health Investigation (PHI)[7], TBCP, VPH, Vaccine Preventable Disease Control Program (VPDC)[8], Public Health Laboratory (LAPHL)[9], and Environmental Health[10] found that functions of vCMR can effectively meet many of their data needs.

In April 2016, SDSCS Staff Committee detailed their findings and recommendations in the SCSCS Executive Report. After extensive internal analysis of health information systems, workflow, organizational and IT infrastructure, and data and information needs along with external analysis of other public health information system vendors, the SDSCS Staff Committee recommended expansion of vCMR to migrate LAC DPH disease programs on to a common platform. vCMR proved to be the most efficient and economical solution for LAC DPH programs because it was originally designed for LAC and previous investments will be leveraged for future developments. Significant product upgrades and enhancements of vCMR will enable LAC DPH programs to retire legacy systems.

RESULTS

Decision to Upgrade vCMR to be the Enterprise Solution for LAC DPH Programs

In November 2016, the Interim Health Officer and SDSCS Executive Workgroup accepted the SDSCS Staff Committee's recommendation to expand vCMR. Accordingly, vCMR received a new name to reflect its new purpose—The Integrated Reporting, Investigation, and Surveillance System (IRIS). The IRIS Project includes:

- Migration to cloud-based computing technology
- Interfaces with Health Agency, State and partner systems:
    - LAC Department of Health Services' Online Real-time Central Health Information Database ORCHID
    - Electronic Case Reporting (eCR)
    - Electronic initial Case Reporting (EiCR)
- Additional enhancements
    - Improved security (e.g., multi-factor authentication)
    - Physician Portal (e.g., PHL orders)

The IRIS Project Team picks up where the SDSCS Staff Committee concluded and will plan, develop, test, and implement IRIS.

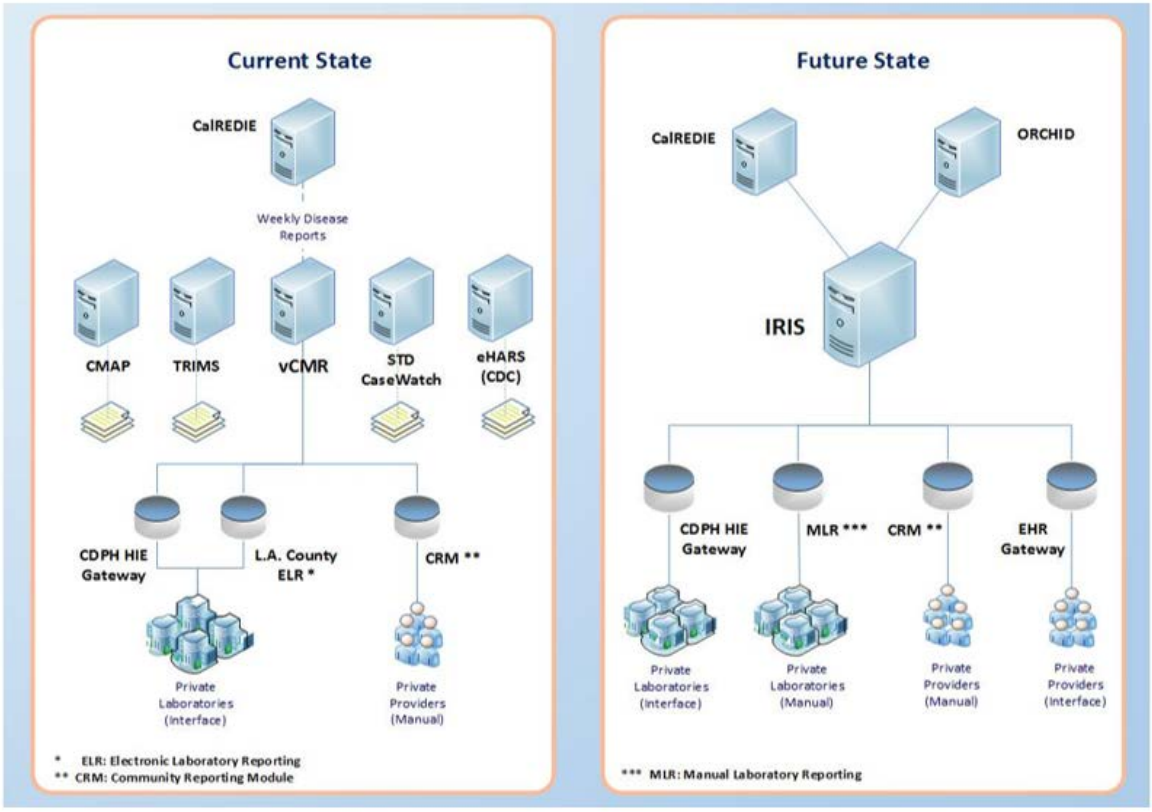
Collaboration among LAC DPH Programs and the Future of IRIS

The IRIS Project Team includes staff from Public Health Information Systems (PHIS), Internal Services Department (ISD), Project Management Office (PMO), County Council, Communicable Disease Control and Prevention (CDCP), and ACDC. The Team will begin meeting and collaborating with DPH programs to

[5] http://www.publichealth.lacounty.gov/chs/index.htm
[6] http://publichealth.lacounty.gov/phn/index.htm
[7] http://publichealth.lacounty.gov/phi/
[8] http://publichealth.lacounty.gov/ip/index.htm
[9] http://publichealth.lacounty.gov/lab/index.htm
[10] http://publichealth.lacounty.gov/eh/index.htm

gather business and functional requirements. The IRIS project team adopted a participatory approach to bring TBCP, DHSP, and VPH programs into IRIS. Other programs (CHS, NA, and PHI) will be given expanded access to and use of IRIS to conduct field work. Subject Matter Experts (SMEs) from each department are included in the planning and development of the IRIS project. The goal of this participatory approach is to ensure all programs have an opportunity to voice respective programmatic needs and establish realistic expectations of IRIS's capabilities for both current and future needs. The expected expansion of IRIS is displayed in Figure 1 below.

Figure 1.
IRIS Current and Future State



In November 2017, staff conducted a Joint Application Development (JAD) Session under the existing contract. The JAD sessions provided the basic IRIS system requirements and solutions and established regular meetings with each programs' SMEs. The IRIS project is now well underway to become the first integrated disease surveillance system for LAC DPH.

EVALUATION OF SYNDROMIC SURVEILLANCE IN DETECTING HEPATITIS A IN LOS ANGELES COUNTY

OVERVIEW

Beginning in November 2016, a hepatitis A virus (HAV) outbreak[1] was identified in San Diego County which subsequently spread to Santa Cruz, Los Angeles, and Monterey Counties. Infections primarily occurred among homeless individuals and those who use illicit drugs. Due to the proximity of Los Angeles County (LAC) to San Diego County and its own large homeless population, on September 19, 2017, the LAC Department of Public Health (LAC DPH) declared an outbreak of HAV[2] among persons who are homeless and/or use illicit (injection and non-injection) drugs. By October 10, 2017, LAC DPH identified 12 local outbreak-related HAV cases. To monitor the impact of the outbreak, LAC DPH's syndromic surveillance team created an HAV syndrome category and began querying local emergency department (ED) data to identify any increases in HAV-related visits.

METHODS

From January 1, 2017 through October 10, 2017, which corresponds to the Centers for Disease Control and Prevention (CDC) weeks 1–41, ED data from all participating syndromic EDs in LAC were queried for patients who reported symptoms and signs of HAV infection. For comparison, ED data from the full 2016 calendar year also was queried. The query consisted of key word searches primarily within the chief complaint field, and if available, from the diagnosis and triage note fields. Based on the CDC clinical description of hepatitis A,[3] the HAV syndrome category was defined as: jaundice (or elevated liver function tests) with nausea or vomiting. Any ED visit that mentioned a diagnosis of hepatitis A also met the syndrome criteria. The resulting line lists were reviewed, and the query parameters were periodically refined to exclude visits unrelated to hepatitis A. For instance, analyses excluded: patients with a previous history of HAV infection or vaccination for hepatitis A, those diagnosed with other types of hepatitis, and patients diagnosed with neonatal jaundice. The syndromic system also was queried for records that matched the 12 initial outbreak-related LAC cases by hospital and admission date. In addition, the chief complaint, diagnosis, and triage note fields were reviewed for any mention of homelessness or illicit drug use (IDU).

RESULTS

For the 2017 time-period (weeks 1–41), the LAC DPH syndromic system detected 158 ED patients meeting the HAV syndrome category criteria. Of these, 12.7% had a diagnosis of HAV, 53.8% had jaundice, 36.7% had elevated liver enzymes, 65.2% had nausea, and 65.8% had vomiting. In 2016, 170 ED patients who met the syndrome criteria were detected: 8.2% had a diagnosis of HAV, 64.1% had jaundice, 32.4% had elevated liver enzymes, 63.5% had nausea, and 71.2% had vomiting. In both years, no indications of homelessness or IDU were identified.

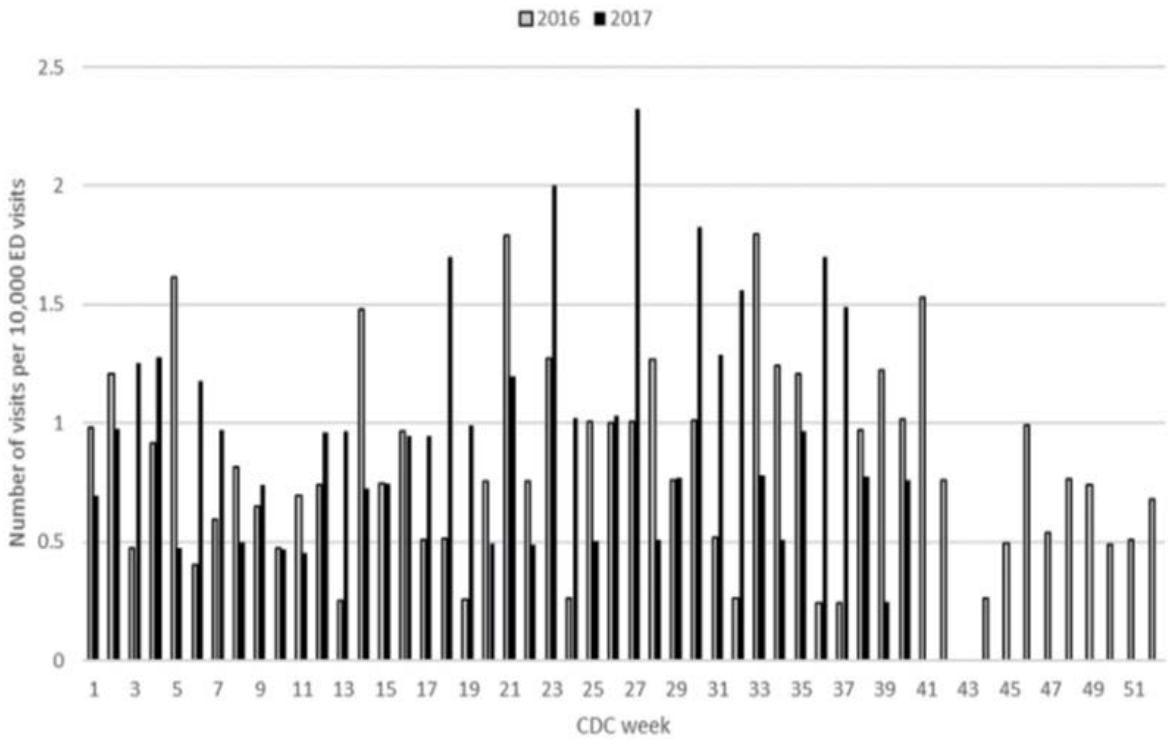
[1] https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Hepatitis-A-Outbreak.aspx
[2] http://publichealth.lacounty.gov/eprp/Health%20Alerts/DPH%20HAN%20Hep%20A%20Outbreak%20091917.pdf
[3] https://wwwn.cdc.gov/nndss/conditions/hepatitis-a-acute/case-definition/2012/

Of the 12 initial and confirmed HAV outbreak-related cases in LAC, one-fourth (n=3) did not go to a hospital, thus did not have any syndromic data. Only two cases went to EDs that do not participate in LAC DPH syndromic surveillance, but a medical chart review showed that they would not have met the syndrome criteria. Of the remaining cases (n=7), all went to a participating syndromic ED, 43% (n=3) met the syndrome criteria, but none of their records included any mention of homelessness or IDU.

DISCUSSION

In 2017, a large hepatitis A outbreak in San Diego County, primarily among individuals who were homeless and/or illicit drug users, prompted the LAC DPH to create a HAV syndrome category and begin querying local participating ED data to monitor for any increases in HAV-related visits. In the end, no major outbreak of HAV occurred in LAC, and no major change was seen in the trend of HAV syndrome visits in 2017 as compared to 2016 (Figure 1). Use of a stricter syndrome definition, such as requiring a specific diagnosis of HAV, may result in underreporting, but may also provide a more accurate baseline for detecting increases and monitoring trends. While the query relied primarily on ED chief complaint, diagnosis and triage notes also proved useful in detecting HAV syndrome visits.

Figure 1.
Proportion of ED Visits Meeting Hepatitis A Syndrome Category Criteria
Los Angeles County, 2016–2017



LIMITATIONS

One of the challenges in monitoring HAV incidence is that the clinical signs and symptoms are very general and may be comparable with many other conditions. An emerging outbreak may not be detected above background levels unless the increase in ED patients with HAV is large or consolidated over time. In addition, variability in data quality in the free text fields such as chief complaint and triage notes may be problematic. Cases will be missed if data fields are not fully and accurately documented, if patients didn't go to a participating syndromic hospital, or if they don't go to a hospital at all. In addition, while many syndromic hospitals now report diagnosis information, this information may be delayed due to the time required for complete laboratory results. Further complicating these findings, none of the confirmed HAV cases that were known to be homeless included any mention of homelessness in their charts. This omission, as well as the omission of IDU status, indicate that these conditions are not currently reliably captured in the syndromic extraction of ED patient records.

CONCLUSIONS

Syndromic surveillance, despite its limitations, remains a valuable complement to electronic laboratory reporting and other traditional reporting mechanisms. Accordingly, LAC DPH will continue to employ syndromic surveillance to facilitate monitoring health issues and disease trends in our county.

Acute Communicable Disease Control Program

Special Studies Report

2017

Los Angeles County
Department of Public Health

Sharon Balter, MD
Director
Acute Communicable Disease Control

ACUTE COMMUNICABLE DISEASE CONTROL
SPECIAL STUDIES REPORT 2017

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Health Information Systems

THE FIRST YEAR OF MANDATED CARBAPENEM-RESISTANT *ENTEROBACTERIACEAE* AND ANTIBIOGRAM REPORTING IN LOS ANGELES COUNTY: 2017

BACKGROUND

Carbapenem-resistant *Enterobacteriaceae* (CRE)[1] are a family of gram-negative bacteria that can be resistant to most antibiotics including the carbapenem class of drugs which are used to treat severe infections. The majority of CRE infections are associated with patients in an acute care hospital or skilled nursing facility (SNF) who are immunocompromised or have invasive devices such as intravenous catheters or are ventilator dependent. The Centers for Disease Control and Prevention (CDC) is concerned about the rapid spread of CRE and has recommended aggressive approaches for identifying and preventing further spread [1].

Using data from 2010–2012, the Los Angeles County Department of Public Health (LAC DPH) assessed the prevalence of CRE in LAC[2] and received over 2,000 laboratory reports of carbapenem-resistant *Klebsiella pneumoniae*, one type of CRE. Prior work by the CDC suggested only sporadic cases of CRE were identified in LAC hospitals and prevalence was unknown. The large number of cases received was substantially higher than anticipated, providing justification for further surveillance.

CDC's National Healthcare Safety Network (NHSN)[3] is an electronic healthcare-associated infection (HAI) tracking system. In California, all acute care hospitals are mandated to report select HAIs to the California Department of Public Health via this system. The NHSN includes an option to report the three most common CRE infections (*Escherichia coli, Enterobacter sp., Klebsiella sp.)* as part of the system's LabID Event module. In April 2010, LAC DPH requested and received voluntary conferral of rights to the NHSN data submitted to California Department of Public Health. On January 19, 2017 a Health Officer Order (HOO)[4] was issued requiring all acute care hospitals and SNFs report CRE infections as well as a facility-specific annual antibiogram to LAC DPH. Antibiogram data provide a comprehensive summary of antimicrobial resistance organisms isolated in healthcare facilities. LAC DPH will use data submitted from healthcare facilities to compile a regional antibiogram to assess resistance and detect new trends in LAC.

METHODS

In California, general acute care hospitals (GACH) and long term acute care hospitals (LTACH) mandatorily report HAI data into NHSN. LAC DPH decided to build CRE reporting into this already established system and expand the data captured by creating a LAC CRE Group which added patient information and key variables needed to assess and describe the epidemiology of CRE in LAC. For surveillance purposes in this study, CRE infections were defined using the NHSN Safety Component Manual[5] as *Enterobacteriaceae* (*E. coli, Enterobacter sp., Klebsiella sp*.) resistant to carbapenem antibiotics or that produce carbapenemases.

[1] https://www.cdc.gov/hai/organisms/cre/definition.html
[2] http://publichealth.lacounty.gov/acd/docs/CRKP_ICHE.pdf
[3] https://www.cdc.gov/nhsn/index.html
[4] http://publichealth.lacounty.gov/acd/docs/CREorder.pdf
[5] https://www.cdc.gov/nhsn/pdfs/pscmanual/pcsmanual_current.pdf

LAC DPH sent detailed instructions for this new reporting requirement to all LAC facilities mandated to report. In addition, a webinar was created to provide step by step guidance on how to join the LAC CRE Group, as well as how to confer rights to LAC DPH and create custom variables. In contrast to GACHs and LTACHs, because most SNFs are not enrolled in the NHSN, a paper reporting form was created for these locations.

The NHSN LAC CRE group was used as the data source for analysis to calculate hospital and community onset rates as well as for descriptive epidemiology statistics. All SNF reports were submitted via paper case report forms and were entered into an Access database by ACDC staff.

For GACHs and LTACHs, CRE rates were analyzed using NHSN calculations of number of infections reported for the numerator and admissions for community-onset (CO) and patient days for healthcare-onset (HO) for the denominator. CO infections were identified within 3 days of admission and HO after 3 days of admission in both GACHs and LTACHs. Stratification of data by onset type in SNFs was not possible since most admission date information was either missing or filled out incorrectly.

According to the Centers for Medicare and Medicaid services (CMS) requirements, GACHs and LTACHs submitted final reports to NHSN by May 15, 2018. Data analysis was performed in May and June 2018. Additional analysis was done comparing CRE case counts between the two NHSN LAC groups; the general LAC group and the LAC CRE Group containing patient information and custom variables.

