MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	20
Annual Incidence[a]	
LA County	0.21
California[b]	0.18
United States[b]	0.11
Age at Diagnosis	
Mean	35
Median	30
Range	13-77 years

[a]Cases per 100,000 population.
[b]Calculated from: CDC. *Notice to Readers:* Final 2016 Reports of Nationally Notifiable Infectious Diseases and Conditions *Weekly* / January 6, 2018 / 65(52). Available at: https://www.cdc.gov/mmwr/volumes/65/wr/mm6552md.htm?s_cid=mm6552md_w

DESCRIPTION

Meningococcal disease (MD) or invasive meningococcal disease (IMD) occurs most often as meningitis, an infection of the cerebrospinal fluid (CSF), or meningococcemia, an infection of the bloodstream. It is transmitted through direct or droplet contact with nose or throat secretions of persons colonized in the upper respiratory tract with *Neisseria meningitidis* bacteria. Common 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. Of the 13 serogroups, A, B, C, Y, and W-135 are responsible for causing nearly all cases of meningococcal disease.

For the purpose of surveillance, the LAC DPH defines reports of IMD 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**].

Both suspected clinical cases of IMD and laboratory findings consistent with IMD are immediately reportable to the public health department. All cases are investigated by public health nurses within the district corresponding to the home of residence. In addition to the standardized case report form, a supplemental form documenting additional risk factors is completed.

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. Another 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 and older, 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, Advisory Committee on Immunization Practices (ACIP) recommended routine use of meningococcal vaccine for HIV positive persons two years and older [**4**]. Serogroup B meningococcal

vaccination is recommended in addition to quadivalent conjugate vaccine for people 10 years or older who are at increased risk for meningococcal disease.

Within LAC, DPH recommended meningococcal vaccination for men who have sex with men (MSM) at increased risk for IMD in 2014 due to an increase of IMD among MSM in LAC that occurred from 2012 through 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 and is ongoing.

Antimicrobial chemoprophylaxis of close contacts of sporadic cases of IMD remains the primary means for prevention of IMD among close contacts. This includes:

a) Household members,
b) Daycare center contacts, and
c) Anyone directly exposed to the patient's oral secretions during the seven days prior to the paient's onset of illness (e.g., through kissing, sharing beverages or cigarettes, mouth-to-mouth resuscitation, endotracheal intubation, or endotracheal tube management).

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-patient 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.

2016 TRENDS AND HIGHLIGHTS sssss

- 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 0.2 cases per 100,000 in 2016 (Figure 1).
- There were no cases reported among persons less than five years old in 2016. The highest number of cases (n=6, 55%) occurred among those 15-34 years old (Figure 2). 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 less than one year old. This trend is maintained nationally. There have been no cases of IMD in children less than one year old in LAC since 2010.
- The monthly onset of disease deviated from the typical seasonal trend where a peak occurs during the winter season. The highest numbers of cases occurred in May and June with four cases each (Figure 4).
- Culture confirmation was obtained for 13 of the 20 cases (65%). The remaining were confirmed by PCR. *N. meningitidis* was detected in seven cases from blood and CSF (35%), seven from CSF only (35%), and six from blood only (30%).
- Only two cases were not serotyped: one due to the specimen being discarded, and the other was non-groupable. The majority of serotyped cases were serogroup C (n=10, 50%), five (25%) were serogroup B, two (10%) were serogroup W-135, and one was serogroup Y (Figure 6). The proportion of serogroup C cases in LAC has been declining since 2013 due to an increase in serogoup B cases. All serogroup C cases were associated with a southern California regional outbreak occurring primarily among MSM that began in March 2016 (see bullet below).
- No fatalities were documented this year. The last fatality due to IMD in LAC occurred in 2014.
- Beginning March 2016, an increase in IMD was detected among MSM in LAC and neighboring jurisdictions in southern California. LAC DPH collaborated with the Centers for Disease Control and Prevention (CDC) and affected local health departments to investigate cases and enhance vaccination uptake among the at-risk MSM community. A supplemental history form was modified to focus on unique risk factors among MSM such as attendance at gay/MSM establishments or events. Cases were defined as outbreak-associated if they were

identified as serogroup C with the outbreak molecular sequence type or without a known sequence type. No direct geographic and social epidemiologic links were found between any outbreak cases. By the end of 2016, there were 27 outbreak-associated cases across southern California, 11 of which were LAC residents (41%). The outbreak is ongoing into 2017.

REFERENCES

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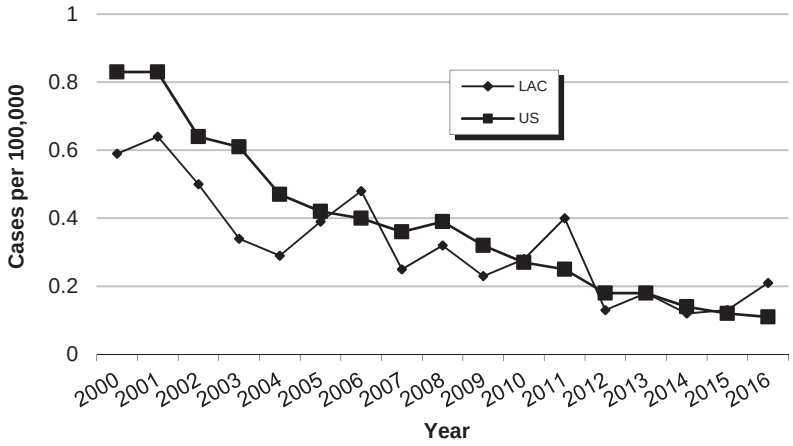
2. Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report. Updated Recommendations for Use of MenB-FHbp Serogroup B Meningococcal VaccineAdvisory Committee on Immunization Practices (ACIP), 2016. 19 May 2017, 66 (19): 509-513.
3. Centers for Disease Control and Prevention. 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.