RESULTS

Out of 83 GACHs and 8 LTACHs in LAC, 72 (86.7%) GACHs and all LTACHs reported at least one CRE event. Pooled LTACH HO rates were higher than GACHs at 1.22 (range 0.50–2.18) infections compared to 0.66

Figure 1.
Boxplots of HO Infection Rate Distribution
GACHs and LTACHs
where >0 cases reported, LAC 2017

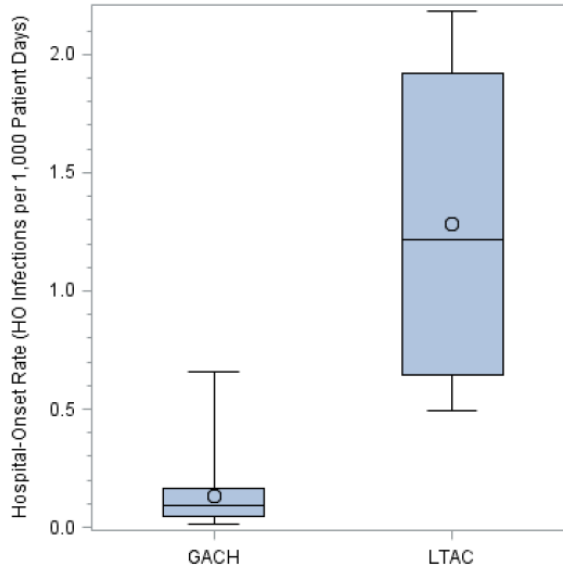
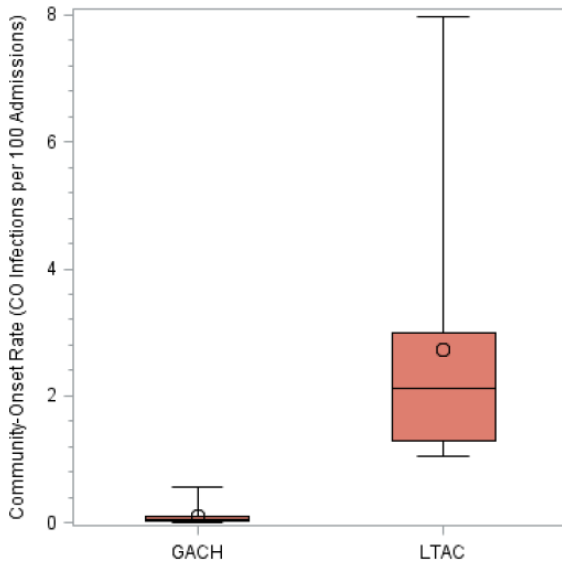


Figure 2.
Boxplots of CO Infection Rate Distribution
GACHs and LTACHs
where >0 cases reported, LAC 2017



(range 0.01–0.66) per 1,000 patient days respectively (**Figure 1**). The pooled CO CRE rates reported from LTACHs were also higher than GACHs, 2.11 (range 1.04–7.97) infections and 0.35 per 100 admissions, respectively (**Figure 2**).

GACH

In GACHs, the majority of healthcare-onset CRE reported was *Klebsiella* (64.9%), followed by *Enterobacter* (22.4%) and *E. coli* (12.7%) (**Table 1**). *Klebsiella* (75.6%) was also the most commonly reported community onset CRE followed by *E. coli* (13.5%) and *Enterobacter* (10.9%).

Table 1.
CRE Organism Type by Healthcare or Community Onset, GACH
LAC, 2017 (N=1280)

	HO		CO		
Organism Type	No.	%	No.	%	**TOTAL**
E. coli	63	12.7	106	13.5	169
Enterobacter	112	22.4	85	10.9	197
Klebsiella	323	64.9	591	75.6	914
TOTAL	**498**	**38.9**	**782**	**61.1**	**1280**

Across the three CRE organisms that were assessed, the most common type of CRE infections reported from GACH were CO genitourinary tract infections, followed by HO respiratory infections (**Table 2**).

Table 2.
CRE Organism by Specimen Source by Healthcare or Community Onset, GACH
LAC, 2017 (N=1280)

	E. coli				Enterobacter				Klebsiella			
	HO		CO		HO		CO		HO		CO	
Specimen Source	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Cardiovascular	7	11.1	10	9.4	6	5.4	3	3.5	38	11.8	43	7.3
Digestive System	7	11.1	1	0.9	6	5.4	3	3.5	7	2.2	25	4.2
Ear, Eye, Nose, Throat	0	0	0	0	0	0	0	0	0	0.0	2	0.3
Genitourinary	14	22.2	69	65.1	14	12.5	44	51.8	73	22.6	312	52.8
Musculoskeletal	0	0.0	0	0.0	0	0.0	2	2.4	1	0.3	0	0.0
Reproductive Male	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3	0	0.0
Respiratory	16	25.4	7	6.6	65	58.0	10	11.8	120	37.2	70	11.8
Skin/Soft tissue	11	17.5	11	10.4	14	12.5	17	20.0	67	20.7	122	20.6
Unspecified	8	12.7	8	7.6	7	6.3	6	7.1	16	5.0	17	2.9
TOTAL	**63**	**4.9**	**106**	**8.3**	**112**	**8.8**	**85**	**6.6**	**323**	**25.2**	**591**	**46.2**

The mean age of CRE HO and CO infections reported from GACH were 63.5 and 67.4 years respectively. Although data on race and ethnicity was collected, much of this data was missing (**Table 3**).

Table 3.
CRE Infections Demographic Data by Healthcare or Community Onset, GACH LAC, 2017 (N=1280)

	HO		CO	
Demographics	No.	%	No.	%
Gender				
Female	187	37.6	371	47.4
Male	311	62.4	411	52.6
Ethnicity* (N=176)				
Hispanic	19	29.2	33	29.7
Non-Hispanic	46	70.8	78	70.3
Mean Age (Median, Range)	63.5	(65, 0–97)	67.4	(70, 0–102)

* Missing 1104; not a required field.

Information on fatalities related to CRE infections was requested; however, a large proportion of these data were missing. Of the 283 CRE events where death data was completed, 38 reported a fatal outcome.

LTACH

In LTACHs, the majority of HO CRE reported was *Klebsiella* (93%), followed by *E. Coli* (4.5%) and *Enterobacter* (2.5%) (**Table 4**). *Klebsiella* (86.2%) was also the most commonly reported CO CRE followed by *Enterobacter* (7.6%) and *E. Coli* (6.3%).

Table 4.
CRE Organism Type by Healthcare or Community Onset, LATCH LAC, 2017 (N=517)

	HO		CO		
Organism Type	No.	%	No.	%	**TOTAL**
E. coli	16	4.5	10	6.3	26
Enterobacter	9	2.5	12	7.6	21
Klebsiella	333	93.0	137	86.2	470
TOTAL	**358**	**69.2**	**159**	**30.8**	**517**

The most common type of CO CRE infections across all three organisms and HO *E. Coli* reported from LTACHs were identified from urine specimens. HO *Enterobacter* and *Klebsiella* were most commonly reported from respiratory sources (**Table 5**).

Table 5.
CRE Specimen Source by Organism by Healthcare or Community Onset, LTACH
LAC, 2017 (N=517)

	E. coli				Enterobacter				Klebsiella			
	HO		CO		HO		CO		HO		CO	
Specimen Source	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Cardiovascular	0	0.0	0	0.0	2	22.2	1	8.3	28	8.4	1	0.7
Digestive System	0	0.0	0	0.0	0	0.0	2	16.7	5	1.5	39	28.5
Genitourinary	9	56.3	9	90.0	0	0.0	6	50.0	117	35.1	62	45.3
Respiratory	3	18.8	1	10.0	6	66.7	2	16.7	141	42.3	24	17.5
Skin/Soft tissue	4	25.0	0	0.0	1	11.1	0	0.0	38	11.4	9	6.6
Unspecified	0	0.0	0	0.0	0	0.0	1	8.3	4	1.2	2	1.5
TOTAL	**16**	**3.1**	**10**	**1.9**	**9**	**1.7**	**12**	**2.3**	**333**	**64.4**	**137**	**26.5**

The mean age of CRE HO and CO infections reported from LTACHs were 69.9 and 66.8 years respectively. Although data on race and ethnicity was collected, because this was not a required field, much of this data was missing and could not be analyzed and reported (**Table 6**).

Table 6.
CRE Infections Demographic Data by Healthcare or Community Onset, LTACH
LAC, 2017 (N=517)

	HO		CO	
Demographics	No.	%	No.	%
Gender				
Female	185	51.7	78	49.0
Male	173	48.3	81	51
Mean Age (Median, Range)	69.9	(72, 0–100)	66.8	(71, 0–96)

Information on fatalities at LTACH hospitals related to CRE infections, like the GACH, was requested, however a large proportion of these data were missing. Of the 59 CRE events where death data was completed, 15 reported a fatal outcome.

SNFs

A total of 56 CRE events were reported by 33 SNFs in 2017. No deaths were reported.

Table 7.
CRE Organism Type, SNF
LAC, 2017 (N=56)

	No.	%
E. coli	9	16.1
Enterobacter	7	12.5
Klebsiella	40	71.4
TOTAL	**56**	

The mean age of SNF CRE infections was 68.8 years, which was similar to both GACHs and LTACHs. CRE in females was more commonly reported from SNFs.

Table 8.
CRE Infections Demographic Data, SNF
LAC, 2017 (N=56)

Demographics	No.	%
Gender (N=56)		
Female	30	53.6
Male	26	46.4
Ethnicity* (N=32)		
Hispanic	14	43.8
Non-Hispanic	18	56.2
Race* (N=50)		
African American	8	16.0
Asian	11	22.0
White	31	62.0
Mean Age (Median, Range)	68.8	(69, 24–94)

* Missing data

The most common specimen source reported in *Klebsiella* and *E. Coli* infections was urine. Sputum was the most common specimen source for *Enterobacter* infections.

Table 9.
CRE Specimen Source by Organism, SNF
LAC, 2017 (N=56)

Specimen Source[1]	*E. coli*		Enterobacter		Klebsiella	
	No.	%	No.	%	No.	%
Blood	0	0.0	1	14.3	1	2.5
Sputum	1	11.1	5	71.4	7	17.5
Wound	3	33.3	0	0.0	0	0
Urine	5	55.6	0	0.0	24	60
Rectal	0	0.0	0	0.0	3	7.5
Other[2]	0	0.0	0	0.0	3	7.5
No Source	0	0.0	1	14.3	3	7.5
TOTAL[3]	**9**	**16.1**	**7**	**12.5**	**40**	**71.4**

1. Multiple specimen source listed for some cases.
2. Tracheal and gastrostomy tube.
3. No organism specified for 3 cases.

The majority of CRE events reported by SNFs list the patient was admitted from a GACH (60.7%).

Table 10.
Admissions from Facility Type, SNFs
LAC, 2017 (N=56)

Facility Type	Admissions	
	No.	%
Hospital	34	60.7
LTACH	5	8.9
SNF	2	3.6
Home	0	0
Missing	15	26.8
TOTAL	**56**	

Data Analysis

For GACHs and LTACHs, 19 hospitals were found to have reporting issues in the CRE Group including not joining or conferring rights, incorrect reporting plans, or a lag in data entry. Communication addressing the specific issue identified for each hospital was generated and sent via email to the hospital infection preventionist by the respective LAC DPH liaison public health nurse and an epidemiologist. If additional troubleshooting or technical assistance was required, the assigned epidemiologist would follow-up with the infection preventionist. By May 2018, all 19 with reporting issues had corrected the problems. In addition, 2018 reporting plans were checked to ensure the corrections had carried over to the new year.

Forty duplicates were identified within NHSN data. Efforts were made to reach out to NHSN to troubleshoot how this occurred and make appropriate corrections to avoid future duplicate event entry.

SNF data was merged with the GACH and LTACH data to check for duplicate reporting. Multiple errors were identified including CRE reported by a SNF that should have or had already been reported by the ordering acute care hospital, incorrect date of current admission to the SNF, reporting a history of CRE (no current lab), and reporting on different organisms (i.e. *Pseudomonas*) not covered by the HOO. Analysis of SNF reports resulted in identification of two CRE reports that should have been reported by the acute care hospital but were missed. Five cases had already been reported in NHSN by the acute care hospital. These errors were communicated to the appropriate facilities.

Antibiogram

All 92 acute care hospitals (including LTACHs) in LAC submitted antibiograms during the first year of the HOO. With this information, the first LAC regional antibiogram[6] was completed, published, and distributed in January 2018 and is posted on the ACDC website. Data entry and analysis is currently underway for 2017 data.

DISCUSSION

Overall the first year of CRE reporting in LAC generated valuable data and identified high rates of CRE in healthcare facilities, especially among LTACHs. This information will help guide targeted prevention efforts moving forward. Reporting errors were identified from GACHs, LTACHs, and SNFs and efforts have been made to correct discrepancies both retrospectively and going forward.

LIMITATIONS

All the custom variables that LAC DPH requested in NHSN reporting plans exhibited low response rates resulting in missing data. We plan to address these reporting gaps by identifying facilities that did not complete the custom variable fields and reaching out to them to notify them and provide additional assistance as needed.

There was no NHSN data validation done to ensure that hospitals are reporting CRE accurately and thoroughly. Historically, the California Department of Public Health has performed hospital data entry validation for other diseases, however this verification has not been conducted as CRE is not reportable at the state level. Currently, data validation in SNFs is not feasible as there are over 300 SNFs in LAC.

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[6] http://publichealth.lacounty.gov/acd/AntibiogramData.htm

ACTIVATING VITAL ADVANCES IN ANTIMICROBIAL RESISTANCE TESTING AMONG LOS ANGELES COUNTY HEALTHCARE FACILITIES

BACKGROUND

Antibiotic resistance (AR) and multi-drug resistant organisms (MDRO) are an intensifying public health threat. Carbapenem-resistant Enterobacteriaceae (CRE) are especially concerning. CRE mortality rates are often as high as 30-40% [1-5] due to limited treatment options. In addition, many CRE can spread AR to other bacteria via plasmid-encoded genetic resistance mechanisms, called carbapenemases [6]. Given this, it is not surprising that CRE has been classified as a critically important and urgent global threat by the Centers for Disease Control and Prevention (CDC) and the World Health Organization [7-8]. While CRE has been steadily increasing in the United States [9-10], Los Angeles County (LAC) has been identified as a hotspot for CRE infections because of its large number of healthcare facilities and its international patient population [11], which create a complex system within which CRE and other MDROs can readily spread.

Early administration of microbiologically active antimicrobial therapy can reduce morbidity and mortality from CRE infections [5, 12-14]. This depends on accurate determination of the minimum inhibitory concentration (MIC) of the infecting organism to antibiotics. Interpretation of the MIC results is conducted using breakpoints, which categorize whether an antibiotic is resistant or susceptible to any given antibiotic and determine the probability of treatment success. The Clinical Laboratory Standards Institute (CLSI) provides guidance on what methodologies clinical laboratories should use to detect CRE and other nosocomial pathogens.

The CLSI updated the carbapenem MIC breakpoints for Enterobacteriaceae in 2010 based on data from multiple clinical studies demonstrating that ongoing use of the previous breakpoints resulted in higher patient mortality [3, 4]. Failure to update breakpoints also impacted infection control measures, which is estimated to contribute to a 3-5% annual spread of CRE [15]. Ongoing use of outdated CLSI breakpoints will result in the failure to recognize clinically and epidemiologically concerning MDROs such as CRE.

It is thus imperative that clinical laboratories are up-to-date on their CRE detection methods. To assess CRE detection practices amongst clinical laboratories, the Acute Communicable Disease Control Healthcare Outreach Unit (HOU) partnered with California Department of Public Health and academic investigators to conduct the California Antimicrobial Resistance Laboratory Network Assessment (CARLA) survey in 2015. The CARLA survey identified that 42% of hospital laboratories in LAC used outdated carbapenem breakpoints for Enterobacteriaceae [16]. Furthermore, many laboratories did not perform carbapenemase testing, as recommended by CLSI to ensure detection of carbapenemase-producing Enterobacteriaceae with use of outdated breakpoints [16].

Clinical laboratories must take manual steps to ensure their antimicrobial susceptibility testing (AST) instruments are up-to-date. However, the HOU theorized that lack of awareness of the problems

surrounding use of outdated breakpoints and/or technical knowledge of how to update breakpoints caused the delayed uptake of revised breakpoints. This prompted our initiative to better understand why laboratories failed to update breakpoints and, in turn, assist them in implementing up-to-date CRE detection methods.

OBJECTIVE

This report describes the HOU's efforts to update carbapenem breakpoints amongst targeted clinical laboratories in LAC to improve detection of CRE.

METHODS

HOU established the antimicrobial resistance/antimicrobial stewardship (AR/AS) team, composed of five HOU liaison public health nurses (LPHNs), an epidemiologist, and an infectious disease physician serving as the HOU's AR expert. Targeted hospitals were chosen based upon their responses to the question of using outdated CRE breakpoints in the CARLA survey. To be included in our target list, the labs had to respond with i or ii to the following question: What breakpoints does your laboratory use for carbapenems when testing Enterobacteriaceae?

i. Pre-2010 breakpoints only ←
ii. Pre-2010 breakpoints combined with tests for carbapenemase production ←
iii. Current CLSI M100 S25 breakpoints
iv. Other

The AR/AS team collaborated with CDC and local microbiology experts to develop a protocol that guides clinical laboratories through the process of updating CRE detection methods, which includes:

1. ordering verification panels from the Food and Drug Administration (FDA)/CDC AR Isolate Bank;
2. updating breakpoints in the AST instrument, which may involve scheduling a visit with the local service technician of their AST device manufacturer; and
3. conducting a verification study to ensure accurate results.

The team first conducted in-person visits with each hospital's laboratory director, microbiology supervisor, antimicrobial stewardship chair, and infection preventionist to discuss unique issues that were impacting their CRE detection methods and provide initial recommendations. Following the initial visit, the AR/AS team provided each hospital with the CRE breakpoint update protocol, sample verification study protocol, and template to document the results of the verification studies.

During follow-up consultations, the AR expert provided additional support, which included facilitating communication with the CDC, FDA, and local laboratory equipment representatives. The AR/AS team also checked in with each hospital regularly to encourage progress, and that their methods were thoroughly implemented.

RESULTS

Between July to August 2017, the AR/AS team conducted outreach to 41 hospitals who responded with i or ii to the question above. The survey was sent out to all hospitals in California in 2015, including 97 in Los Angeles (at the time of the survey). All 41 laboratories had in person AR/AS team visits. At the time of

the initial AR/AS visit, 7 (17%) had updated to the current CLSI breakpoint following the CARLA survey, and were not targeted for further follow-up.

Of the remaining 34 laboratories, 27 (79.4%) assumed their AST instruments were using current breakpoints. Half of laboratories (17, 50%) were uncertain of how to approach changing breakpoints on their AST instrument, and 10 (29.4%) indicated they lacked the resources to perform a verification study. Only 7 (20.5%) facilities were familiar with the FDA/CDC AR Isolate Bank as a resource for verification studies. All 34 laboratories using historical breakpoints were accredited, most were accredited by the College of American Pathologists (29, 85%), the others by the Joint Commission (5, 15%). Laboratory staffing included dedicated microbiology staff in 28 (82%) laboratories, a laboratory director with a specialization in microbiology (MD or PhD) in 5 (15%), and a clinical laboratory scientist in 29 (85%).

All 34 hospital laboratories agreed to work toward updating carbapenem breakpoints following the AR/AS team visit. After one year of follow-up, 15 laboratories (47%) successfully updated breakpoints; 12 (35%) received isolates but did not update; and 6 (18%) are planning to complete the update in 2018. Common barriers for the 19 laboratories failing to update the breakpoint included: too much clinical work and/or not enough staffing (12, 63%) and inability to update the laboratory information systems or electronic medical record (5, 26%). Other less common reasons included waiting on new testing platforms (n=2) and changes in laboratory staff (n=3).

DISCUSSION

Ongoing use of outdated carbapenem breakpoints by clinical laboratories is a public health problem. Failure to update breakpoints hampers infection control initiatives, hinders CRE treatment success, and helps fuel spread of CRE [2-5, 15]. Prior to the AR/AS visit, most microbiology laboratory personnel did not feel empowered to make changes, even when they were aware of the problem. However, with the cooperation of antimicrobial stewardship and infection control leadership—in conjunction with ongoing follow-up by the AR/AS team—the laboratories gained vital support for the breakpoint update initiative.

The AR/AS team visits allowed HOU to use existing resources for targeted outreach to engage hospital laboratories in updating carbapenem breakpoints. The key to success of the project was developing a strong system of collaborations with our CDC partners, local experts, representatives of AST device manufacturers, and individual hospital staff—especially the clinical laboratory scientist who typically leads the laboratory methodology validation efforts. The process of verifying new MIC breakpoints is outside the scope of typical laboratory work-flow, so many facilities needed encouragement and administrative support to complete the process. Thanks to the AR/AS team visits, all (100%) of targeted hospitals began the process of updating breakpoints and nearly half of the hospital laboratories completed the update within one year.

Physicians and other healthcare staff depend on the assurance that the results provided by their laboratory are accurate, significant, and clinically relevant. By improving laboratory detection methods, CRE will now be correctly classified in LAC hospital laboratories. This will decrease inappropriate antibiotic therapy and in turn decrease the risk of death from CRE infection. Now that CRE can be accurately

detected and reported, HOU can also improve our efforts to contain the spread of CRE within LAC. In addition, because LAC has a large international patient population, this project likely will also decrease the spread of CRE globally.