Reported Meningococcal Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2012-2016

	2012 (N=12)			2013 (N=17)			2014 (N=11)			2015 (N=12)			2016 (N=20)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
1-4	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
5-14	0	-	-	1	5.9	0.1	0	-	-	0	-	-	1	5.0	0.1
15-34	4	33.3	0.1	7	41.2	0.2	6	54.5	0.2	4	33.3	0.1	11	55.0	0.4
35-44	0	-	-	3	17.6	0.2	1	9.1	0.1	1	8.3	0.1	4	20.0	0.3
45-54	2	16.7	0.2	2	11.8	0.2	3	27.3	0.2	3	25.0	0.2	1	5.0	0.1
55-64	2	16.7	0.2	1	5.9	0.1	1	9.1	0.1	1	8.3	0.1	0	-	-
65+	4	33.3	0.4	3	17.6	0.3	0	-	-	3	25.0	0.3	3	15.0	0.2
Unknown	0	-	-	0	-	-	0	-	-	0	-	-			
Race / Ethnicity															
Asian	2	16.7	0.2	0	-	-	2	18.2	0.1	0	-	-	1	5.0	0.1
Black	2	16.7	0.3	4	23.5	0.5	2	18.2	0.3	2	16.7	0.3	3	15.0	0.4
Hispanic	5	41.7	0.1	6	35.3	0.1	6	54.5	0.1	6	50.0	0.1	9	45.0	0.2
White	3	25.0	0.1	6	35.3	0.2	1	9.1	-	4	33.3	0.1	7	35.0	0.3
Other	0	-	-	1	5.9	-	0	-	-	0	-	-	0	-	-
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
SPA															
1	0	-	-	0	-	-	0	-	-	1	8.3	0.3	0	-	-
2	2	16.7	0.1	5	29.4	0.2	3	27.3	0.1	4	33.3	0.2	2	10.0	0.1
3	0	-	-	1	5.9	0.1	1	9.1	0.1	0	-	-	3	15.0	0.2
4	5	41.7	0.4	4	23.5	0.4	6	54.5	0.5	3	25.0	0.3	6	30.0	0.5
5	2	16.7	0.3	2	11.8	0.3	0	-	-	1	8.3	0.2	4	20.0	0.6
6	3	25.0	0.3	1	5.9	0.1	0	-	-	2	16.7	0.2	0	-	-
7	0	-	-	3	17.6	0.2	0	-	-	1	8.3	0.1	3	15.0	0.2
8	0	-	-	1	5.9	0.1	1	9.1	0.1	0	-	-	2	10.0	0.2
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	-	-	-

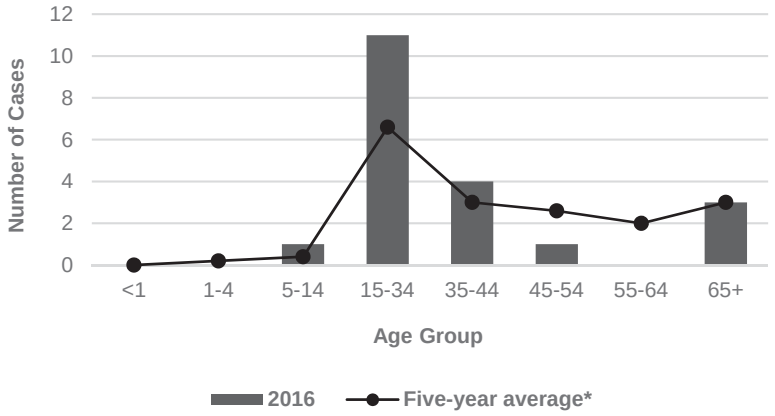
*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates* of Meningococcal Disease LAC and US, 2000-2016



*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 2. Meningococcal Disease Cases by Age Group, LAC, 2016 (N=20)



*2011-2015

Figure 3. Meningococcal Disease Cases by Race/Ethnicity, LAC, 2012-2016

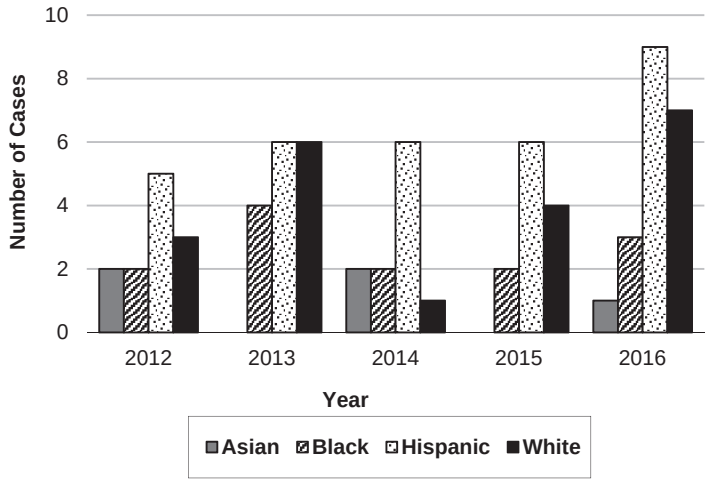
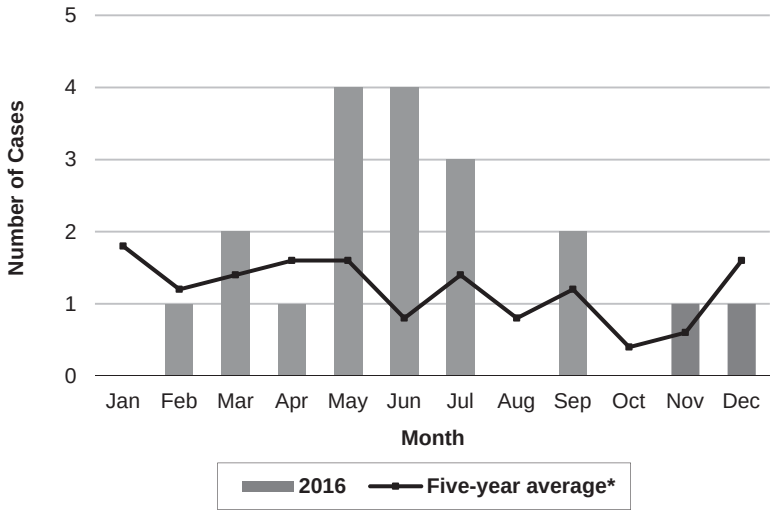


Figure 4. Reported Meningococcal Disease Cases by Month of Onset, LAC, 2016 (N=20)



*2011-2015

Figure 5. Meningococcal Disease Cases by SPA
LAC, 2012-2016

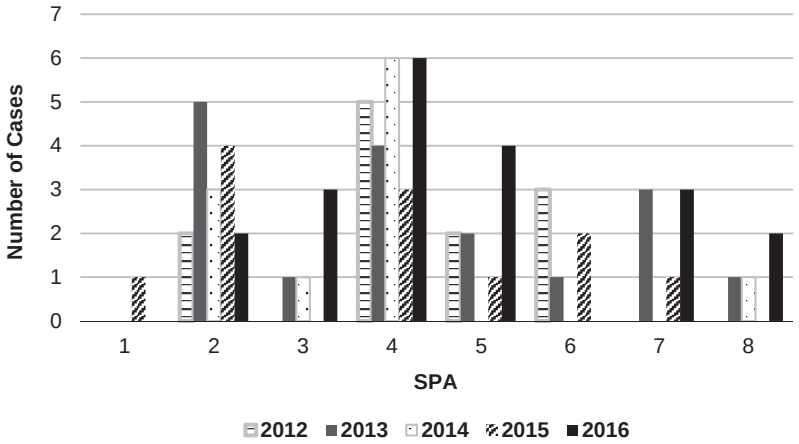
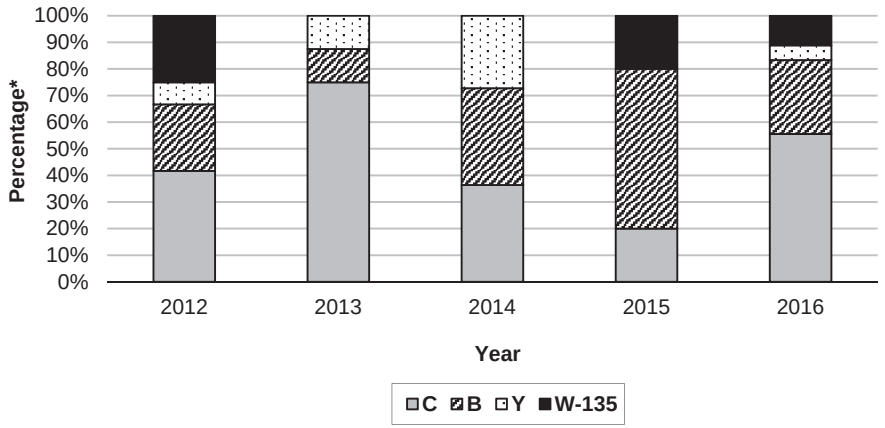


Figure 6. Meningococcal Disease by Serogroup
LAC, 2012–2016



*Among cases with known serogroup.

MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	12
Annual Incidence[a]	
LA County	0.13
California[b]	0.12
United States[b]	0.12
Age at Diagnosis	
Mean	47
Median	46
Range	16–84 years

[a]Cases per 100,000 population.
[b]Calculated from: CDC. *Notice to Readers:* Final 2015 Reports of Nationally Notifiable Infectious Diseases and Conditions *Weekly* / November 25, 2016 / 65(46);1306–1321. Available at: www.cdc.gov/mmwr/volumes/65/wr/mm6546a9.htm

DESCRIPTION

Meningococcal disease (MD) occurs most often as meningitis, an infection of the cerebrospinal fluid (CSF), or meningococcemia, an infection of the bloodstream. It is transmitted through direct or droplet contact with nose or throat secretions of persons colonized in the upper respiratory tract with *Neisseria meningitidis* bacteria. Common 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. Of the 13 serogroups, A, B, C, Y, and W-135 are responsible for causing nearly all cases of meningococcal disease.

For the purpose of surveillance, the LAC DPH defines reports of invasive meningococcal disease 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].

Both suspected clinical cases of MD and laboratory findings consistent with MD are immediately reportable to the public health department. All cases are investigated by public health nurses within the district corresponding to the home of residence. A standardized case report is completed. In December 2012, in addition to the standardized case report form, a supplemental form documenting additional risk factors was included in the investigation. Additional risk factors such as sexual history (men who have sex with men [MSM]) and travel history were documented due to the ongoing outbreak of MD among MSM in New York City in 2011-2012 [2].

A total of four vaccines have been made available in the US that protect against serogroups A, C, Y, and W-135. A quadrivalent unconjugate polysaccharide meningococcal vaccine (MPSV4) is licensed for persons >55 years old and ≥2 years old when a quadrivalent conjugate polysacharide vaccine is not available. Two quadrivalent conjugate vaccines, MenACWY-D and MenACWY-CRM, are licensed for use in persons 2-55 years old. MenACWY-D is also licensed for used in children 9-23 months old. Both vaccines are recommended for all adolescents between 11-18 years old, preferably at 11 or 12 years old, and for those 2-55 years old who are at increased risk for meningococcal disease. An additional booster dose is needed if the primary dose was given before 16 years old. Routine vaccination is recommended for college freshman living in dormitories, persons at increased risk for meningococcal disease. An additional conjugate vaccine, Hib-MenCY-TT, has been licensed for infants 6 weeks to 18 months old but only protects against serogroups C and Y disease [3]. Two serogroup B vaccines, MenB-FHbp and MenB-4C, were approved for use in persons 10-25 years old [4].