There are several limitations to this intervention. While the AR/AS team was successful with improving updated carbapenem MIC breakpoint usage in LAC, the HOU experience may not be generalizable to other public health jurisdictions. The AR/AS team includes academic investigators in infectious disease and microbiology. However, we hope that making our resources available to other jurisdictions will make our initiative more widely adoptable. To date, the FDA—which dictates which breakpoints AST instruments must use—has officially recognized many but not all CLSI breakpoints, which complicates the process of updating AST systems in a timely manner. Additionally, HOU did not collect information on how the breakpoint initiative impacted patient outcomes, infection prevention practices, antimicrobial prescribing, or the incidence rate of CRE in LAC.

Despite the large number of hospital laboratories in LAC using outdated CRE detection methods and limited staff resources, this project was a success. The AR/AS team's findings informed a need to do further broad education to improve AR detection practices across LAC. This project also greatly improved HOU's rapport with hospital laboratories, which is critical to detect and contain CRE and other AR bacteria of epidemiological concern. Now that these partnerships have been established, HOU will be able to continue to improve laboratory capabilities in our jurisdiction in the global fight against AR.

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USING CDC'S CORE ELEMENTS OF OUTPATIENT STEWARDSHIP TO IMPROVE ANTIBIOTIC PRESCRIBING PRACTICES IN LOS ANGELES COUNTY

BACKGROUND

Inappropriate antibiotic use is the primary contributor to the spread of antibiotic resistance. To date, most efforts by the Los Angeles County Department of Public Health (LAC DPH) to build antimicrobial stewardship capacity has focused on inpatient settings. However, estimates are that more than 30 percent of antibiotics prescribed in outpatient settings are unnecessary [1]. Primary care clinics and clinicians prescribe approximately half of all outpatient antibiotics in the United States [2]. Outpatient antibiotic prescribing, in particular, has been demonstrated to be directly associated with antimicrobial resistance [3].

Antimicrobial stewardship efforts have been demonstrated to influence antimicrobial prescribing, microbial resistance, and costs. Antimicrobial stewardship has become a current standard of care in medical practice and interventions to improve antibiotic prescribing are supported by the California Medical Foundation, the Infectious Disease Society of America (IDSA), and the Centers for Disease Control and Prevention (CDC) [4]. Unfortunately, outpatient antimicrobial stewardship is neither uniform nor widely adopted across LAC.

The CDC Core Elements of Outpatient Antibiotic Stewardship note four key areas of stewardship: commitment, action for policy and practice, tracking and reporting, and education and expertise [5]. A review of the literature demonstrated that individual interventions targeting these four areas had varying degrees of effectiveness; however, no outpatient antimicrobial stewardship program meeting all Core Elements has been assessed for effectiveness nor implementation characteristics studied [6].

The objective of Targeting Appropriate Prescribing in Outpatient settings (TAP OUT) is to assist outpatient clinics to implement an antimicrobial stewardship program. The outcome of interest is inappropriate antibiotic prescribing for acute upper respiratory infections (URI).

METHODS

LAC DPH recruited 20 primary care and 3 urgent care clinics, representing 208 providers, to participate in the TAP OUT project. The clinics are all part of the same medical network. LAC DPH staff partnered with the clinics' stewardship team, which included the medical director, infection preventionist, and two physician stewardship champions, to develop an antimicrobial stewardship program that met all the CDC Core Elements of Outpatient Stewardship. The stewardship program implemented includes public commitment, communication skills training, clinical treatment education, and prescribing audits. LAC DPH and the clinic stewardship team adapted evidence-based strategies to meet the needs and preferences of the clinic providers and patients. To measure the effectiveness of the program, patient encounter data were analyzed for changes in inappropriate antibiotic prescribing for URI between the 2016–17 and 2017–18 influenza seasons. Inappropriate antibiotic prescribing was defined using California Medical

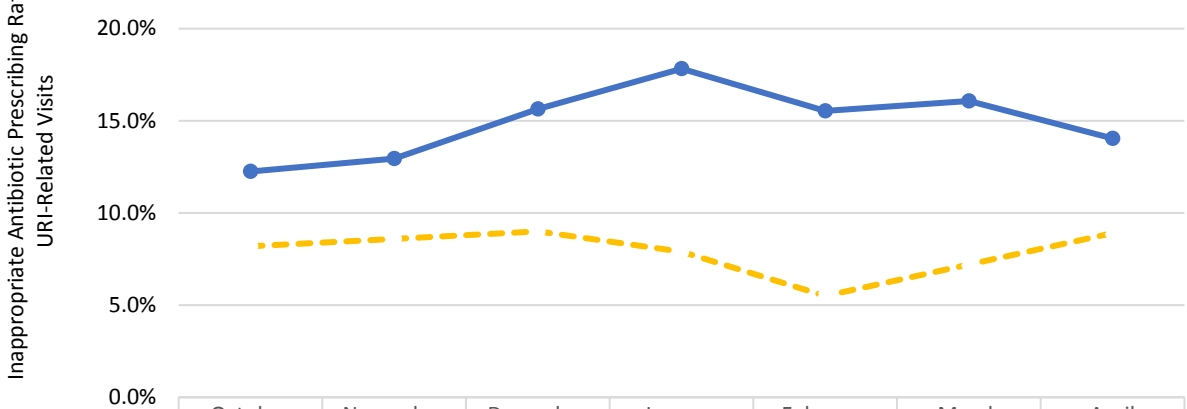
Association Foundation Alliance Working for Antibiotic Resistance Education[1] guidelines. The definition of URI was based on analysis of International Classification of Diseases[2] Tenth Edition encounter codes. Patients currently on immunomodulatory therapy were excluded from the analysis. To evaluate implementation process characteristics, a key informant interview was conducted.

RESULTS

A total of 20 primary care and 3 urgent care clinics, representing 208 providers, participated in TAP OUT (see Methods). The baseline estimated inappropriate antibiotic prescribing rate for URI was 15.5% amongst all prescribers (range: 0-100%). During the intervention period, the estimated inappropriate prescribing rate decreased to 7.6% (51% reduction, p<0.0001). Monthly rates during both periods are described in Figure 1.

Several key implementation elements of implementation were identified, such as leadership buy-in and on-site peer champions. Visible and recurring prescribing reminders were useful. To improve adoption, the ASP was integrated into existing workflow. Costs were limited and related to information technology resources to analyze prescribing data and create feedback reports.

Figure 1. Inappropriate Antibiotic Prescribing Rate for URI-Related Visits LAC, October–April 2016–2017 vs. 2017–2018



	October	November	December	January	February	March	April
2016-17	12.3%	13.0%	15.6%	17.8%	15.5%	16.1%	14.1%
2017-18	8.2%	8.6%	9.0%	7.9%	5.5%	7.2%	8.9%

DISCUSSION

The TAP OUT antimicrobial stewardship program was shown to successfully decrease inappropriate antibiotic prescribing for acute upper respiratory infection diagnoses. The program compiled low-cost, highly effective interventions into a program that met all CDC Core Elements of Outpatient Stewardship. Further, the program focused on interventions aimed at altering prescriber behavior, rather than patient

[1] Physicians for a Healthy California (PHC). Alliance Working for Antibiotic Resistance Education (AWARE). https://www.phcdocs.org/aware/

[2] World Health Organization (WHO). Family of International Classifications. http://www.who.int/classifications/en/

education or ordering restrictions in the electronic health records. Interventions targeting prescribing behavior change of healthcare providers have been demonstrated to be effective in decreasing overall and inappropriate antibiotic prescribing [7]. This project adds to the scant literature on how antibiotic stewardship programs can be implemented in outpatient settings.

When planning and implementing the stewardship program, many barriers were identified to changing healthcare providers' prescribing behaviors. Concerns regarding patient satisfaction and competing priorities were discussed with the clinics' medical director. In addition, obtaining patient encounter data to measure the effectiveness of the program involved lengthy discussions with the clinic information technology staff. However, buy-in from clinic champions was key in deciding which stewardship strategies would work in their unique setting. The clinics were motivated to lower their antibiotic prescribing rate for URI as it is tied to Centers for Medicare and Medicaid Services reimbursement.

There are some limitations of the project. First, all sites were part of the same medical network; thus, certain implementation results may not be generalizable to the general primary and urgent care population. Second, because each patient visit was de-identified, we could not link patient visits to understand the full medical history. It is possible that subsequent visits indicate a bacterial etiology, but this would not have been able to be assessed through a single visit record. Lastly, results were dependent on electronic health record and billing data, which are imperfect for performance measurement, though have demonstrated validity [8].

Having demonstrated effective implementation of the stewardship program, LAC DPH will disseminate best practices to outpatient providers county-wide. We hope to study the effects of the stewardship program on other infection types, including urinary tract infections.

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2017 SYMPOSIUM ON INFECTION PREVENTION CONTROL IN SKILLED NURSING FACILITIES

OVERVIEW

On September 28, 2017, the Los Angeles County Department of Public Health (LAC DPH) Acute Communicable Disease Control (ACDC) program held a symposium for key county skilled nursing facility (SNF) staff responsible for infectious disease outbreak prevention and control. This is the second annual SNF symposium ACDC has held. For information on the first symposium, see ACDC's 2016 Special Report.[1] Presentations and related materials for both the 2016 and 2017 symposiums are archived on the ACDC SNF webpage.[2]

During the 2017 symposium, representatives from local SNFs included directors of nursing, administrators, and infection preventionists. Due to the large number of SNFs in LAC, over 315, attendance was limited to two representatives per facility. The goals of the symposium were to improve partnerships between SNFs and LAC DPH as well as to improve prevention and control of infectious diseases in SNF settings. The symposium also strived to implement antimicrobial stewardship programs and better management of multidrug-resistant organisms (MDROs) in SNFs. Other topics covered included: immunization recommendations for healthcare personnel and residents, reporting requirements for Carbapenem-resistant Enterobacteriaceae (CRE), and how to protect employees from blood-borne pathogens and aerosol transmissible diseases.

SUMMARY

A total of 108 attendees from 65 local SNFs attended the day-long event. In addition, the event included 23 attendees from ACDC, the Association for Professionals in Infection Control and Epidemiology (APIC) Greater LA Chapter, representatives from several nursing home consulting companies, nursing home corporate consultants, laboratory serving SNFs, and partnering agencies.

The topics for the 2017 symposium focused primarily on the prevention and control of infectious diseases that are common in SNF settings and greatly impact the vulnerable population cared for in these settings. The presenters were representatives from ACDC, LAC DPH's Vaccine Preventable Disease Control (VPDC) Program, guest speakers from UCLA, and other organizations. The agenda was as follows:

[1] ACDC. 2016 Special Studies Report.
http://publichealth.lacounty.gov/acd/pubs/reports/2016SpecialStudiesReport.pdf
[2] ACDC. Skilled Nursing Facilities: Infection Prevention Resources and Guidelines.
http://publichealth.lacounty.gov/acd/SNF.htm

AGENDA	
8:00 am – 8:30 am	**Registration** Breakfast & Coffee
8:30 am – 8:50am	**Introduction & Welcome** *Harriett Pitt, RN, BSN, MS, CIC* - ***Moderator*** LAC DPH – Acute Communicable Disease Control *Sharon Balter, MD* Chief, LAC DPH Acute Communicable Control Program
8:50 am – 9:50 am	**Prevention and Management of Carbapenem-resistant Enterobacteriaceae and other Multi-Drug Resistant Organisms** *Dawn Terashita, MD, MPH* LAC DPH – Acute Communicable Disease Control
9:50 am – 10:00 am	**Break**
10:00 am – 11:00 am	**Immunization for Health Care Personnel and Residents at Skilled Nursing Facilities** *Melanie Barr, RN, MSN, CNS* LAC DPH – Vaccine Preventable Disease Control
11:00 am – 12:30 pm	**Protecting Skilled Nursing Facility Employees from Blood-borne Pathogens and Aerosol Transmissible Diseases** *Kevin Riley, PhD, MPH* UCLA Labor Occupational Safety and Health Program
12:30 pm – 1:15 pm	**Lunch**
1:15 pm – 2:30 pm	**Antimicrobial Stewardship: Doing Our Part to Help Solve the Problems in Healthcare** *James McKinnell, MD* LAC DPH – Acute Communicable Disease Control
2:30 pm – 2:40pm	**Break**
2:40 pm – 3:40 pm	**Progress and Outcome Metrics for a Collaborative Antibiotic Stewardship Program Between Cedars-Sinai and Local Skilled Nursing Facilities to Improve Management of UTIs** *Haoshu (Hali) Yang, Pharm D* Cedars Sinai Medical Center
3:40 pm – 4:00 pm	**Closing Remarks & Evaluations**

In addition to presentations, each attendee received a folder with *APIC Infection Prevention Guide to Long-Term Care* and the following materials:

- LAC List of Reportable Diseases and Conditions
- CDPH Pneumococcal Vaccine Timing Flow Chart- For Adults

- LAC DPH: Infection Prevention Transfer Form
- Additional Resource Materials for Infection Prevention & Control
- Listing of Useful Resources and Websites
- Packets with
    - Influenza Outbreak Prevention and Control Guidelines
    - Scabies Prevention and Control Guidelines: Acute and Long-Term Care Facilities
    - Norovirus Outbreak Prevention Toolkit
    - Health Education Materials for Influenza and Scabies
- Antibiotic Stewardship materials – posters, educational brochures, etc.
    - "Treat True Infections, Not Colonization" Poster (English)
    - "Reassess Antibiotics at 48 Hours" Poster (English)
    - "Cold or Flu. Antibiotics Don't Work for You." (English/Spanish)

Overall, the symposium was very well received, and the representatives from the SNFs urged LAC DPH to continue to hold additional trainings to provide further guidance on topics viral to SNFs. ACDC plans to hold another symposium in 2018 as these trainings have become an annual event.

OUTBREAK OF EPIDEMIC KERATOCONJUNCTIVITIS CAUSED BY HUMAN ADENOVIRUS TYPE D53 IN AN OPTOMETRY CLINIC, 2017

BACKGROUND

On June 22, 2017, the Los Angeles County Department of Public Health (LAC DPH) was notified by a medical epidemiologist at Hospital X of seven patients seen at an optometry clinic (Clinic A) on June 8, 2017 who later developed symptoms of epidemic keratoconjunctivitis (EKC).[1] This report prompted a cluster investigation by ACDC.

EKC is caused by adenovirus.[2] It is a contagious, severe form of conjunctivitis that can cause pain and blurry vision for up to four weeks [1]. EKC associated with adenovirus is a frequent cause of outbreaks in eye care settings. Adenovirus is concerning as a healthcare-associated infection due to its high transmission rate, significant ocular morbidity, and hardiness in healthcare environments [2]. Prior outbreaks have been associated with breakdowns in infection prevention practice, including eye drop administration, glove use, and instrument disinfection [3].

This report describes ACDC's outbreak investigation and the measures taken to prevent future infections and enhance patient safety.

METHODS

For this investigation, a ***case*** was defined as an individual who had symptom onset between June 5–July 3, 2017, and had either:

1) a diagnosis by an ophthalmologist or optometrist of EKC, adenoviral conjunctivitis, or viral conjunctivitis; or
2) laboratory confirmation of adenovirus from a specimen collected by conjunctival swab.

A ***healthcare-linked case*** was defined as a person with a diagnosis or laboratory confirmation (as described in 1 and 2 above) who had visited the optometry clinic (Clinic A) between June 5–July 3, 2017 and had symptom onset within ≤21 days of that visit.

A ***household case*** was defined as a household and/or family contact of another case, with a diagnosis or laboratory confirmation (as described in 1 and 2 above) and did not visit the clinic prior to symptom onset.

Case finding was conducted by phone and medical record review. Medical records from Clinic A were surveyed for all patients with an EKC diagnosis between June 7-July 3. To better understand if healthcare-linked transmission possibly occurred during the period when symptomatic EKC case patients presented at the clinic, all patients who visited the clinic during June 7-21 were called and asked if they were

[1] https://en.wikipedia.org/wiki/Keratoconjunctivitis
[2] https://www.cdc.gov/adenovirus/index.html

experiencing symptoms of EKC. Case characteristics and exposures were ascertained during medical record review.

On June 23rd, ACDC conducted an announced site visit to walk through the premises, observe infection prevention practices, interview staff members, and review infection prevention policies.

Cell culture isolates or conjunctival swab specimens from case patients were sent to the LAC DPH Public Health Laboratory (PHL) for conventional and shell vial culture and detection by fluorescent monoclonal antibody staining. Specimens from additional case patients were tested by viral culture at the laboratory of Hospital X. Specimens were then submitted to the California Department of Public Health Viral and Rickettsial Disease Laboratory (CDPH-VRDL) by PHL for adenovirus detection and molecular typing by sequence analysis of the hypervariable region of the adenovirus hexon gene and the adenovirus group-specific region of the fiber gene [4, 5].

RESULTS

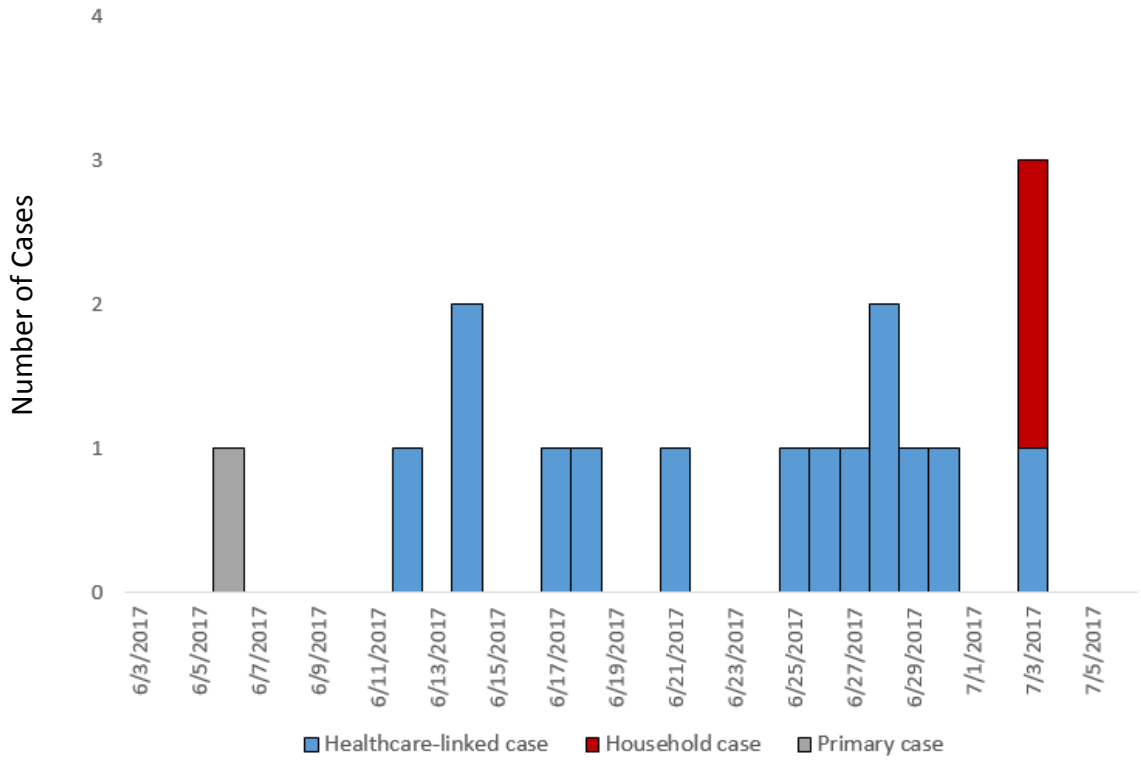
Medical record review identified 17 cases. Among 805 patients contacted by phone, none reported EKC symptoms. Fourteen patients met the case definition of a healthcare-linked case, and one patient appeared to be the source of introduction into the clinic (hereafter called the primary case). Two additional cases met the household case definition—both reported a symptomatic spouse prior to their illness.