In addition to ACIP recommended groups, DPH has recommended meningococcal vaccination for MSM at increased risk for IMD since 2014. The vaccine should be offered to:

- All HIV-infected gay/MSM

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

Antimicrobial chemoprophylaxis of close contacts of sporadic cases of MD remains the primary means for prevention of MD among close contacts. This includes:

a) Household members,
b) Daycare center contacts, and
c) Anyone directly exposed to the patient's oral secretions (e.g., through kissing, mouth-to-mouth resuscitation, endotracheal intubation, or endotracheal tube management)

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 >10 days after onset of illness in the index case-patient 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.

2015 TRENDS AND HIGHLIGHTS

- The incidence of MD 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 2015 (Figure 1). In 2015, LAC documented one of the lowest incidence and case counts with only 12 cases.
- There were no cases reported among persons less than 15 years old in 2015. The highest number of cases (n=6, 55%) occurred among those 15-34 years old (Figure 2). This has been the trend for previous five years. However, in a typical distribution curve depicting incidence for MD, the peak incidence occurs among infants <1 year old. There have been no cases of MD in children <1 year old since 2010.
- The monthly onset of disease deviated from the typical seasonal trend of peaking in the winter season. The highest numbers of cases occurred in January and April with four cases each (Figure 4).
- Culture confirmation was obtained for 10 of the 12 cases (83%), and of these, seven (70%) were cultured from blood, two (20%) from blood and CSF, and one (10%) from synovial fluid.
- Two cases were not serotyped: one due to the specimen being discarded and the other due to a negative culture and PCR test (case was diagnosed by gram stain). The majority of serotyped cases were serogroup B (n=6, 60%), two (20%) were serogroup C, and two (20%) were serogroup W-135 (Figure 6). The proportion of serogroup B cases in LAC has increased since 2013. Seven outbreaks of serogroup B disease have occurred on college campuses since 2009 in the US. However, the incidence of serogroup B disease in young adults 18-23 years old remains low (0.1 per 100,000), and no outbreaks or increases in college students or that age group have been documented within LAC [5].
- No fatalities were documented this year. In contrast, LAC documented a 27% case fatality rate (n=3) in 2014.
- Though no outbreaks occurred within LAC, a serogroup B case who reported travel to and exposure to students at the University of Oregon was confirmed to have a strain indistinguishable from the strain associated with an outbreak occurring there.
- An increase of MD among MSM occurred between October 2012 and September 2014 (n=13). Due to increases in fatalities and HIV co-morbid cases, among other factors, LAC DPH recommended vaccination against MD among certain risk groups in the MSM community beginning April 2014. The number of MD cases among MSM has declined since then with only one case in 2015. However, LAC DPH continues to endorse the recommendation.

References

1. Centers for Disease Control and Prevention. National Notifiable Disease Surveillance System. Meningococcal Disease (*Neisseria meningitidis),* 2015 Case Definition. https://wwwn.cdc.gov/nndss/conditions/meningococcal-disease/case-definition/2015/. Accessed: June 8, 2016.
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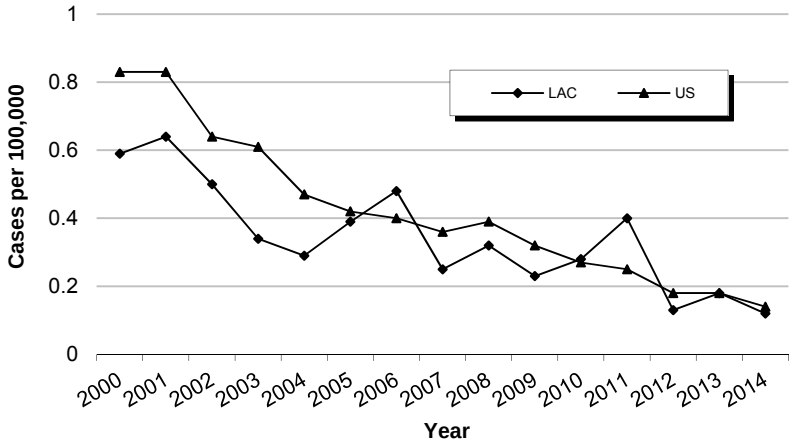
Reported Meningococcal Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
LAC, 2011-2015