The median patient age of cases was 62 years (range: 43–78 years), and 12 cases (70.6%) were women. No hospitalizations resulted from infection, though seven cases (41.2%) had more than one symptomatic visit to the clinic, a hospital emergency department, or an urgent care center. Cases presented with symptoms consistent with EKC, including redness (14, 82.3%) and discharge (13, 76.5%). The mean incubation period was 9 days (range: 5-19 days).

Review of healthcare-linked case-patient clinic visit dates prior to symptom onset revealed two apparent clusters. The primary case visited the clinic on June 7th with symptoms consistent with EKC, before the initial visits of seven additional case-patients on June 7th and June 8th. On June 20th, one of the case-patients from the first cluster visited the clinic with EKC symptoms. Another seven case-patients visited the clinic after this case-patient on June 20th and June 21st, prior to the onset of their EKC symptoms (**Figure 1**).

Medical chart review indicated common exposures among the 14 healthcare-linked case-patients—all were seen by the same optometrist in the same exam room following the primary case. No healthcare personnel reported EKC symptoms before or during the outbreak period. Among the 14 healthcare-linked case-patients, other exposures included slit lamp contact (13, 92.3%), tonometry (12, 85.7%), and multi-dose dilating eye drops (10, 66.7%). Use of multi-dose sodium fluorescein eye drops was noted for 6 (86%) cases in the first cluster and none in the second cluster. During the primary case's initial clinic visit on June 7th, the primary case received sodium fluorescein drops from a multi-use vial and had a slit lamp examination; the slit lamp is connected to the tonometer.

Figure 1.
Cases of Epidemic Keratoconjunctivitis by Date of Symptom Onset
Optometry Clinic, LAC, June 3–July 6, 2017
(N=17)



The clinic closed on June 22nd for intensive environmental cleaning of clinic surfaces and equipment, instrument cleaning and disinfection, and providing staff training on infection prevention. The clinic reopened the following day.

Several observations were made during the site visit to the clinic. Optometry Clinic A is part of Hospital X's medical network. Staff who provide care at the clinic include three optometrists, one ophthalmologist, and three optometric assistants. The clinic has three exam rooms and averages 1,300 patients per month. Clinic patients begin in the waiting area, then proceed to one of three exam rooms, each with its own slit lamp with tonometer. Site visit observations and staff interviews indicated gaps in infection prevention practices including: using multi-dose eye drops on multiple patients; occasionally touching the eye or surrounding area; and reprocessing tonometers with a 70% isopropyl alcohol wipe rather than the recommended 5-10-minute disinfecting soak with chlorine or ethyl alcohol [2].

Conjunctival swab specimens from four case patients, all symptomatic with conjunctivitis, were sent to the PHL culture—adenovirus was detected in two. Specimens from an additional 11 case-patients were tested at the laboratory of Hospital X, and adenovirus was identified in 6 by viral culture.

Of the eight case-patients positive upon culture, specimens were then submitted for human adenovirus (HAdV) detection and molecular typing—all 8 were positive for HAdV-D53. Subsequently, VRDL generated HAdV-D53 whole genome sequences (WGS) from one patient sample, which was nearly identical to a recently reported WGS of HAdV-D53 from Japan (GenBank sequence LC215428).

DISCUSSION

This report describes an investigation of a cluster of 17 patients in an optometry center infected with EKC. All cases had either visited the optometry clinic or were household contacts of clinic patients. In conjunction with ACDC's infection prevention assessments, analysis of the molecular testing for adenovirus indicate that a common source likely served as the mode of transmission between patients.

HAdV-D53 has been recognized as an agent of EKC outbreaks in Japan since 1980 [6, 7, 8] and in Germany since 2005 [9]. However, HAdV-D53 has not previously been reported to the United States National Adenovirus Type Reporting System and, to our knowledge, this is the first reported EKC outbreak associated with HAdV-D53 in the United States. We asked the index case about travel only. No travel was reported.

As the first documented EKC outbreak associated with HAdV-D53 in the United States, this outbreak highlights the need for rigorous implementation of recommended infection prevention practices in eye care settings. Based on our observations, we hypothesize that the virus was introduced to surfaces in the exam room by a symptomatic patient, and subsequent lapses in infection prevention practices led to transmission. Prior studies have demonstrated that adenoviruses may persist on environmental surfaces for several weeks [10]. Previous EKC outbreaks in eye care clinics have been linked to improper disinfection practices and lapses in hygienic protocols [3]. Observations found deficiencies in tonometer disinfection and multi-use eye drop administration. Enhanced infection prevention practices, including staff education on eye drop administration and longer slit lamp and tonometer disinfection times were implemented. No further cases were reported after July 3, 2017.

To prevent EKC transmission in eye care settings, recommended practices include the use of disposable tonometer tips, disinfectants efficacious against adenoviruses for tonometers and slit lamps, and single-use eye drops when available [2,11]. Adherence to recommended infection prevention practices is critical to avoid EKC and other healthcare-associated infections. LAC DPH plans to outreach to the optometry and ophthalmology provider community to educate regarding infection prevention.

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INVESTIGATION OF SURGICAL SITE INFECTIONS IN ORTHOPEDIC HIP AND KNEE REPLACEMENT POST-OPERATIVE AT AN ACUTE CARE HOSPITAL SETTING

BACKGROUND

Surgical site infections (SSIs) following orthopedic procedures, including joint replacement, are significantly rare since evidence-based infection prevention practices related to skin preparation, surgical technique, and prophylaxis of antibiotics are currently the standard of care in orthopedic surgery. In the most recent National Healthcare Safety Network[1] report which included data from 2006 to 2008, reported knee replacement postoperative infection rates ranged from 0.68% to 1.60% and hip replacement infection rates ranged from 0.67% to 2.4% [1]. While these infections are extremely uncommon, their impact can be significant. SSIs related to orthopedic surgical procedures are associated with increased healthcare costs, morbidity, and even mortality. Moreover, orthopedic SSIs can significantly impact a patient's quality of life including requiring a prolonged hospital stay and leading to physical limitations.

On December 15, 2016, a local hospital's infection preventionist (IP) notified the Los Angeles County Department of Public Health (LAC DPH) Morbidity Unit of a cluster of six cases of SSIs at an acute care hospital (Hospital A) occurring after orthopedic surgeries (knee and hip) from October to November 2016. The LAC DPH's Acute Communicable Disease Control Program (ACDC) reviewed the case information. Of the six SSIs, three resulted from knee surgeries and three from hip surgeries. Two of the six SSIs were classified as deep incisional and four were prosthetic joint infections. Onset of symptoms occurred between 24 to 41 days post-surgery. Cultures from wound sites grew different organisms for each patient. Subsequently, additional cases were reported to ACDC by the hospital's IP.

METHODS

Case Finding and Definition

For this investigation, a case was defined as a patient with an SSI following orthopedic surgery of knee or hip replacement at Hospital A from October 2016 through January 2017. ACDC reviewed patient medical records, including operating room (OR) records, as well as patient's laboratory and microbiology reports. In addition, the IP was instructed to call patients who had orthopedic surgery of the hip or knee within the time-period to inquire if they had experienced any signs and symptoms of infection or complications at their surgical site.

Investigation and Assessment of Risk Factors: Site Visits

Over the course of six months from February through June 2017, ACDC partnered with the California Department of Public Health (CDPH) Licensing and Certification program to conduct eight unannounced site visits at Hospital A. The site visits consisted of observations in the OR, OR storage area, and the central processing decontamination (CPD) room. During the visits, several significant lapses in infection control practices were noted and recommendations for control measures were provided.

[1] https://www.cdc.gov/nhsn/index.html

Case Control Study

A 1-to-3 matched case control study was conducted assessing a total of 8 cases and 24 controls. Cases were matched to controls by age and surgical site (hip or knee). Medical records were reviewed, including: preoperative history, nursing perioperative notes, the anesthesia report, operative notes, laboratory records, and discharge notes. Standardized chart abstractions were performed for all cases and controls.

RESULTS

Case Characterization

A total of eight patients met the case definition. Initially, there was a cluster of six cases of SSIs post-orthopedic surgery of knee and hip replacement that occurred between October 20, 2016 through November 23, 2016 based on the surgery date. During this time-period, the attack rate was up to 4.4%. Two additional cases occurred after procedures on January 10, 2017 and January 30, 2017.

Of the eight case patients, the average age was 68 years old (range: 54 to 86 years old); seven had multiple comorbidities, including history of osteoarthritis, hypertension, hyperlipidemia, diabetes, and obesity; five case patients had a BMI above 30. The case patients had an average American Society of Anesthesiologists score[2] of 3.1. The overall attack rate for this outbreak was 3.4% for the eight cases.

Of the eight SSIs, five were knee surgeries and three were hip surgeries. Cultures from wound sites grew different organisms for each patient, including methicillin-sensitive *Staphylococcus aureus*, methicillin-resistant *Staphylococcus aureus*, *Staphylococcus epidermis*, group G *Streptococcus*, *Staphylococcus capitis*, *Enterobacter* cloacae, and *Proteus mirabilis*.

The review of cases did not identify a single surgeon or staff member common to all cases. There was no single common skin preparation solution or irrigation solution identified.

Case Finding

All patients who underwent orthopedic surgery between October 2016 through January 2017 were either followed up at their post-operative appointment or contacted by the pre-operative staff to identify if they manifested signs and symptoms of infection at their surgical site. There were 181 patients with hip and knee surgeries between October to December 2016 who were followed up through post-op appointments or phone calls. From January to March 2017, 179 patients with hip and knee surgeries followed up through post-op appointments or phone calls. No additional cases were identified from the follow up post-op appointment or phone calls.

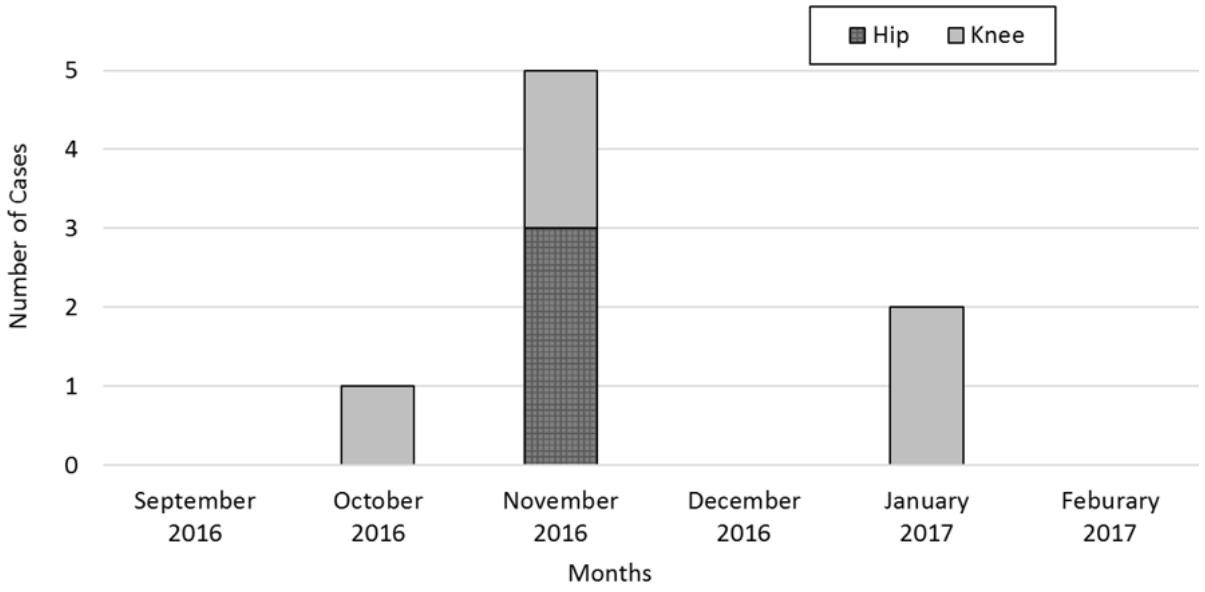
Background Surveillance Rate

In 2016, there were 2,073 surgeries performed at Hospital A and the total number of SSIs was 18 with an annual SSI rate of 0.86% (0.0086). There were 640 hip and knee orthopedic surgeries performed in 2016 with nine SSIs of knee and hip replacement an annual rate of 1.41% (0.0141). According to the National Healthcare Safety Network report with data from 2006 to 2008, knee replacement postoperative infection

[2] http://www.anzjsurg.com/view/0/ASAscore.html

rates range from 0.68% to 1.60% and hip replacement infection rates from 0.67% to 2.4%. During the peak of this investigation, there were six cases within 34 days (October 20, 2016 through November 23, 2016), with an attack rate of 4.4% and a total attack rate of 3.4% from October 2016 through January 2017 (**Figure 1**).

Figure 1.
Surgical Site Infections among Post-Orthopedic Surgery Patients
Hospital A, 2016–2017



Case Control Study

To identify possible risk factors associated with infection, ACDC conducted a case control study. A total of 24 controls were selected from patients who had undergone hip or knee arthroplasty during the outbreak period. A comprehensive medical record review was performed using a standardized chart abstraction tool, which included information on the patient's demographics, hospitalization, and surgical procedure.

The study found that patient demographics were similar between cases and controls. Cases and controls did not differ significantly with respect to American Society of Anesthesiologists score, length of hospitalization, day of week on which procedure was performed, anatomical site of procedure, or whether a tourniquet was placed. No significant commonalities among cases versus controls were found with respect to surgeon, other staff, instruments used, or prosthetics used.

Overall, we were unable to identify significant patient risk factors from the case control study. Scientific literature suggested that the utilization of immediate-use steam sterilization during a procedure may play a role in surgical site infections [2]. However, we were unable to inspect the role of immediate-use steam sterilization in this outbreak due to incomplete logs and printouts.

Final Recommendations

In addition to interim recommendations provided throughout this investigation, ACDC issued the following final recommendations to prevent or limit future infections:

- Ensure the early identification of new SSIs associated with hip and knee replacements through surveillance with immediate reporting of new cases to ACDC.
- Update policies and procedures in CPD and OR on an annual basis.
- Ensure the comprehensive documentation of immediate-use steam sterilization in the OR logs.
- Continue to monitor adherence to the policies and procedures in the CPD and ensure they are being followed by CPD staff.

DISCUSSION AND CONCLUSIONS

ACDC investigated eight cases of SSIs from multiple organisms following associated orthopedic (knee and hip replacement) surgeries. Cases were identified among patients during October 2016 through January 2017. The overall attack rate for this outbreak was 3.4% during this time-period. Despite multiple site visits by ACDC and CDPH Licensing and Certification as well as an outside consultant, we continued to observe lapses in infection control practices among the staff who worked in the CPD and OR core area. Following our recommendations, the facility improved competencies among their CPD staff by providing trainings on cleaning and sterilizing of the surgical instruments and documented the staff training. The overall cleanliness of the CPD and OR core area improved throughout the investigation and infection control practices also improved among the associated staff.

Based on our investigation, we hypothesized that multiple factors may have contributed to the outbreak of SSIs among the orthopedic patients, including improper cleaning and sterilization of the surgical instruments in the CPD and OR core area, use of immediate-use steam sterilization during procedures, staffing changes in CPD, and an increase in census of orthopedic surgeries. A case control study was conducted, but no significant risk factors were identified.

During the outbreak investigation, the facility's infection control staff, hospital administration, OR and CPD staff all contributed to the overall improvement of the conditions and infection control practices to reduce SSIs in the facility. The IP continued to be in contact with ACDC until December 1, 2017, to provide status on any new possible cases. No additional associated positive cultures reported since March 22, 2017.

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LOS ANGELES COUNTY HEPATITIS A OUTBREAK AMONG PERSONS EXPERIENCING HOMELESS OR USING ILLICIT DRUG

BACKGROUND

In 2017, Los Angeles County (LAC) experienced an outbreak of hepatitis A virus (HAV) occurring primarily among persons experiencing homelessness or with illicit drug use (IDU). This outbreak occurred in the context of several other large outbreaks in California[1] and nationally.[2] The largest hepatitis A outbreak in California occurred in San Diego County, where the outbreak began in March of 2017 and resulted in 582 confirmed cases by the time the local health emergency ended in January 2018 and mostly involved persons experiencing homelessness or IDU.

Given the proximity to San Diego County and the extensive travel between LAC and San Diego, the LAC Department of Public Health (DPH) closely monitored for potential HAV introduction and spread in LAC. In July 2017, hepatitis A illness was identified in two homeless persons in LAC who had lived in San Diego at the time of acquiring the virus. A health advisory was released to inform healthcare professionals.[3] In September 2017, HAV also was identified in two LAC residents experiencing homelessness who did not have any links to an outbreak-associated region. Because this possibly indicated local HAV transmission LAC DPH declared a local outbreak of hepatitis A and a health alert was issued.[4] Subsequently, LAC DPH held a webinar[5] in November and issued a health alert update in March 2018.[6]

The Incident Command System (ICS) was activated to coordinate the LAC DPH hepatitis A outbreak response. The ICS leadership identified 4 strategies for controlling the outbreak:

1. Enhancing surveillance and case containment
2. Increasing vaccination
3. Improving sanitation
4. Educating community and stakeholders

The primary objective of this report is to describe the epidemiology of the hepatitis A outbreak cases identified through enhanced surveillance in LAC in 2017. Secondarily, the report will briefly summarize results of the activities to increase vaccination, sanitation, and education.

METHODS

Enhanced Surveillance

The Acute Communicable Disease Control Program of LAC DPH initiated enhanced surveillance to identify acute HAV cases among the homeless and drug using populations from June through December 2017.

[1] https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Hepatitis-A-Outbreak.aspx
[2] https://www.cdc.gov/hepatitis/outbreaks/2017March-HepatitisA.htm
[3] http://publichealth.lacounty.gov/eprp/Health%20Alerts/DPH%20HAN%20Hep%20A%207.31.17%20LAHAN%20revised.pdf
[4] http://publichealth.lacounty.gov/eprp/Health%20Alerts/DPH%20HAN%20Hep%20A%20Outbreak%20091917.pdf
[5] http://publichealth.lacounty.gov/eprp/Health%20Alerts/Hep%20A%20enduring%20webinar%20flyer%20111417.pdf
[6] http://publichealth.lacounty.gov/eprp/Health%20Alerts/HAV%20outbreak%20update%203.15.18%20final.pdf

Case Definitions

- **Minimal Criteria**: Confirmed acute hepatitis A virus (HAV) infection meets the Counsel of State and Territorial Epidemiologists (CSTE) case definitions for an acute case of hepatitis A:[7] (1) discrete onset of any sign or symptom consistent with acute viral hepatitis (fever, headache, malaise, anorexia, nausea, vomiting, diarrhea, and abdominal pain), and (2) jaundice and/or elevated serum aminotransferase levels, and (3) immunoglobulin M (IgM) antibody to hepatitis A virus (anti-HAV) positive.
- **Confirmed Outbreak Case**: A person who meets the CSTE clinical case definition and is laboratory confirmed, OR, a case that meets the clinical case definition and occurs in a person who has an epidemiologic link with a person who has laboratory-confirmed hepatitis A. Cases were either identified as homeless, homeless and using illicit drugs, men who have sex with men (MSM) and using illicit drugs, using illicit drugs or homeless secondary cases. Cases were counted if they were exposed in another county but had onset in LAC.

Case Identification

The California Code of Regulations (Title 17, Section 2500) requires healthcare providers to report acute hepatitis A cases within one working day of identification.[8] In addition, most LAC clinical laboratories automatically report positive hepatitis A IgM antibody tests via the electronic laboratory reporting (ELR) system.

In response to the outbreak, providers were requested to immediately report suspected/confirmed hepatitis A in a person experiencing homeless to facilitate:

- timely interview by LAC DPH staff before cases are discharged to the street and potentially lost to follow-up,
- identification of contacts who could benefit from preventive therapy, and
- case placement in a recuperative care facility during the infectious period to prevent further disease transmission.

Case Investigation

A supplemental form was created for interviewing persons experiencing homelessness or using illicit drugs. It was expected that data from the supplemental forms could guide the ICS leadership response to the outbreak by better defining the epidemiology of outbreak-associated cases and characterizing risk factors for disease.