	2011 (N=37)			2012 (N=12)			2013 (N=17)			2014 (N=11)			2015 (N=12)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	1	2.7	0.2	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
5-14	1	2.7	0.1	0	0.0	0.0	1	5.9	0.1	0	0.0	0.0	0	0.0	0.0
15-34	12	32.4	0.4	4	33.3	0.1	7	41.2	0.2	6	54.5	0.2	4	33.3	0.1
35-44	10	27.0	0.7	0	0.0	0.0	3	17.6	0.2	1	9.1	0.1	1	8.3	0.1
45-54	3	8.1	0.2	2	16.7	0.2	2	11.8	0.2	3	27.3	0.2	3	25.0	0.2
55-64	5	13.5	0.5	2	16.7	0.2	1	5.9	0.1	1	9.1	0.1	1	8.3	0.1
65+	5	13.5	0.5	4	33.3	0.4	3	17.6	0.3	0	0.0	0.0	3	25.0	0.3
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race / Ethnicity															
Asian	4	10.8	0.3	2	16.7	0.2	0	-	-	2	18.2	0.1	0	0.0	0.0
Black	12	32.4	1.4	2	16.7	0.3	4	23.5	0.5	2	18.2	0.3	2	16.7	0.3
Hispanic	11	29.7	0.2	5	41.7	0.1	6	35.3	0.1	6	54.5	0.1	6	50.0	0.1
White	10	27.0	0.3	3	25.0	0.1	6	35.3	0.2	1	9.1	0.0	4	33.3	0.1
Other	0	-	-	0	-	-	1	5.9	-	0	-	-	0	-	-
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
SPA															
1	1	2.7	0.3	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	8.3	0.3
2	9	24.3	0.4	2	16.7	0.1	5	29.4	0.2	3	27.3	0.1	4	33.3	0.2
3	2	5.4	0.1	0	0.0	0.0	1	5.9	0.1	1	9.1	0.1	0	0.0	0.0
4	5	13.5	0.4	5	41.7	0.4	4	23.5	0.4	6	54.5	0.5	3	25.0	0.3
5	1	2.7	0.2	2	16.7	0.3	2	11.8	0.3	0	0.0	0.0	1	8.3	0.2
6	9	24.3	0.8	3	25.0	0.3	1	5.9	0.1	0	0.0	0.0	2	16.7	0.2
7	4	10.8	0.3	0	0.0	0.0	3	17.6	0.2	0	0.0	0.0	1	8.3	0.1
8	6	16.2	0.5	0	0.0	0.0	1	5.9	0.1	1	9.1	0.1	0	0.0	0.0
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates* of Meningococcal Disease LAC and US, 2000-2015



*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 2. Meningococcal Disease Cases by Age Group, LAC, 2015 (N=12)

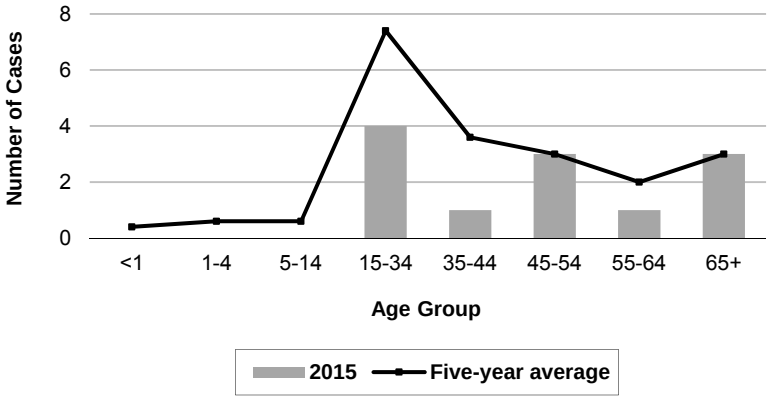


Figure 3. Meningococcal Disease Cases by Race/Ethnicity, LAC, 2011-2015

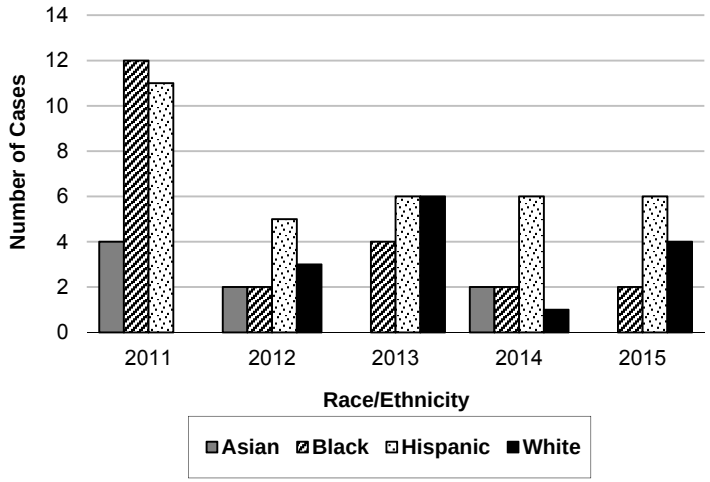


Figure 4. Reported Meningococcal Disease Cases by Month of Onset, LAC, 2015 (N=12)

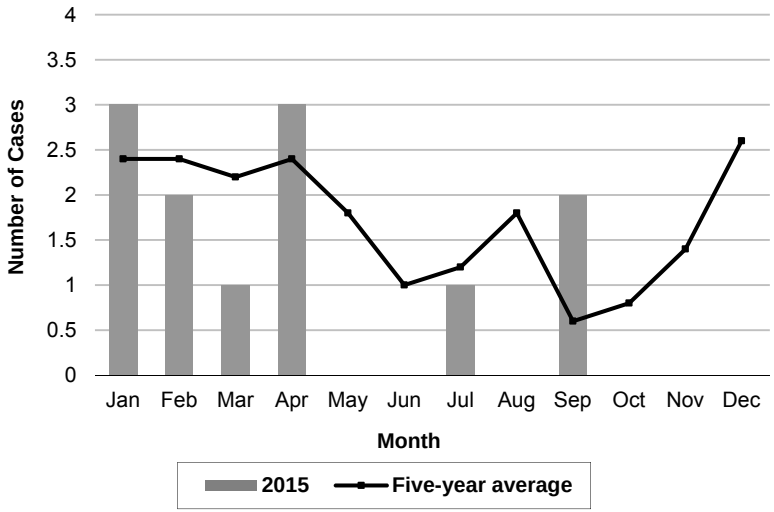


Figure 5. Meningococcal Disease Cases by SPA
LAC, 2011-2015

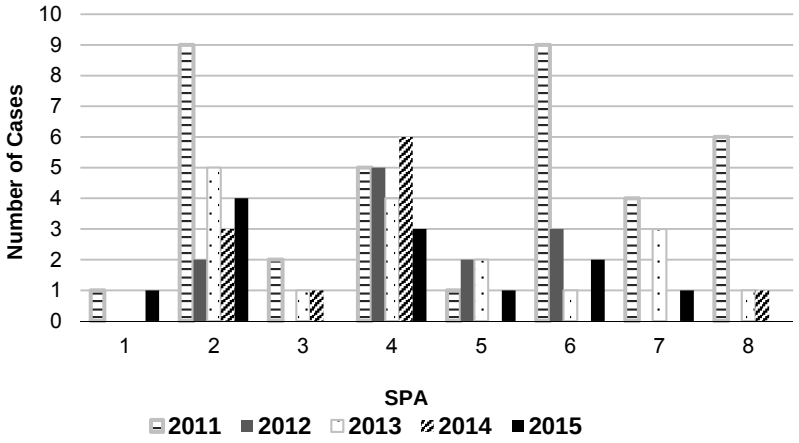
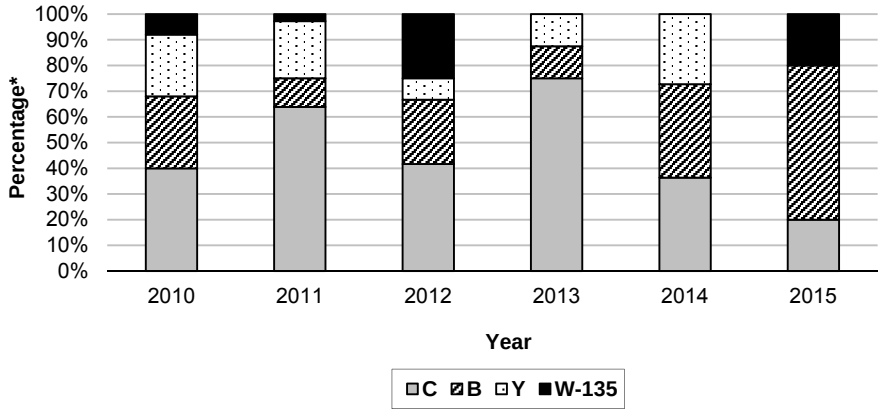


Figure 6. Meningococcal Disease by Serogroup
LAC, 2011–2015



*Among cases with known serogroup.

MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	11
Annual Incidence[a]	
LA County	0.12
California[b]	0.15
United States[b]	0.14
Age at Diagnosis	
Mean	38.8
Median	34
Range	22–62 years

[a]Cases per 100,000 population.

[b]Calculated from Final 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.

DESCRIPTION

Meningococcal disease (MD) occurs most often as meningitis, cerebrospinal fluid (CSF) infection, or meningococcemia, a bloodstream infection. It is transmitted through direct or droplet contact with nose or throat secretions of persons colonized in the upper respiratory tract with the *Neisseria meningitidis* bacterium. Symptoms include sudden onset of fever, headache, nausea, vomiting, stiff neck, petechial rash and lethargy and can progress to overwhelming sepsis, shock and death within hours. Despite effective antibiotic therapy, mortality rates are between 10% and 15%. Long-term sequelae are significant neurologic or orthopedic complications (deafness or amputation). This disease affects all age groups and historically occurred most often in infants. Of the 13 serogroups, A, B, C, Y, and W-135 are responsible for causing nearly all cases of MD.

For surveillance, the LAC DPH defines reports of invasive MD as confirmed when *N. meningitidis* has been isolated from a normally sterile site (e.g., blood or CSF). In the absence of a positive culture, reports are defined as probable if there is evidence of the bacteria in a normally sterile site by polymerase chain reaction (PCR) analysis or CSF antigen test. Reports are classified as suspected cases when they present with clinical diagnosis of purpura fulminans or demonstrate gram-negative diplococci by gram staining.[1]

Both suspected clinical cases of MD and laboratory findings consistent with MD are immediately reportable to LAC DPH. All cases are investigated by public health nurses who complete a standardized case report. In December 2012, a supplemental form documenting additional risk factors was added to assess additional risk factors such as sexual history (men who have sex with men [MSM]) and travel history were documented due to the ongoing outbreak of MD among MSM in New York City in 2011-2012.[2]

Four vaccines are available in the US that protect against serogroups A, C, Y, and W-135. A quadrivalent unconjugated polysaccharide meningococcal vaccine (MPSV4) is licensed for persons >55 years and for those ≥2 years old when quadrivalent conjugated-polysacharide vaccine is not available. Two quadrivalent conjugate vaccines, MenACWY-D and MenACWY-CRM, are licensed for use in persons aged 2 to 55 years; MenACWY-D is also licensed for used in children age 9 through 23 months. Both vaccines are recommended for all adolescents between ages 11-18 years, preferably at 11 or 12 years, and for those between 2 and 55 years who are at increased risk for MD. An additional booster dose is needed if the primary dose was given before 16 years old. Routine vaccination is recommended for college freshman living in dormitories, persons at increased risk for meningococcal disease. An additional conjugate vaccine, Hib-MenCY-TT, has been licensed for infants 6 weeks to 18 months old, but only protects against serogroups C and Y disease.[3] In 2014, a serogroup B vaccine, MenB-FHbp, was approved for persons 10 through 25 years of age.[4]

1 Centers for Disease Control and Prevention. National Notifiable Disease Surveillance System. Meningococcal Disease (Neisseria meningitidis), 2010 Case Definition. wwwn.cdc.gov/NNDSS/script/casedef.aspx?CondYrID=774&DatePub=1/1/2010 12:00:00 AM. Accessed: May 29, 2013.

2 Centers for Disease Control and Prevention. Notes from the field: serogroupo C invasive meningococcal disease among men who have sex with men—New York City, 2010-2012. Morbidity and Mortality Weekly Report. 4 Jan 2013; 61(51): 1048.