Laboratory Testing

Clinical laboratories were contacted to determine if serum samples were available for all confirmed cases identified as homeless and/or using illicit drugs. If available, specimens were submitted to the LAC Public Health Laboratory (PHL) for shipment to the California Viral and Rickettsial Disease Laboratory (VRDL) for confirmation and genetic sequencing of HAV.

[7] https://wwwn.cdc.gov/nndss/conditions/hepatitis-a-acute/case-definition/2012/
[8] http://publichealth.lacounty.gov/acd/docs/ReportableDiseaseListSept2018.pdf

Vaccination Outreach

Increasing the proportion of the at-risk population immune to hepatitis A through vaccination was identified as the best tool for preventing hepatitis A illness and decreasing HAV transmission. Vaccinations were included as a service provided by LAC DPH supported street outreach teams targeting homeless persons. Vaccination was also promoted to persons who had close frequent contact with homeless people including first responders, persons who serve food to the homeless, and sanitation personnel. The LAC jail systems offered vaccine to new inmates. LAC DPH community clinics offered vaccines at no charge to those at risk. Health insurance plans and community providers were engaged in the campaign, with the larger health plans offering hepatitis A vaccine to at-risk members at no charge through walk-in clinics. Vaccines were also distributed by LAC DPH to community providers that serve at-risk populations.

Hygiene and Sanitation Outreach

LAC includes 88 cities as well as large unincorporated areas. LAC DPH coordinated with all cities and other county departments such as the Departments of Public Works, Parks and Recreation, and the Sheriff to improve sanitation conditions for persons experiencing homelessness.

Many homeless persons in LAC have created makeshift structures and dwellings which serve as their homes, often creating these in clusters in a small area which is then recognized as a homeless encampment. Due to poor access to hygiene facilities, living in a homeless encampment can serve as a major risk factor to acquire and transmit HAV. LAC DPH, in partnership with Los Angeles Homeless Services Authority (LAHSA) and Department of Public Works, conducted surveys of homeless encampments throughout LAC to assess where additional toilets, showers, and hand washing facilities were most needed, and developed plans with cities to increase toilet, shower and hand washing facilities in these areas.

In close partnership with the LAHSA, LAC DPH Environmental Health (EH), inspected and provided educational materials to homeless shelters across LAC. The educational materials provided guidance on the proper cleaning of facilities and laundering of bedding to protect homeless residents from acquiring and transmitting HAV. A toolkit was developed with template resources and policies for staff at homeless shelters to support their efforts to improve sanitation conditions in their shelters. Additionally, teleconference calls were held to address real life questions and concerns among shelter providers.

Finally, since transmission of HAV among food handlers is of heightened concern, there was a concerted effort to assure that restaurants across LAC were aware of the outbreak and taking measures to reduce the risk of transmission among their workers.

Educational Outreach

The educational outreach efforts aimed to educate key community groups and stakeholders as quickly as possible. The outreaches consisted of holding in-person group meetings, sending informational letters, stakeholder targeted teleconferences, and targeted education of healthcare professionals. A major public awareness campaign was launched, including strategic engagement with the media to support broad dissemination of information, and print media advertisement throughout various public transportation

bus and rail lines to promote awareness, hand-washing and vaccination. The countywide 211 information line staff were trained, and the 211-line was used as a primary source for answering questions from the public. The engagement with media included various press briefings, teleconferences, and press releases. Educational materials targeting specific at-risk populations were prepared in English, Spanish, and other threshold languages. Examples of health education materials developed include those targeting first responders, employees with direct contact with homeless people, food handlers, and men who have sex with men. Our educational outreach materials were posted on our webpages.[9]

RESULTS

Epidemiology of Outbreak Cases

From May 1 to December 31, 2017, 17 total outbreak cases were identified that met the confirmed case definition (**Table 1**). The first identified outbreak-associated case had symptom onset during the week of May 28 and the last case had symptom onset during the week of December 17. Of the 17 outbreak-associated cases that developed symptoms while in LAC, 13 were LAC residents with three being secondary cases identified as part of outbreak at a mental health hospital (**Table 1**). Three IDU cases also identified as men who have sex with men (MSM). The median age of all cases was 36 years (minimum-maximum: 24-64 years); 15 (88%) were male; 14 (82%) cases were white (**Table 2**). Most cases were from SPA 4 (n=7, 41%) and SPA 7 (n=5, 29%), 11 (65%) cases were hospitalized, and there were no deaths.

Table 1. Confirmed Outbreak-Associated Hepatitis A Cases in LA County, May 1 to December 31, 2017 (N=17)

	LAC Residents, n	Non-LAC Residents, n	Total, n (%)
Homeless	4	1	5 (29%)
Homeless_IDU	2	3	5 (29%)
IDU	1	0	1 (6%)
IDU_MSM	3	0	3 (18%)
Secondary cases[a]	3	0	3 (18%)

Abbreviations: IDU, illicit drug use; MSM, men who have sex with men

[a] Associated with an outbreak-associated homeless case

[9] http://publichealth.lacounty.gov/acd/Diseases/HepA/Materials.htm

Table 2.
Demographics of Confirmed
Outbreak-Associated Hepatitis A Cases
LAC, May 1–December 31, 2017
(N=17)

Demographics	No.	%
Age group (years)		
15-34	6	35%
35-44	6	35%
45-54	3	18%
55-64	2	12%
Gender		
Female	15	88%
Male	2	12%
Race/Ethnicity		
Asian	0	0%
Black	0	0%
Hispanic	2	12%
White	14	82%
Unknown	1	6%

Laboratory Results

Of the 17 outbreak-associated cases, serologic specimens were available for 13 cases to send to VDRL for serologic confirmation and viral sequencing. Of the 13 cases with specimens provided to VDRL for testing, 10 cases had genotype 1b (the genotype associated with the San Diego outbreak), two cases were 1a, and virus was not detected for one case (specimen was drawn more than 4 weeks after onset). All ten genotype 1b genotype cases were homeless (**Table 3**).

Table 3.
Hepatitis A Outbreak Cases Among Homeless and Illicit Drug Users Genotype Results
LAC 2017
(N=17)

	Genotype Test Results			
Risk Group	Genotype 1b No.	Genotype 1A No.	Negative No.	No Specimen No.
Homeless	2	0	1	2
Homeless and IDU	5	0	0	0
IDU	0	1	0	0
IDU and MSM	0	1	0	2
Secondary Cases*	3	0	0	0
TOTAL	**10**	**2**	**1**	**4**

*Linked to an outbreak-associated homeless case.

Vaccination Outreach

LAC DPH conducted 486 vaccination outreaches, including 297 that targeted homeless populations, 28 at substance use treatment centers, 82 for first responders, and 14 at the jails. A total of 33,866 hepatitis A vaccine doses were either administered by LAC DPH (12,393 doses) or distributed to community partners (14,800 doses) to administer to at-risk persons. During the outbreak response, hepatitis A doses were administered for 7,395 for homeless persons, 777 for persons at substance use treatment centers, 10,964 for jail inmates and parolees, and 6,160 for first responders.

Hygiene and Sanitation Outreach

As part of the outbreak response, EH distributed hepatitis A educational flyers to over 37,000 food facilities. All homeless shelters are regularly inspected through the EH Housing and Institutions Program. A total of 52 homeless shelters were inspected during the outbreak and provided with information on hepatitis A including the importance of proper hand washing by food handlers.

Education Outreach

Immediately after declaring a local outbreak, LAC DPH engaged 17 distinct stakeholder groups, including city leaders, homeless service providers, healthcare providers, substance user disorder treatment providers, first responders including police and fire agencies, veteran's affairs agencies, schools and colleges, mental health service providers, and LGBTQ providers. Over 100,000 individual stakeholders received letters and educational information and were invited to participate in targeted teleconference calls. Additionally, over the course of the next 4 months, over 500 in-person educational training outreach sessions were conducted at various community settings, including with homeless service providers, substance use disorder providers, jails, and first responder agencies. Within the first two weeks of the response efforts, there were over 80 news print articles and 14 televised segments covering the Hepatitis A outbreak and response efforts in LAC.

DISCUSSION

The number of hepatitis A cases in persons experiencing homeless or using illicit drugs in LAC was substantially lower than the number of cases observed in San Diego. It is unclear why the hepatitis A outbreak remained contained in LAC, despite having a larger population of persons experiencing homelessness and a lower number of vaccines distributed compared with San Diego. One possible reason for the successful containment of the outbreak in LAC could be the activation of ICS early in the outbreak. The ICS structure facilitated improved coordination of the outbreak response across all relevant LAC DPH Programs, and it assisted with recruiting and targeting additional resources towards the outbreak control activities.

According to CDC, the incidence of hepatitis A among adults in the United States has increased since 2014. Paradoxically, the increased hepatitis A incidence might be a consequence of the US childhood vaccination policy. According to the National Health and Nutrition Examination Survey, the percentage of U.S. adults immune to hepatitis A infection has declined from 1999–2006 to 2009–2012. Prior to the licensure of the hepatitis A vaccine in 1995, there were regular large hepatitis A outbreaks that resulted in immunity among exposed adults. Those outbreaks ceased with universal vaccination of children for hepatitis A. As

a result, there is now a large population of adults who are not immune to hepatitis A because they were too old to benefit from the changes in childhood hepatitis A vaccine policy, but they are not old enough to have been exposed to the historic hepatitis A epidemics. The growing population of adults not immune to hepatitis A represents a population susceptible to future hepatitis A outbreaks.

Although the hepatitis A outbreak of 2017 appears to have ended, the conditions that predisposed the outbreak persist in LAC, such as the large population of persons experiencing homelessness who are not immune to hepatitis A and who do not have access adequate hygiene and sanitation services. Therefore, LAC DPH will remain vigilant for acute HAV cases and respond immediately to control potential outbreaks.

NOROVIRUS SUSPECT FOODBORNE OUTBREAK AT A LOS ANGELES COUNTY RESTAURANT

BACKGROUND

On December 18, 2017 the Los Angeles County Department of Public Health (LAC DPH) received a Foodborne Illness Report (FBIR)[1] from the Corporate Wellness Coordinator of a fast food chain restaurant. One of their restaurants, restaurant A (RA), identified gastrointestinal illness in 11 employees. Most of the cases occurred during the week of December 10, 2017 with symptoms including diarrhea, weakness, vomiting, and body aches. Between December 13th to December 21st, LAC DPH received 12 more FBIRs describing 17 additional persons with similar gastrointestinal illness. Three ill employees of RA were also employees of a neighboring restaurant, restaurant B (RB). The LAC DPH Acute Communicable Disease Control program (ACDC) launched an investigation to explore the scope of the outbreak, identify possible risk factors, and determine the necessary procedures to prevent further spread of illness.

METHODS

ACDC coordinated the investigation of illness at both restaurants. First, ACDC partnered with the Corporate Wellness Coordinator for RA to assemble a line list for all employees. ACDC then gathered information on menu items offered for consumption at RA and developed three types of questionnaires. The first was a standard questionnaire for patrons of RA to gather information on date and foods consumed at RA, plus symptom type, onset, and illness histories. These interviews were conducted by telephone and the contact information (for both cases and controls) was obtained from the multiple FBIRs submitted to ACDC. The second standard questionnaire was drafted for employees of RA to gather information on job duties, foods consumed during a typical work shift, symptom type, onset, and illness histories. These interviews were also conducted by telephone. The third standardized questionnaire was drafted for employees of RB to gather job duty, food and symptom histories. These questionnaires were emailed to the RB manager for distribution to all employees of that restaurant. In addition, ACDC staff conducted a site visit and dropped off stool collection kits to staff of RA.

The LAC DPH Environmental Health Services (EHS)[2] Wholesale Food and Safety (WFS) conducted an inspection of RA to observe food handling, cooking, and cleanliness practices. WFS contacted RB to collect employee illness information considering that there were employees that worked in both places.

Management from RA cooperated with the investigation, made employees available for interviews, and coordinated the distribution, pick-up, and recollection of stool kits from employees for delivery to Community Health Services (CHS).[3] Service Planning Area 4 served as the collection point for stool specimens collected from RA employees by RA management. These samples were then picked up by courier and delivered to the Public Health Laboratory (PHL). The PHL tested all submitted stool specimens

[1] http://www.publichealth.lacounty.gov/EH/SSE/FoodMilk/reportillness.htm
[2] http://publichealth.lacounty.gov/eh/index.htm
[3] http://www.publichealth.lacounty.gov/chs/index.htm

using a BioFire FilmArray™ Gastrointestinal Panel and a norovirus reverse transcription polymerase chain reaction (RT-PCR).[4]

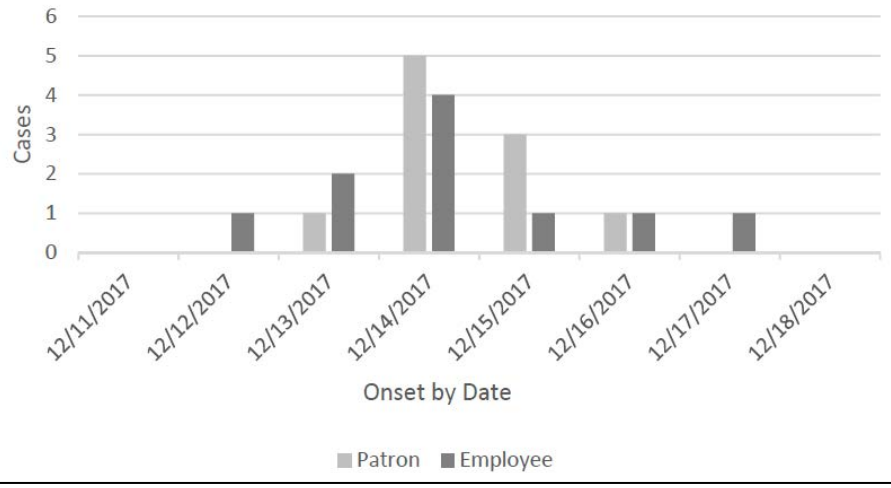
ACDC defined a case as any individual who ate at RA anytime between December 10–15, 2017 and: a) tested positive for norovirus, or b) was symptomatic with diarrhea and vomiting, or c) was symptomatic with diarrhea or vomiting plus two of the following symptoms: nausea, fatigue, headache, body aches, chills, and fever. If cases reported an incubation time of less than 12 hours or greater than 48 hours, they were excluded from analyses, as this did not fit the known incubation period for norovirus. A control was defined as any asymptomatic individual who ate at RA between December 10–15, 2017 and did not have a positive laboratory result for norovirus.

RESULTS

RA is a fast food establishment that prepares fresh food orders for the public in an assembly line fashion with each grouping of ingredients, chosen by the patron, placed into the meal by separate line staff, and are not heated after preparation. Food can be eaten in the restaurant or taken to-go. There is one restroom in the restaurant for both employees and restaurant patrons to share. ACDC interviewed all 29 RA employees, and stool was collected on 25 of the employees (86%). Three employees of RA also worked next door at RB. In view of this connection, the employees of RB were interviewed for illness history—16 of the 21 RB-only employees were interviewed (76%).

All told, ACDC interviewed 61 persons, which included employees from RA and RB, as well as RA patrons. Of these 61 interviews, 23 (38%) met the case definition, and 11 were included as controls. The remaining 27 were excluded from the analysis because they did not meet the case definition. The dates of onset for the 23 people who met case definition ranged from December 12–17, 2017 (Figure 1).

Figure 1.
Norovirus Epidemic Curve at Restaurant A by Onset Date
LAC, 2017
(n=20)



[4] https://www.medicinenet.com/script/main/art.asp?articlekey=22766

Cases

A total of 23 individuals met the case definition. This included 13 RA employees, 1 RB employee, and 9 RA patrons. Laboratory confirmation for norovirus was obtained for 16 of the 23 cases (69%). Of the 23 cases, 61% were female (Table 1). Case ages ranged from 14 to 48 years with a median of 23 years. Most cases were between the ages of 20 to 49 years. The three most common symptoms were: nausea (87%), vomiting (78%), and fatigue (74%). Only two cases had a fever ≥ 102° F (9%). The median incubation was 28 hours with a range of 12 to 48 hours. The median duration was 2 days with a range of 8 hours to 5 days (Table 2).

Table 1.
Case Demographics
(N=23)

	n	Percent
Male	9	39%
Female	14	61%
Age Group	0	0%
<1	0	0%
1-4	0	0%
5-9	0	0%
10-19	6	26%
20-49	17	74%
50-74	0	0%
>74	0	0%
Median Age	23 Years	Range: 14-48 Years

Table 2.
Cases Reported Symptoms
(N=23)

Symptom	n	Percent
Diarrhea	16	70%
Bloody Diarrhea	0	0%
Abdominal cramps	15	65%
Nausea	20	87%
Fatigue	17	74%
Chills	12	52%
Body Aches	13	57%
Headaches	13	57%
Fever	5	22%
Fever ≥ 102˚F	2	9%
Dizziness	10	43%
Vomiting	18	78%
Asymptomatic	3	15%
Median Duration=2 Days (Range: 8 hours-5 Days)		
Median Incubation=28.5 Hours (Range: 12 Hours to 48 Hours)		

Food Analysis

Statistical analyses of the food items eaten by restaurant patrons and employees are shown in Table 3. Foods from RA were analyzed by arrangement (i.e. burrito, bowl, quesadilla, taco) as well as by individual ingredients available for inclusion into these arrangements. No food items were statistically associated with illness at the $p \leq 0.05$ level.

Inspection

The EHS WFS inspection of RA revealed the following violations: 1) inadequate immersion times for sanitizing food use utensils, and 2) potentially hazardous foods held at unapproved temperatures. All violations were addressed and corrected immediately by restaurant management during the inspection. Food items held at unapproved temperatures were disposed of at the time of inspection.

Table 3.
Food Items Eaten

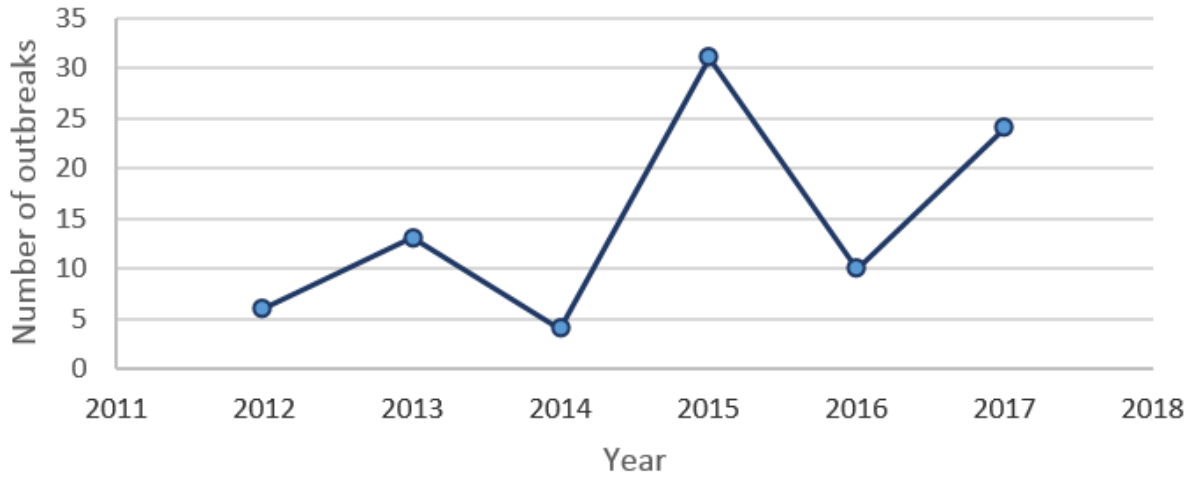
	Cases (N=23)			Controls (N=11)			
Food Item	**Percent**	**N**	**N**	**Percent**	**n**	**N**	**p-value**
Burrito	30%	7	23	27%	3	11	1.000
Bowl	39%	9	23	36%	4	11	1.000
Taco	9%	2	23	0%	0	11	1.000
Quesadilla	13%	3	23	9%	1	11	1.000
Queso Burrito	4%	1	23	0%	0	11	1.000
Flour Tortilla	30%	7	23	27%	3	11	1.000
Corn Tortilla	9%	2	23	0%	0	11	1.000
Chips	39%	9	23	36%	4	11	1.000
Steak	30%	7	23	18%	2	11	0.682
Carnitas	9%	2	23	0%	0	11	1.000
Chicken	57%	13	23	55%	6	11	1.000
Barbacoa	4%	1	23	27%	3	11	0.089
Sofritas	4%	1	23	9%	1	11	1.000
Brown Rice	39%	9	23	55%	6	11	0.475
White Rice	61%	14	23	64%	7	11	1.000
Black Beans	57%	13	23	45%	5	11	0.717
Pinto Beans	39%	9	23	18%	2	11	0.271
Fajita Veggies	57%	13	23	36%	4	11	0.465
Queso Dip	30%	7	23	18%	2	11	0.682
Tomato Salsa	70%	16	23	45%	5	11	0.262
Red Chili	30%	7	23	36%	4	11	1.000
Green Chili	26%	6	23	55%	6	11	0.138
Sour Cream	57%	13	23	27%	3	11	0.152
Corn Salsa	57%	13	23	36%	4	11	0.465
Lettuce	57%	13	23	36%	4	11	0.465
Monterey Jack Cheese	74%	17	23	91%	10	11	0.384
Guacamole	78%	18	23	64%	7	11	0.425

DISCUSSION

This is a laboratory confirmed outbreak of norovirus of unknown origin. The PHL reported that all the confirmed norovirus samples from this outbreak belong to the same genotype, GII.P16-GII.2. Norovirus is part of the family Caliciviridae. It is highly contagious and can transmit disease with as few as 18 viral particles [1]. Infected individuals can even shed the virus before they know they are ill [1]. Norovirus is most often transmitted via a fecal oral route with illness onset 12–48 hours after ingestion of contaminated food, direct person-to-person contact, or contact with contaminated surfaces. The virus can be spread to the environment via the stool or vomitus of infected people [1]. It is the most commonly

reported cause of gastrointestinal (GI) illness in the United States and worldwide [1]. Norovirus infections can occur year-round, but about half of all cases occur between December and February in the northern hemisphere [2]. CaliciNet, a database designed to collect surveillance data about this family of viruses, reported that California had the highest number of confirmed norovirus outbreaks (44) between the months of September 1, 2017 and December 31, 2017 [2]. Surveillance data collected by LAC DPH for non-foodborne GI illness in LAC showed that the month of December 2017 had the second highest occurrence of GI illness outbreaks in the community for the last six years (Figure 2).

Figure 2.
Number of Non-Food GI Outbreaks For the Month of December
LAC, 2012–2017



The method by which this outbreak spread is unclear. The most likely means of transmission is through a food item contaminated by an ill employee. This theory is supported by the finding that the first few persons to become symptomatic in this outbreak were food preparation employees for RA. Most RA employees reported eating at the restaurant during every shift. Another possibility is that this illness was passed from person to person as infected individuals could have touched potentially contaminated common surfaces while dining, working or living together, or sharing the same bathroom with infected individuals. This web of work, home, social, and public connections among RA and RB employees prevented ACDC from being able to identify a definitive source of this outbreak.

PREVENTION AND EDUCATION

To prevent the spread of illness in their facility, RA management implemented an in-house norovirus protocol which, in part, included: disposing of all ready to eat foods in the kitchen, enacting employee hand washing monitoring every 30 minutes, providing employee education on the spread of norovirus, and implementing a complete disinfection of the kitchen. RA also immediately removed ill employees

from work with three days paid leave per policy and called all other employees due to arrive at work to check for symptoms of illness.

ACDC provides education on norovirus during and/or after interviewing both patrons and employees. In addition to the inspection, EHS WFS provides the restaurant with literature about norovirus and how to prevent its spread in a restaurant setting.

LIMITATIONS

One limitation of this investigation was that all the RA employees reported eating at the restaurant during every shift worked. With norovirus having an incubation range of 12–48 hours, it was difficult to know which meal likely exposed individuals to norovirus. Employees reported when they last worked prior to illness, and this was verified by the electronic time-keeping report provided by RA. Some cases could recall exactly what they ate. Others had a more general recall, such as being able to name the types of foods they might typically eat during the work week; however, they were unable to specify which days specific food items were eaten. These limitations made it difficult to determine accurate incubation times as measured from specific meals consumed as well as the ability to ascertain which if any foods might be implicated in the outbreak.

CONCLUSION

This was an outbreak of norovirus with no specific source identified. There have been no further complaints against RA at this specific location beyond December 29, 2017. ACDC, in conjunction with EHS WFS, will continue to monitor for future reports of illnesses.

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FIRST PROBABLE LOCALLY-ACQUIRED CHAGAS DISEASE CASE LOS ANGELES COUNTY, 2017

INTRODUCTION

Chagas disease, or American trypanosomiasis,[1] is a parasitic infection that is caused by the protozoan *Trypanosoma cruzi* found only in the Americas where approximately 8 million people are infected [1]. The estimated 300,000 infections in the United States (US) are mainly attributed to residents who have migrated from Latin American countries [1–3]. Transmission is usually linked to poor housing conditions in which the insect vector, triatomine bugs,[2] thrives and is commonly associated with rural areas of Latin America [1]. Less than 50 locally transmitted human infections have been documented in the US since the first case was identified in 1955 [4,5]. Of the two known locally transmitted cases in California, only one experienced acute disease. This case was a resident of Tuolumne County who was diagnosed with Chagas disease in 1982 [6–8]. The other case was an asymptomatic infection in a resident of Ventura County. This report describes the first documented case of acute Chagas disease with probable local transmission in Los Angeles County (LAC).

BACKGROUND

Trypanosoma cruzi is transmitted to humans primarily through contact with the feces of infected blood-feeding triatomine bugs (family Reduviidae), also called "kissing" or "conenose" bugs. In California, the primary reservoir is the woodrat (*Neotoma sp*)[3] [9]. At least 23 additional species of mammalian wildlife also have been documented as animal reservoirs for the parasite in US [6]. Other modes of transmission include blood transfusion, organ transplantation, and vertical (mother-to-child) transmission [1]. Chagas disease has an acute and chronic phase. Acute disease can be mild or asymptomatic and parasites may be found in the circulating blood. Symptoms may consist of fever, malaise, and swelling around the site where the parasite entered the skin or mucous membranes. The chronic phase of Chagas disease may also be asymptomatic, and during this time few or no parasites are found in the blood. An estimated 20–30% of chronic cases will develop debilitating or life-threatening dysfunction of the heart and/or digestive

[1] https://www.cdc.gov/parasites/chagas/epi.html
[2] https://www.cdc.gov/parasites/chagas/gen_info/vectors/index.html
[3] https://www.britannica.com/animal/woodrat

tract. People who are immunosuppressed may experience reactivation of Chagas disease, with a corresponding resurgence of parasitemia [1].

CASE INVESTIGATION

In September 2017, a patient with travel history to a Latin American country approximately 18 months prior, was reported to the LAC Department of Public Health (DPH) with a positive rapid diagnostic test for malaria. The patient was admitted to an acute care hospital with ongoing fever and rash. Blood smears did not detect malaria parasites but instead revealed *T. cruzi* parasites. Commercially available IgG antibody testing for *T. cruzi* also returned positive. Smear review and molecular testing by polymerase chain reaction (PCR) performed at the US Centers of Disease Control and Prevention (CDC) confirmed *T. cruzi* infection. Though only one of two serological tests at CDC routinely performed for confirmation were initially reactive, additional testing by immunofluorescence assay (IFA) later confirmed the infection (**Table 1**).

Table 1.
Diagnostic Blood Tests of Chagas Case
LAC, 2017

Date of Collection	Type of Test	Result of Test	Laboratory
9/12/17	Parasite Blood Exam	Detected	Hospital
9/13/17	*T. cruzi* Immunoglobulin G (IgG) Immunoassay (IA)	Reactive	Commercial
9/12/17	PCR	Detected	CDC
9/13/17	*T. cruzi* Enzyme immunoassay (EIA)	Reactive	CDC
9/13/17	Trypomastigote excreted-secreted antigen (TESA)	Non-reactive	CDC
9/13/17	*T. cruzi* Immunofluoresence Assay (IFA)	Reactive (1:256)	CDC

The patient had no pertinent past medical history. Thirty-five days prior to admission he was treated with trimethoprim-sulfamethoxazole for a lesion on his shoulder, diagnosed as cellulitis. Five days later he developed fever to 39.4°C with an erythematous, non-pruritic rash over the trunk and limbs, headache, and a dry cough. He was seen by several physicians during multiple emergency room visits and was treated with antibiotics and steroids, including prednisone and hydroxychloroquine. Upon CDC confirmation of Chagas disease, the patient initiated benznidazole therapy that was provided as part of an expanded access investigational new drug (IND) protocol operated by the CDC. Results of PCR testing performed six weeks after completion of therapy were negative.

The patient was born and raised in southern California and had been residing in a rural area of western LAC for the past 17 years. The patient reported occasionally seeing triatomine bugs in his home in recent years. He also reported ticks on his pet dogs and a neighbor who kept sheep. He described a current rat infestation in his home and had been handling dead rodents to dispose of them after trapping. The patient also previously lived in other domestic and international locations where Chagas disease is not endemic. Approximately 20 to 25 years prior, he took frequent short trips to Baja California, Mexico. Earlier in 2017, he traveled to other parts of California, but reported staying in well-built structures and denied insect exposures. His most recent foreign travel occurred 18 months prior to admission. On this trip, he visited a Latin American country in which Chagas disease is endemic, but stayed in an enclosed, air-conditioned dwelling with doors and screens. He denied insect bites or exposures there and was well between the time of his return and the presenting illness.

The LAC DPH and California Department of Public Health (CDPH) conducted an environmental investigation at the patient's residence and surrounding areas. Inspection of the property revealed evidence of rodents inside the home (i.e., droppings) and openings on the exterior that were large enough to allow rodent entry into the walls of the house. Rockwork around the house and climbing ivy provided attractive harborage for triatomines. An attempt to collect triatomine bugs in late September was unsuccessful. However, CDPH investigators were able to trap five rodents in late October: two *Peromyscus boylii* (brush mice) and three *Neotoma macrotis* (woodrats). Rodent blood and tissue specimens that were sent to the University of Georgia for analysis did not yield positive results for *T. cruzi* infection.

DISCUSSION

This is the first confirmed case of Chagas disease documented in LAC that was acquired via probable local vector transmission. The diagnosis was confirmed by a positive blood smear and PCR indicative of acute infection with *T. cruzi* and supported by an appropriate clinical presentation. The rural environmental setting of the patient's home residence, where triatomine bugs are common, in addition to the patient's recollection of triatomine bugs inside his home, support the plausibility of vector-borne transmission. Environmental studies have shown that up to 36% of *Triatoma protracta*, California's most widespread and common triatomine bug, collected in LAC are infected with *T. cruzi* [10,11]. In homes, the bugs can find refuge in beds, upholstered furniture, and animal bedding, emerging nightly to feed upon people and their pets [12].

Confirmation of the location where the patient acquired his infection, either locally or abroad, is complicated by his travel history, medical history, and ambiguous serological testing results conducted at CDC. Because Chagas disease is often asymptomatic, it can be many years before the infection is recognized or chronic symptoms manifest. Recrudescence of a previously acquired infection is possible in the setting of steroid therapy. However, experts at the CDC believe that the level of immunosuppression that the patient received likely was not sufficient for such a response. Additional serological testing that was performed at the conclusion of the case investigation could not definitively define the timing of his infection. Additional serological testing in the following years may provide that evidence; however, even that is uncertain.

Locally transmitted vector-borne transmission of Chagas disease in the US is rare. However, human cases may not be well documented given variability in patient testing and reporting to local and state health departments. Only six states in the US mandate Chagas disease reporting, and it is not a reportable condition in California [13]. Without comprehensive human case surveillance, epidemiology and transmission risk of Chagas disease in LAC is not well known or defined. Though this is the first documented case of probable locally transmitted Chagas disease in LAC, there may have been prior cases that were missed due to underdetection of Chagas disease.

Experts have postulated that the low incidence of vector-borne transmission in the US may be explained by delayed defecation exhibited by local triatomine bugs (which would reduce transmission efficacy), by limited exposure to the vectors, and by low *T. cruzi* infection rates among triatomine bugs [11]. However, experimental studies have demonstrated that some triatomine bugs may defecate immediately upon feeding [14]. As construction, development, and suburbanization in LAC and the US encroaches upon woodrat and triatomine bug habitat, there will be increasing opportunities for residents to become exposed to *T. cruzi* and local prevalence studies indicate that vector infection rates are not insignificant in southern California [10,11]. Additionally, molecular studies show that local strains of *T. cruzi* are genetically similar to those in Latin America, suggesting that no differences in infectivity or virulence should be observed [10].

This case serves as an important reminder that local transmission of Chagas disease may occur more frequently than presumed in LAC. Local providers should include acute *T. cruzi* infection in the differential

diagnosis of fever of unknown origin in patients with appropriate environmental exposure, even without travel to traditionally endemic areas. Similarly, providers should consider chronic Chagas infection in rural area residents of LAC with unexplained heart disease or symptoms consistent with gastrointestinal Chagas disease.

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BOTULISM CASE REPORT SUMMARY
LOS ANGELES COUNTY, 2017

Botulism is a rare but serious and potentially fatal paralytic illness caused by a nerve toxin produced by the bacterium *Clostridium botulinum*. The bacterial spores that cause botulism are common in both soil and water and produce botulinum toxin when exposed to low oxygen levels and certain temperatures. There are five main kinds of botulism: 1) Foodborne botulism can be triggered by eating foods that have been contaminated with botulinum toxin. Common sources of foodborne botulism are homemade foods that have been improperly canned, preserved, or fermented. Though uncommon, store-bought foods also can be contaminated with botulinum toxin; 2) Wound botulism can be triggered by spores of the bacteria getting into a wound and making toxin. People who inject drugs have a greater chance of getting wound botulism in Los Angeles County (LAC). Wound botulism has also occurred in people after a traumatic injury such as a motorcycle accident or surgery; 3) Infant botulism can be triggered by the spores of the bacteria getting into an infant's intestines. The spores grow and produce the toxin, which causes illness; 4) Adult intestinal toxemia (also known as adult intestinal toxemia) botulism is a very rare kind of botulism that can be triggered by spores of the bacteria getting into an adult's intestines, growing, and producing the toxin (similar to infant botulism). Although the cause of this kind of botulism is unknown, people who have serious health conditions that affect the gut may be more likely to get sick; 5) Latrogenic botulism can occur if too much botulinum toxin is injected for cosmetic reasons such as for wrinkles or medical reasons such as for migraine headaches or cervical dystonia.

Because botulism infections may be fatal, they are considered medical emergencies; accordingly, reporting of suspected cases is mandated by the LAC Department of Public Health (DPH) immediately by telephone. Specialized antitoxin is used to treat botulism, which can only be released when authorized by LAC DPH or the California Department of Public Health (CDPH). Testing for case confirmation by mouse bioassay can be conducted at the LAC DPH Public Health Laboratory and matrix-assisted laser desorption/ionization time-of-flight (MALDI-TOF) is conducted by the Centers for Disease Control and Prevention (CDC). Clinically compatible cases with botulinum toxin detected by either mouse bioassay or MALDI-TOF are considered confirmed cases. The CDPH Division of Communicable Disease Control is responsible for the investigation and surveillance of infant botulism cases identified in the county and across the state. LAC DPH is responsible for reporting suspected cases of infant botulism to CDPH's Infant Botulism Treatment and Prevention Program[1] for their investigation.

The number of confirmed botulism cases (non-infant botulism) in LAC fluctuates from year to year. For the past five years, an average of three cases were confirmed annually. The botulism cases in LAC usually have injection drug use as a risk factor. Foodborne botulism in LAC is rare, in the past 10 years only one instance of foodborne botulism was reported with two associated cases confirmed (2012).

[1] https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/InfantBotulism.aspx

In 2017, nine cases of suspected botulism were reported in LAC including four out-of-county cases who received medical care at hospitals in LAC. These four out-of-county suspected cases were referred to the health department in the patient's county of residence. Upon notification and review of case history and symptoms, ACDC physicians authorized the release and use of botulism antitoxin for six suspected botulism cases, and the state released three antitoxins. Ultimately, two were classified as confirmed cases (laboratory-confirmed by MALDI-TOF, with negative mouse bioassay), and one was classified as a probable case (due to negative laboratory testing but with clinically compatible findings and history of injection drug use). Only two suspected cases were determined not to be botulism based on absence of risk factors, negative botulism testing, and an alternate diagnosis of acute flaccid myelitis and lithium toxicity.

A botulism outbreak was also investigated during 2017. In April 2017, public health authorities at the LAC DPH, the Orange County Healthcare Agency, and CDPH investigated an outbreak of botulism consisting of two cases, both adult residents of Orange County, and associated with an herbal tea product produced by a facility in LAC. LAC DPH released a press release,[2] health alerts[3] were disseminated to healthcare providers, warnings were issued to consumers in LAC, Orange County, and California, and the product was recalled.[4]

[2] http://publichealth.lacounty.gov/phcommon/public/media/mediapubhpdetail.cfm?prid=1652
[3] http://publichealth.lacounty.gov/hccp/alerts.htm
[4] http://publichealth.lacounty.gov/eh/recall/2017/recallList_May.htm

INFLUENZA SURVEILLANCE OVERVIEW: 2017–2018 SEASON SUMMARY

OVERVIEW

The traditional influenza surveillance season begins in October and ends mid-May of the following year, covering a 32-week period. Los Angeles County (LAC) uses the Centers for Disease Control and Prevention (CDC) Morbidity and Mortality Weekly Report (MMWR)[1] weeks to refer to surveillance weeks, with week 1 corresponding to the first week in January. The 2017–18 season (October 1, 2017–May 13, 2018) in LAC had higher influenza activity than the previous 5 influenza seasons. Peak activity occurred during week 52 (December 24–30, 2017) when 50% of respiratory specimens tested by sentinel labs were positive for influenza (**Table 1**). In addition, syndromic surveillance detected the highest proportion of visits to emergency departments for influenza-like-illness (ILI) during that same week (**Figure 1**). This season also saw the greatest number of influenza-associated deaths reported since these deaths became reportable in LAC in 2010. The greatest weekly number of influenza-associated deaths (N=54) occurred during week 1 (December 31, 2017–January 6, 2018). Of confirmed deaths with positive influenza test results received during the 2017–18 season, 66% were influenza A viruses (**Table 1**).