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. Use of Serogroup B Meningococcal Vaccines in Persons Aged ≥10 Years at Increased Risk for Serogroup B Meningococcal Disease: Recommendations of the Advisory Committee on Immunization Practices (ACIP). 2015. 12 Jun 2015, 64 (22): 608-11.

In addition to ACIP recommended groups, beginning 2014 DPH recommends meningococcal vaccination for MSM at increased risk for IMD. The vaccine should be offered to:

- All HIV-infected gay/MSM
- Gay/MSM, regardless of HIV status, who regularly have close or intimate contact with multiple partners or who seek partners through the use of digital applications ("apps"), particularly those who share cigarettes or marijuana or use illegal drugs.

Antimicrobial chemoprophylaxis of close contacts of sporadic cases of meningococcal disease remains the primary means for prevention of MD among close contacts, who include: a) household members, b) daycare center contacts, and c) anyone directly exposed to the patient's oral secretions (e.g., through kissing, mouth-to-mouth resuscitation, endotracheal intubation, or endotracheal tube management). 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 >10 days after onset of illness in the index case-patient is probably of limited value. Prophylactic treatment and follow-up of close contacts are routinely handled by the LAC DPH Community Health Services.

2014 TRENDS AND HIGHLIGHTS

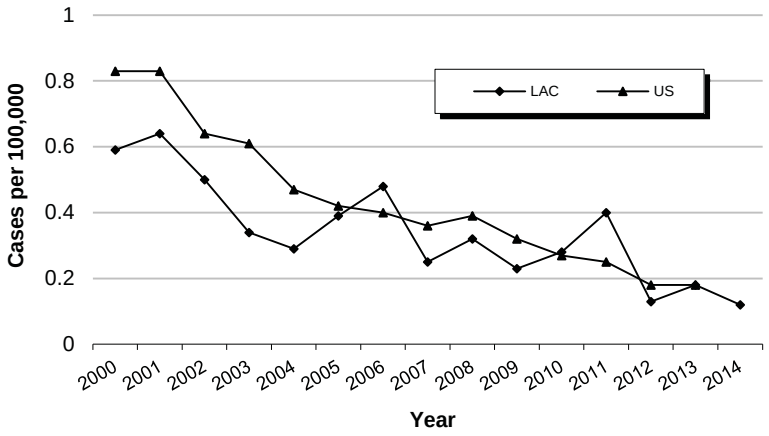
- The incidence of MD in LAC has followed the national incidence for the past decade, and has decreased from a peak of 0.64 cases per 100,000 in 2001 to 0.12 cases per 100,000 in 2014 (Figure 1). In fact, LAC documented its lowest incidence and case count in 2014 with only 11 cases.
- There were no cases reported among persons less than 22 years old in 2014. The highest proportion of cases (55%) occurred among those 15 to 34 years old (Figure 2). Traditionally, the peak incidence of MD had occurred among infants <1 year old. However, in LAC there have been no cases of MD in children <1 year old since 2010 and no cases in children 1 year old through 14 years old since 2011.
- The onset of disease by month followed the typical seasonal trend for MD of peaking in the winter season (January). The highest numbers of cases usually occurs in January and February with very low or no cases in the summer. However, LAC has experienced atypical seasonality in the past five years as shown in the five-year average (Figure 4).
- All cases except one (91%) were culture-confirmed: 6 (55%) were cultured from blood, one from (9%) from cerebrospinal fluid (CSF), two from blood and CSF (18%) and one from synovial fluid (7%). The single case not culture-confirmed was diagnosed by PCR and was classified as probable MD. All cases, including those diagnosed by PCR, had serogroup identified; 4 (36%) were serogroup C, 4 (36%) were serogroup B, and 3 (27%) were serogroup Y (Figure 6). One of the serogroup B isolates was identified by PCR. This is the largest percentage of serogroup B cases LAC has documented in the past few years.
- The case fatality rate, 27% (n=3), is much higher than what has been usually recorded for LAC. Two fatalities were due to serogroup C and one to serogroup Y disease.
- An increase of MD among MSM occurred beginning December 2012. An additional 6 cases were added in 2014 for a total of 13 between October 2012 and September 2014. Due to increases in fatalities and HIV co-morbid cases, among other factors, LAC DPH recommended vaccination against MD among certain risk groups in the MSM community beginning April 2014 (see Special Studies Report for full details).

Reported Meningococcal Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=26)			2011 (N=37)			2012 (N=12)			2013 (N=17)			2014 (N=11)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	2	7.7	-	0	-	-	0	-	-	0	-	-	0	-	-
1-4	2	7.7	-	1	2.7	-	0	-	-	0	-	-	0	-	-
5-14	1	3.8	-	1	2.7	-	0	-	-	1	5.9	-	0	-	-
15-34	8	30.8	-	12	32.4	-	4	33.3	-	7	41.2	-	6	54.5	-
35-44	4	15.3	-	10	27.0	-	0	-	-	3	17.9	-	1	9.1	-
45-54	5	19.2	-	3	8.1	-	2	16.7	-	2	11.8	-	3	27.3	-
55-64	1	3.8	-	5	13.5	-	2	16.7	-	1	5.9	-	1	9.1	-
65+	3	11.5	-	5	13.5	-	4	33.3	-	3	17.6	-	0	-	-
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race/Ethnicity															
Asian	1	3.8	-	4	10.8	-	2	16.7	-	0	0.0	-	2	18.2	-
Black	7	26.9	-	12	32.4	-	2	16.7	-	4	23.5	-	2	18.2	-
Hispanic	11	42.3	-	11	29.7	-	5	41.7	-	6	35.3	-	6	54.5	-
White	7	26.9	-	10	27.0	-	3	25.0	-	6	35.3	-	1	9.1	-
Other	0	-	-	0	0.0	-	0	0.0	-	1	5.9	-	0	0.0	-
Unknown	0	-	-	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-
SPA															
1	1	3.8	-	1	2.7	-	0	0.0	-	0	0.0	-	0	0.0	-
2	3	11.5	-	9	24.3	-	2	16.7	-	5	29.4	-	3	27.3	-
3	3	11.5	-	2	5.4	-	0	0.0	-	1	5.9	-	1	9.1	-
4	2	7.7	-	5	13.5	-	5	41.7	-	4	23.5	-	6	54.5	-
5	2	7.7	-	1	2.7	-	2	16.7	-	2	11.8	-	0	0.0	-
6	6	23.1	-	9	24.3	-	3	25.0	-	1	5.9	-	0	0.0	-
7	3	11.5	-	4	10.8	-	0	-	-	3	17.9	-	0	0.0	-
8	6	23.1		6	16.2	-	0	-	-	1	5.9	-	1	9/1	-
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-