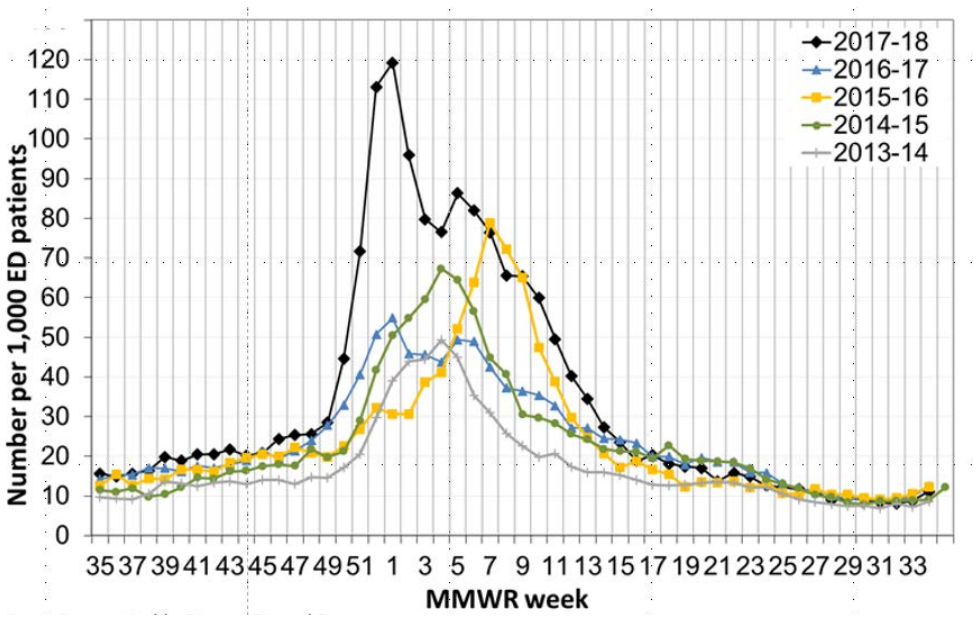
Table 1. Los Angeles County Influenza Surveillance Summary

	2017-18		2016-17
	Peak Week 52*	YTD**	
Sentinel Laboratory Data			
Positive Flu Tests/Total Tests	2971/5926	6,855/107,199	6,855/68,732
(Percent Positive Flu Tests)	0.501	0.172	0.1
Percent Flu A/B	87/13	66/34	92/8
Outbreaks†			
Community Respiratory Outbreaks	6	67	35
Influenza Confirmed Outbreaks	5	77	30
Total	11	144	65
Influenza-Associated Deaths †‡			
Pediatric Flu Deaths	0	2	1
Adult Flu Deaths	61	276	76
Total	61	278	77

*Week 52 corresponds to December 24-30, 2017.
The influenza surveillance year spans** (surveillance weeks 40-20)
†Numbers are provisional and subject to change
‡Confirmed influenza death is defined by a positive lab test, ILI symptoms, and clear progression from illness to death

[1] CDC. MMWR. www.cdc.gov/mmwr/index.html

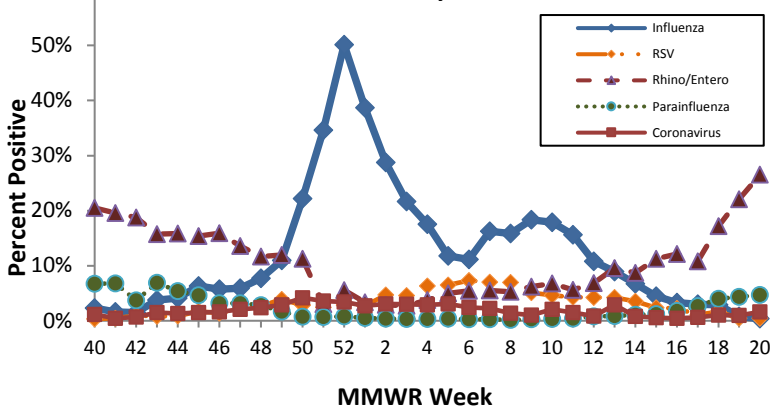
Figure 1.
Proportion of ILI Emergency Department Visits by MMWR Week
LAC, 2013–2018



SENTINEL LABORATORY DATA

Nine sentinel laboratories serving healthcare providers and institutions across LAC reported weekly influenza and other respiratory virus data to the LAC Department of Public Health (DPH) this season (**Figure 2**). Although individual cases of influenza are not reportable to LAC DPH, analyzing data from these sentinel labs provides information on influenza and other respiratory viruses circulating in the county. This season, a total of 107,199 respiratory isolate tests were reported to LAC DPH (**Table 1**). This season, influenza activity began to increase at the beginning of December, peaked at the during Week 52 (Dec 24–30, 2017) and stayed high through March. There was a decline in influenza activity in January and February, but activity trended upwards again in March corresponding with increased influenza B activity. Other viruses co-circulated with influenza, contributing to the overall impact of respiratory illness in LAC. During this season, the majority of influenza positive specimens were influenza A (66%).

Figure 2. Respiratory Viruses, LAC, 2016-17
Percent Positive Cases by MMWR Week

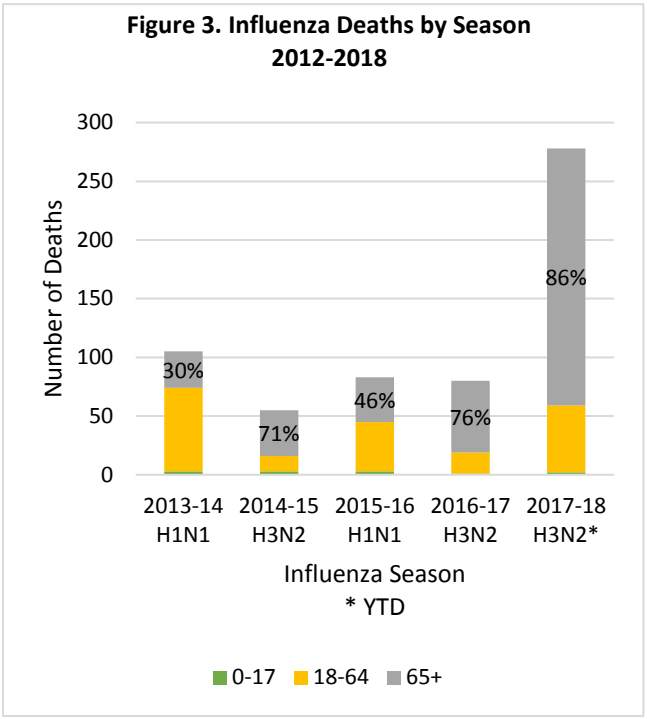


INFLUENZA-ASSOCIATED DEATHS

Since October 15, 2010, laboratory confirmed influenza fatalities of all ages and due to any strain are required to be reported to the ACDC within 7 calendar days.[2] Cases are reported to ACDC from physicians, infection prevention specialists at hospitals, the coroner's office, and via death certificate. A total of 278 influenza-associated deaths (IADs) have been confirmed in LAC this season.[3] There were more deaths reported this season than any season since LAC DPH initiated mandatory reporting.

The majority of deaths (79%) occurred in those 65 years of age and older (N=219), which is consistent with other influenza A H3N2 predominant seasons that more severely affect the 65 and older population (**Figure 3**). During influenza A H3N2 seasons, the 65+ age group accounts for a greater proportion of IADs compared to influenza A H1N1 predominant seasons (**Table 2**).

Figure 3. Influenza Deaths by Season 2012-2018



[2] LAC DPH. Reportable Diseases and Conditions. Title 17, California Code of Regulations, Section 2500 http://publichealth.lacounty.gov/acd/docs/ReportableDiseaseListSept2018.pdf

[3] This total is as of September 10, 2018 and is provisional and can change. The most up-to-date total is available at: http://publichealth.lacounty.gov/acd/FluData.htm

Table 2. Demographic Characteristics of Influenza Fatalities LAC 2012-2018							
		2017-18 N (%)	**2016-17 N (%)**	**2015-16 N (%)**	**2014-15 N (%)**	**2013-14 N(%)**	**2012-13 N (%)**
Age (years)	Median	75.7	82.5	62	81	56	68
	Range	9-105	4-102	1-103	1-101	0-89	0-100
	0-5	0	1 (1)	2 (2)	1 (2)	1 (1)	5 (7)
	6-17	2 (1)	0	1 (1)	3 (5)	3 (3)	3 (4)
	18-40	10 (4)	2 (3)	10 (12)	5 (9)	13 (12)	4 (6)
	41-64	47 (17)	16 (20)	31 (38)	8 (14)	59 (56)	22 (31)
	65+	219 (79)	61 (76)	38 (46)	39 (69)	30 (28)	36 (52)
Gender	Male	127 (46)	35 (44)	44 (54)	30 (54)	67 (64)	35 (50)
	Female	151 (54)	47 (56)	38 (46)	26 (46)	38 (36)	35 (50)
Race	Hispanic	66 (24)	16 (20)	27 (33)	16	48 (46)	29 (42)
	White Non-Hispanic	118 (42)	39 (49)	24 (29)	26	41 (39)	25 (37)
	Asian/Pacifc Islander	40 (14)	4 (5)	14 (17)	8	7 (7)	6 (9)
	Black	30 (11)	5 (6)	9 (11)	4	9 (8)	8 (12)
	Native American	0	0	1 (1)	1 (2)	0	0
	Unknown	24 (9)	14 (18)	6 (7)	1 (2)	0	2 (3)
Total Fatalities		**278**	**80**	**82**	**56**	**105**	**70**

RESPIRATORY OUTBREAKS

The total number of respiratory outbreaks confirmed in LAC decreased to 48, compared with 58 during the previous season. The majority of respiratory outbreaks this season occurred in schools or pre-schools (46%), followed by skilled nursing facilities (SNFs) (29%) (Table 3). Respiratory outbreak definitions vary by setting; however, in general, clusters of ILI (fever >100° F with cough and/or sore throat) is cause for investigation. Thirty-two respiratory outbreaks were confirmed in schools, daycare, and assisted living facilities. Of those, influenza was identified as the responsible pathogen in 11 outbreaks, with flu B accounting for the majority of them. In SNFs, influenza was identified in 11 of 14 respiratory outbreaks.

SYNDROMIC SURVEILLANCE

ACDC's Syndromic Surveillance Project monitors initial self-reported symptoms from patients presenting to participating emergency departments throughout LAC. These symptoms are categorized into different clinical syndromes according to specific code words. LAC's influenza surveillance looks at the syndrome of Influenza-like illness and includes symptoms such as: fever, congestion, sneezing, sore throat, runny nose, and cough. Similar to other indicators, there were more ILI emergency department visits this season than were reported in any of the last 5 seasons.

Table 3. Characteristics of Confirmed Community Respiratory Outbreaks, LAC 2012-2017						
	2017-18 N (%)	**2016-17 N (%)**	**2015-16 N (%)**	**2014-15 N (%)**	**2013-14 N (%)**	**2012-13 N (%)**
Total	**144**	**72**	**48**	**58**	**29**	**73**
Location						
Skilled Nursing Facility (SNF)	77 (53)	32 (44)	14 (29)	25 (43)	12 (41)	23 (32)
School or Pre-School	33 (23)	22 (31)	22 (46)	20 (34)	11 (38)	41 (56)
Assisted Living	28 (20)	15 (21)	8 (17)	12 (21)	3 (10)	6 (8)
Daycare/child care	3 (2)	2 (3)	2 (4)	1 (2)	1 (3)	3 (4)
Other	3 (2)	1 (1)	2 (4)	0	2† (7)	0
Etiology						
Influenza	113 (78)	37 (51)	22 (46)	37 (64)	7 (24)	17 (23)
Other Respiratory	1 (1)	8 (11)	2 (4)	1 (2)	0	1 (1)
Respiratory unknown etiology	30 (21)	27 (38)	24 (50)	20 (34)	22 (76)	55 (76)

MOBILIZING THE LARGEST COMMUNITY OUTREACH TO FIGHT MOSQUITO-BORNE DISEASES—LOS ANGELES COUNTY, 2017

BACKGROUND

According to the Centers for Disease Control and Prevention (CDC), Los Angeles County was one of the seven highest jurisdictions for potential Zika outbreak based on the extent of *Aedes* infestations, close proximity to the Mexico border, and high population density. LAC has also had a high number of West Nile Virus (WNV) cases compared to the population and relative to the United States over the past six years. Over the last 5 years, LAC has experienced yearly outbreaks of WNV[1] with an average of 221 cases per year, approximately 10% of the national burden (Table 1). Additionally, the significant spread and increased detection of *Aedes* mosquitoes in new local areas, coupled with the high volume of international travel and our dense population, provide the ideal elements for a potential local outbreak of dengue, Chikungunya, or Zika if these viruses are introduced into the environment by an infected traveler (Map 1). Despite these significant health risks, mosquito-borne disease knowledge, perceived risk, and prevention behaviors are low among residents in the county. In September 2017, the LAC Department of Public Health (DPH) organized and coordinated an unprecedented weeklong county-wide boots-on-the-ground outreach campaign (titled: It's Not Just a Bite!)[2] to distribute educational materials aimed to increase WNV and Zika awareness and knowledge as well as promote preventive action. This campaign was the largest door-to-door campaign ever implemented by LAC DPH to fight a communicable disease.

Map 1. Locations of Zika Cases & Aedes Mosquitoes

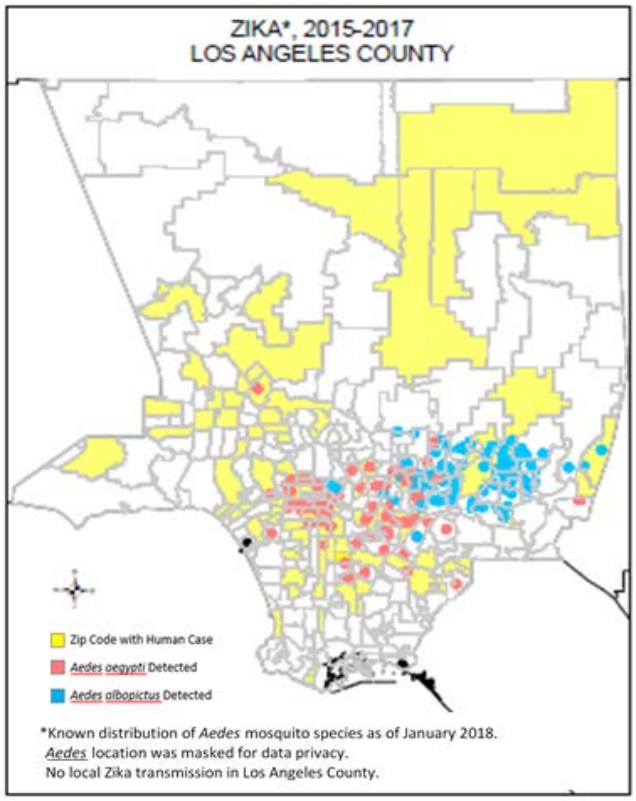


Table 1.
Number of WNV Cases in the United States and LAC, 2013-2017

Total Cases	U.S.	LAC
2013	2900	165
2014	2549	218
2015	2520	300
2016	2437	153
2017	2249	268

[1] LAC DPH. ACDC. West Nile virus data LAC. http://publichealth.lacounty.gov/acd/WNVData.htm
[2] LAC DPH. ACDC. *It's Not Just a Bite*: Mosquito abatement and education campaign 2017. http://publichealth.lacounty.gov/acd/WNVBite.htm

METHODS

Under the emergency response structure, a central command center was organized with four area command centers to coordinate and monitor the event. Several materials were developed including: 1) educational materials for WNV, Zika, and general mosquito-borne disease knowledge, which were translated into multiple languages (English, Spanish, Chinese, Tagalog, and Korean); 2) just-in-time training materials; and 3) scripts for outreach volunteers as well as staff answering the phones. Over 300 County of Los Angeles staff volunteers were recruited from all departments and programs, most of whom did not routinely work with arboviral diseases. DPH deployed 100 two-person teams for 5 days to distribute posters and flyers to public venues across the county including city council halls, libraries, schools, parks and places of worship. The campaign led to the distribution of approximately 55,000 educational materials to over 14,000 venues (Table 2). Environmental Health inspectors further distributed materials during routine site visits at permitted facilities. A digital tool kit was disseminated to city contacts and partners throughout LAC to be used, distributed and printed according to local needs and resources. The on-the-ground effort was complemented by a social media campaign through online platforms such as Twitter, Instagram, and Facebook, which further increased reach of campaign and engaged residents online. The campaign attracted considerable press coverage and media attention which also amplified the reach of these important messages.

Table 2. Venues Reached in Countywide Campaign

Venue	Number
City council/District Office	233
Chamber of Commerce	85
Places of Worship	955
Schools	1,374
Parks	342
Libraries	233
Senior Centers & Residential Facilities	515
Organizations for Pregnant Women	318
Theaters & Outdoor Concert Venues	70
Stores, Pharmacies & Other	9,989
Total	**14,114**

RESULTS

To assess the reach and impact of the outreach campaign, in November 2017, DPH conducted a 27-question two-stage cluster community survey in four LAC cities. This was enacted in partnership with Department of Mental Health Promotores and public health students from the University of California Los Angeles Fielding School of Public Health, California State University Northridge, and University of Southern California. The survey questions assessed exposure to and recall of campaign messages and attempted to identify attitudes and behaviors regarding mosquitoes and mosquito-borne diseases. A total of 464 surveys were completed over two days. Approximately 60% of respondents reported exposure to the campaign through at least one of the following: posters, flyers, community meetings, social media, or news articles. Analyses showed that exposure to the materials was associated with a significant increase in awareness and knowledge of both WNV and Zika (Table 3). Table 4 shows modes of exposure that were significantly associated with increased awareness and/or knowledge of WNV and Zika. Those who

reported exposure to campaign through posters, social media, or news articles had increased Zika awareness and/or knowledge. However, exposure to flyers or community meetings was not found to be associated with a similar increase. Exposure to posters was associated with increased WNV awareness and knowledge, but exposure to flyers, social media, news articles, and community meetings was not. The data did not reveal an increase in mosquito prevention behavior linked to the campaign among those surveyed. Multiple interventions sustained over time, particularly in specific types of materials, may be required to change habits, beliefs and actions regarding prevention of mosquito-borne diseases.

Table 3. Impact of exposure to the campaign

	Exposed	Non-exposed	P-value
Zika			
Awareness	213 (65%)	116 (35%)	<0.001
Knowledge	212 (64%)	118 (36%)	<0.001
Concern	160 (66%)	81 (34%)	0.300
WNV			
Awareness	210 (63%)	126 (38%)	0.002
Knowledge	207 (62%)	127 (38%)	0.008
Concern	129 (62%)	79 (38%)	0.817
Engaged in mosquito prevention	222 (60%)	151 (40%)	0.240

Table 4. Impact of campaign by exposure types

Zika awareness	**OR**	**95% CI**	
Social media	2.61	1.47	4.65
Poster	2.29	1.32	3.96
Zika knowledge			
News articles	1.90	1.22	2.95
Social media	1.84	1.16	2.92
Poster	1.73	1.09	2.74
WNV awareness			
Poster	1.96	1.14	3.38
WNV knowledge			
Poster	1.82	1.17	2.84

DISCUSSION

Overall, the It's Not Just a Bite! campaign was an extraordinary effort to reach and engage the diverse communities in LAC about mosquito-borne disease prevention. In an era where emerging and re-emerging pathogens are increasingly being identified and can spread at record speed through global trade and travel, it is essential for health departments to not only be able to detect these threats but to also be able to rapidly organize and mobilize staff to communicate and engage with the community. The LAC DPH

mosquito-borne disease outreach campaign proved that extensive and rapid community outreach can be successfully accomplished through the mobilization of diverse public health staff and was a valuable learning exercise that can be adapted and quickly deployed for other emergency large-scale responses in the future.

BEYOND CASE COUNTS—CAPTURING A RECORD NUMBER OF DEATHS DUE TO WEST NILE VIRUS IN LOS ANGELES COUNTY BY ENHANCING MONITORING OF PATIENTS

BACKGROUND

In 2017, Los Angeles County (LAC) experienced a record-breaking 27 deaths due to West Nile virus (WNV).[1] That year 11% of the 254 known symptomatic patients stricken with this disease died. Even during the five previous years with unusually high average case counts of 202 cases per year, the number of deaths from WNV peaked at 24 (5-year average of 10.4 deaths per year, 5.3% of those ill).[2] The deaths occurred across racial and geographic boundaries, and had an age range of 59 to 96 years with half being above 75 years of age. Because WNV can often lead to long-term illness or death after a patient leaves the hospital, deaths from WNV infection can be missed with routine monitoring leading to an underestimate of the true impact of this disease.

In the last five years, LAC Department of Public Health (DPH) has received an average of 670 mosquito-borne disease reports per year. The LAC DPH had previously relied upon one investigator to follow up on these reports. Investigations were usually completed before discharge from hospitals and deaths were only captured through informal reporting from providers and family members. Without evidence of death, patients with unknown outcomes were assumed to have survived the disease. Through enhanced monitoring of patients, LAC DPH was able to identify a more accurate number of deaths, and a record number of fatalities from WNV therefore was identified in 2017.

FINDINGS

Grant funding for a new position enabled LAC DPH to conduct additional follow-up of WNV patients where survival was not known. From June through December 2017, a mosquito-borne disease investigator worked with hospital staff to ensure all (100%) discharge information reporting death or survival for hospitalized patients were reported and documented. If discharge information was not available due to prolonged hospital stays, the patient was flagged for additional follow-up in two weeks, at which time, the investigator again requested and reviewed patient discharge information. Repeated requests were often necessary due to lengthy hospitalizations that frequently occur with WNV. This process took a substantial amount of time and effort and increased the estimated hour that is required per case for initial review and confirmation by another hour, essentially doubling the work time for flagged cases. The investigator took on this additional workload while managing the investigations of over 30 cases of WNV a week, which resulted in the addition of 9 reported deaths out of approximately 80 patients. Without grant funding to support another investigator for Zika monitoring, it would have been necessary for the existing investigator to take on Zika investigation responsibilities and we might not have been able to identify the additional fatalities due to this disease. Additional follow-up of WNV survival would have become a lower priority, as it has been in the past, and could not have been completed.

[1] LAC DPH. ACDC. West Nile Virus and Other Arboviral Diseases: 2017. Los Angeles County Epidemiology Final Report. http://publichealth.lacounty.gov/acd/docs/Arbo2017.pdf
[2] LAC DPH. ACDC. West Nile virus data LAC. http://publichealth.lacounty.gov/acd/WNVData.htm

DISCUSSION

The enhanced monitoring of deaths carried out in 2017 highlights the health impact of WNV that was previously under-estimated in LAC. Many residents of our county become severely sick with WNV disease every year since LAC DPH first discovered the virus in the area in 2002. It has been difficult to bring attention and resources to a public health issue that is no longer a new problem and has been portrayed as mild to the majority of those infected, a perception that was supported by lower numbers of deaths. The high number of deaths in the 2017 season brought much needed attention to the severity of WNV and broader recognition that this disease is a dangerous and significant threat in LAC. Awareness has increased not only among public health officials but also among local governments and policy makers. Continuation of improved investigation procedures for WNV deaths will raise the level of concern, provoke new conversations on prevention and promote coordinated action to address the persistent threat of WNV in LAC.

LESSONS LEARNED

Considering the impact of a high number of deaths on the perception of WNV among health officials and the public, LAC DPH is prioritizing the thorough investigation of WNV survival. While LAC DPH still retains the additional investigator supported by grant funding for Zika and other infections for the 2018 season, we will continue to conduct follow-up of our WNV patients without known hospital discharge information and report deaths in a timely manner to boost awareness and promote WNV prevention and control efforts.

It was challenging for a single investigator to conduct enhanced monitoring of patients while conducting routine case investigations of over 250 WNV cases over the six-month WNV season in LAC. As this was the first time this follow up was conducted, there was no precedent and no estimate of additional workload this would entail. Going forward, it will be helpful to establish a protocol for follow up that others can easily follow step by step. In addition, we can explore documenting and reporting other serious effects of WNV illness such as long hospitalization stays and the need for rehabilitation. Without the support of the grant funding source, improved investigations of the effects of WNV could not be carried out and the additional vital information about the true and serious impact of this disease would not be fully recognized.

THE EXPANSION OF THE LOS ANGELES COUNTY WEB-BASED DISEASE SURVEILLANCE SYSTEM TO AN ENTERPRISE INTEGRATED REPORTING, INVESTIGATION, AND SURVEILLANCE SYSTEM

BACKGROUND

Brief History of web-Visual Confidential Morbidity Reporting System

Prior to 1999, the Los Angeles County Department of Public Health (LAC DPH) Acute Communicable Disease Control (ACDC) Program relied on telephone reports or paper-based reporting, via fax and mail. These reports were then subsequently manually entered for data collection of disease incidents. This low-technology reporting and tracking method required a significant amount of paperwork and person hours and potentially could cause reporting delays and quality control issues. Beginning in 2000, ACDC enacted a web-based, centralized repository for disease reports, laboratory reports, foodborne illness reports and outbreaks. The system is called the visual Confidential Morbidity Reporting (vCMR)[1] system.

vCMR serves as primary disease surveillance system for ACDC and as a disease repository for several LAC DPH programs. vCMR supports the rapid exchange of electronic public health information between community practitioners (through the web Community Reporting Module) and electronic laboratory reporting (ELR). The system provides ACDC with a cohesive surveillance system to rapidly detect, identify, and investigate reportable communicable diseases. Over the years, ACDC implemented key configurations and modifications to support LAC DPH's unique needs including maintenance of historical data and images, electronic laboratory reporting of national, state, and local disease. vCMR also capably supports various workflows which allow public health nurses, investigators, and health services to cooperatively share information and manage cases and outbreaks. LAC DPH's ability to develop vCMR with differing key configurations and modifications is reflective of the unique needs of a large local jurisdiction. Although vCMR supported some of the data management needs of these programs, there are several other LAC DPH programs that primarily use respective legacy database systems and paper-based forms. These programs include the Division of STD and HIV Programs (DHSP)[2], the Tuberculosis Control Program (TBCP)[3], and Veterinary Public Health (VPH)[4].

LAC DPH Evaluates an Electronic Enterprise Solution for Disease Surveillance and Investigation

In November 2013, an LAC DPH Executive Team formed the Share Disease Surveillance and Control System (SDSCD) Project. Participants collaborated with the LAC DPH Chief Information Office to develop a strategy and approach to implement a shared system for disease surveillance for DPH. Subsequently, in 2014, SDSCS Staff Committee evaluated health information and operational needs across DPH programs. From both a local and national perspective, it was determined that LAC DPH needed to unify its disease programs and provide an integrated enterprise solution that promotes information sharing and digitizing paper-based workflows.

[1] http://www.publichealth.lacounty.gov/acd/vcmr/Index.htm
[2] http://publichealth.lacounty.gov/dhsp/
[3] http://publichealth.lacounty.gov/tb/index.htm
[4] http://publichealth.lacounty.gov/vet/index.htm

LAC DPH programs including Community Health Services (CHS)[5], DHSP, Public Health Nursing Administration (NA)[6], Public Health Investigation (PHI)[7], TBCP, VPH, Vaccine Preventable Disease Control Program (VPDC)[8], Public Health Laboratory (LAPHL)[9], and Environmental Health[10] found that functions of vCMR can effectively meet many of their data needs.

In April 2016, SDSCS Staff Committee detailed their findings and recommendations in the SCSCS Executive Report. After extensive internal analysis of health information systems, workflow, organizational and IT infrastructure, and data and information needs along with external analysis of other public health information system vendors, the SDSCS Staff Committee recommended expansion of vCMR to migrate LAC DPH disease programs on to a common platform. vCMR proved to be the most efficient and economical solution for LAC DPH programs because it was originally designed for LAC and previous investments will be leveraged for future developments. Significant product upgrades and enhancements of vCMR will enable LAC DPH programs to retire legacy systems.

RESULTS

Decision to Upgrade vCMR to be the Enterprise Solution for LAC DPH Programs

In November 2016, the Interim Health Officer and SDSCS Executive Workgroup accepted the SDSCS Staff Committee's recommendation to expand vCMR. Accordingly, vCMR received a new name to reflect its new purpose—The Integrated Reporting, Investigation, and Surveillance System (IRIS). The IRIS Project includes:

- Migration to cloud-based computing technology
- Interfaces with Health Agency, State and partner systems:
    - LAC Department of Health Services' Online Real-time Central Health Information Database ORCHID
    - Electronic Case Reporting (eCR)
    - Electronic initial Case Reporting (EiCR)
- Additional enhancements
    - Improved security (e.g., multi-factor authentication)
    - Physician Portal (e.g., PHL orders)

The IRIS Project Team picks up where the SDSCS Staff Committee concluded and will plan, develop, test, and implement IRIS.

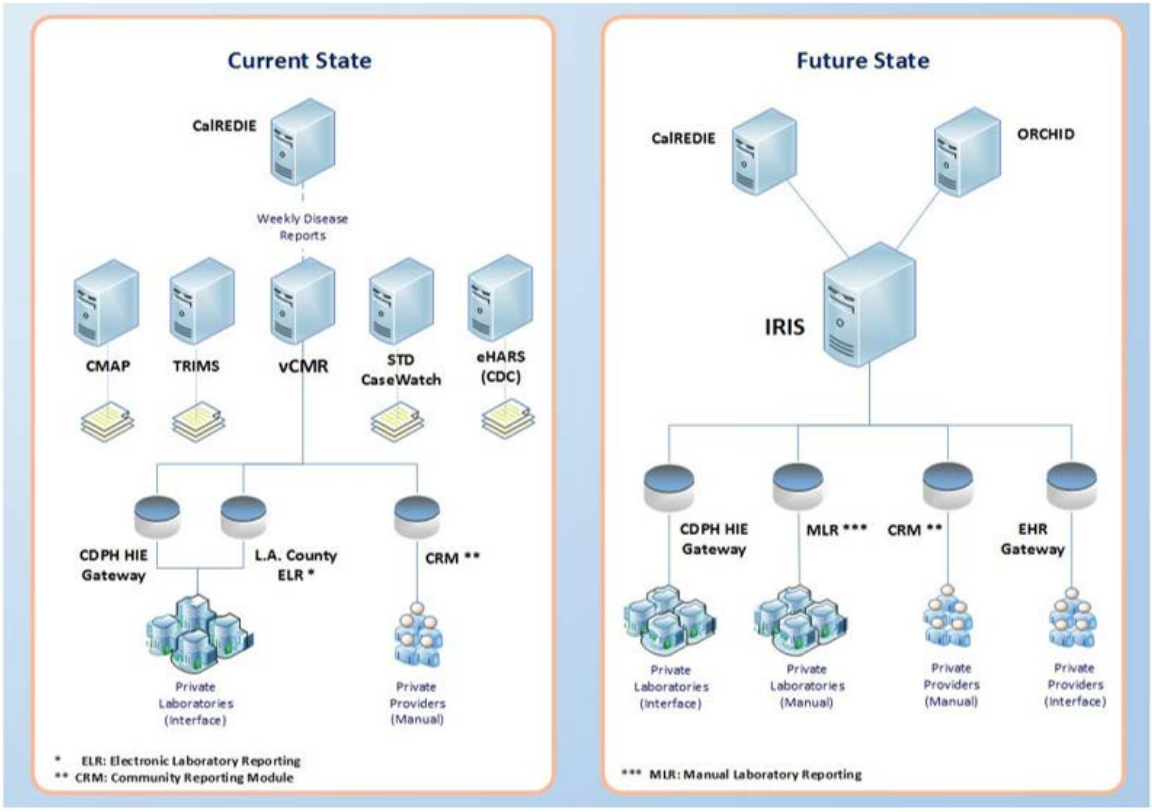
Collaboration among LAC DPH Programs and the Future of IRIS

The IRIS Project Team includes staff from Public Health Information Systems (PHIS), Internal Services Department (ISD), Project Management Office (PMO), County Council, Communicable Disease Control and Prevention (CDCP), and ACDC. The Team will begin meeting and collaborating with DPH programs to

[5] http://www.publichealth.lacounty.gov/chs/index.htm
[6] http://publichealth.lacounty.gov/phn/index.htm
[7] http://publichealth.lacounty.gov/phi/
[8] http://publichealth.lacounty.gov/ip/index.htm
[9] http://publichealth.lacounty.gov/lab/index.htm
[10] http://publichealth.lacounty.gov/eh/index.htm

gather business and functional requirements. The IRIS project team adopted a participatory approach to bring TBCP, DHSP, and VPH programs into IRIS. Other programs (CHS, NA, and PHI) will be given expanded access to and use of IRIS to conduct field work. Subject Matter Experts (SMEs) from each department are included in the planning and development of the IRIS project. The goal of this participatory approach is to ensure all programs have an opportunity to voice respective programmatic needs and establish realistic expectations of IRIS's capabilities for both current and future needs. The expected expansion of IRIS is displayed in Figure 1 below.

Figure 1.
IRIS Current and Future State



In November 2017, staff conducted a Joint Application Development (JAD) Session under the existing contract. The JAD sessions provided the basic IRIS system requirements and solutions and established regular meetings with each programs' SMEs. The IRIS project is now well underway to become the first integrated disease surveillance system for LAC DPH.

EVALUATION OF SYNDROMIC SURVEILLANCE IN DETECTING HEPATITIS A IN LOS ANGELES COUNTY

OVERVIEW

Beginning in November 2016, a hepatitis A virus (HAV) outbreak[1] was identified in San Diego County which subsequently spread to Santa Cruz, Los Angeles, and Monterey Counties. Infections primarily occurred among homeless individuals and those who use illicit drugs. Due to the proximity of Los Angeles County (LAC) to San Diego County and its own large homeless population, on September 19, 2017, the LAC Department of Public Health (LAC DPH) declared an outbreak of HAV[2] among persons who are homeless and/or use illicit (injection and non-injection) drugs. By October 10, 2017, LAC DPH identified 12 local outbreak-related HAV cases. To monitor the impact of the outbreak, LAC DPH's syndromic surveillance team created an HAV syndrome category and began querying local emergency department (ED) data to identify any increases in HAV-related visits.

METHODS

From January 1, 2017 through October 10, 2017, which corresponds to the Centers for Disease Control and Prevention (CDC) weeks 1–41, ED data from all participating syndromic EDs in LAC were queried for patients who reported symptoms and signs of HAV infection. For comparison, ED data from the full 2016 calendar year also was queried. The query consisted of key word searches primarily within the chief complaint field, and if available, from the diagnosis and triage note fields. Based on the CDC clinical description of hepatitis A,[3] the HAV syndrome category was defined as: jaundice (or elevated liver function tests) with nausea or vomiting. Any ED visit that mentioned a diagnosis of hepatitis A also met the syndrome criteria. The resulting line lists were reviewed, and the query parameters were periodically refined to exclude visits unrelated to hepatitis A. For instance, analyses excluded: patients with a previous history of HAV infection or vaccination for hepatitis A, those diagnosed with other types of hepatitis, and patients diagnosed with neonatal jaundice. The syndromic system also was queried for records that matched the 12 initial outbreak-related LAC cases by hospital and admission date. In addition, the chief complaint, diagnosis, and triage note fields were reviewed for any mention of homelessness or illicit drug use (IDU).

RESULTS

For the 2017 time-period (weeks 1–41), the LAC DPH syndromic system detected 158 ED patients meeting the HAV syndrome category criteria. Of these, 12.7% had a diagnosis of HAV, 53.8% had jaundice, 36.7% had elevated liver enzymes, 65.2% had nausea, and 65.8% had vomiting. In 2016, 170 ED patients who met the syndrome criteria were detected: 8.2% had a diagnosis of HAV, 64.1% had jaundice, 32.4% had elevated liver enzymes, 63.5% had nausea, and 71.2% had vomiting. In both years, no indications of homelessness or IDU were identified.

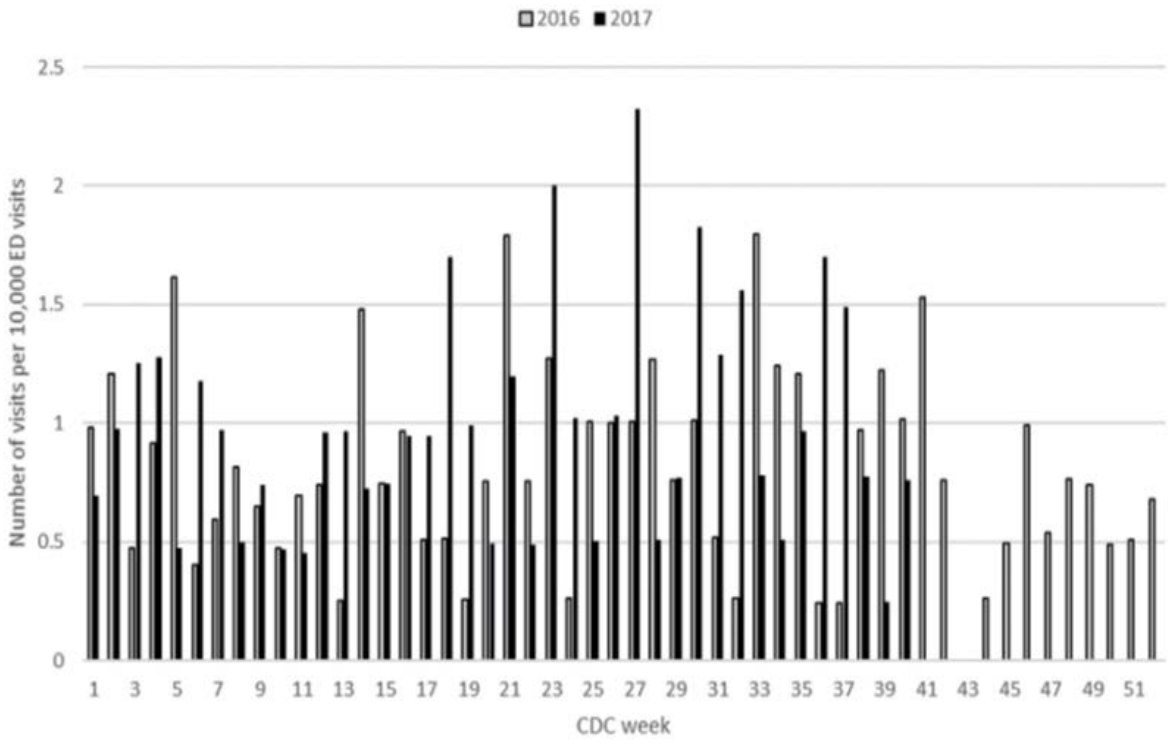
[1] https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Hepatitis-A-Outbreak.aspx
[2] http://publichealth.lacounty.gov/eprp/Health%20Alerts/DPH%20HAN%20Hep%20A%20Outbreak%20091917.pdf
[3] https://wwwn.cdc.gov/nndss/conditions/hepatitis-a-acute/case-definition/2012/

Of the 12 initial and confirmed HAV outbreak-related cases in LAC, one-fourth (n=3) did not go to a hospital, thus did not have any syndromic data. Only two cases went to EDs that do not participate in LAC DPH syndromic surveillance, but a medical chart review showed that they would not have met the syndrome criteria. Of the remaining cases (n=7), all went to a participating syndromic ED, 43% (n=3) met the syndrome criteria, but none of their records included any mention of homelessness or IDU.

DISCUSSION

In 2017, a large hepatitis A outbreak in San Diego County, primarily among individuals who were homeless and/or illicit drug users, prompted the LAC DPH to create a HAV syndrome category and begin querying local participating ED data to monitor for any increases in HAV-related visits. In the end, no major outbreak of HAV occurred in LAC, and no major change was seen in the trend of HAV syndrome visits in 2017 as compared to 2016 (Figure 1). Use of a stricter syndrome definition, such as requiring a specific diagnosis of HAV, may result in underreporting, but may also provide a more accurate baseline for detecting increases and monitoring trends. While the query relied primarily on ED chief complaint, diagnosis and triage notes also proved useful in detecting HAV syndrome visits.

Figure 1.
Proportion of ED Visits Meeting Hepatitis A Syndrome Category Criteria
Los Angeles County, 2016–2017



LIMITATIONS

One of the challenges in monitoring HAV incidence is that the clinical signs and symptoms are very general and may be comparable with many other conditions. An emerging outbreak may not be detected above background levels unless the increase in ED patients with HAV is large or consolidated over time. In addition, variability in data quality in the free text fields such as chief complaint and triage notes may be problematic. Cases will be missed if data fields are not fully and accurately documented, if patients didn't go to a participating syndromic hospital, or if they don't go to a hospital at all. In addition, while many syndromic hospitals now report diagnosis information, this information may be delayed due to the time required for complete laboratory results. Further complicating these findings, none of the confirmed HAV cases that were known to be homeless included any mention of homelessness in their charts. This omission, as well as the omission of IDU status, indicate that these conditions are not currently reliably captured in the syndromic extraction of ED patient records.

CONCLUSIONS

Syndromic surveillance, despite its limitations, remains a valuable complement to electronic laboratory reporting and other traditional reporting mechanisms. Accordingly, LAC DPH will continue to employ syndromic surveillance to facilitate monitoring health issues and disease trends in our county.