*Rates have not been calculated because there are too few cases to unreliable findings.

Figure 1. Incidence Rates* of Meningococcal Disease LAC and US, 2000-2014**



*Rates calculated based on less than 19 cases or events are considered unreliable.
**US rates for 2014 unavailable as of November 2015.

Figure 2. Meningococcal Disease Cases by Age Group, LAC, 2014 (N=11)

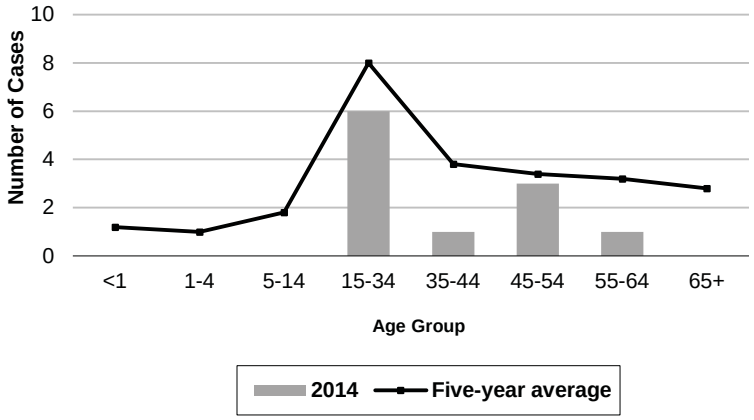


Figure 3. Meningococcal Disease Cases by Race/Ethnicity, LAC, 2010-2014

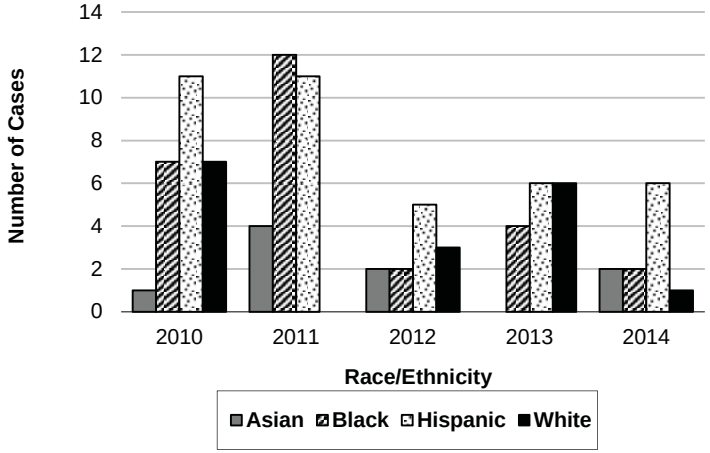


Figure 4. Reported Meningococcal Disease Cases by Month of Onset, LAC, 2014 (N=11)

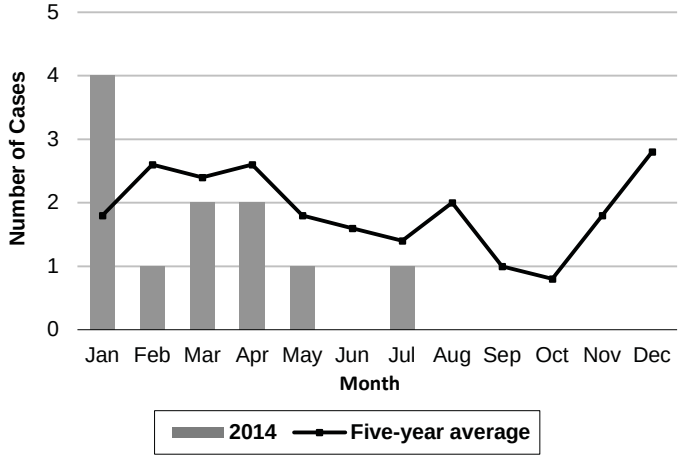


Figure 5. Meningococcal Disease Cases by SPA
LAC, 2014 (N=11)

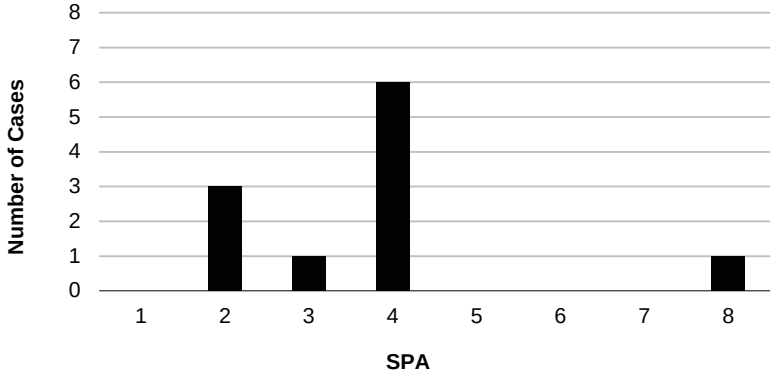
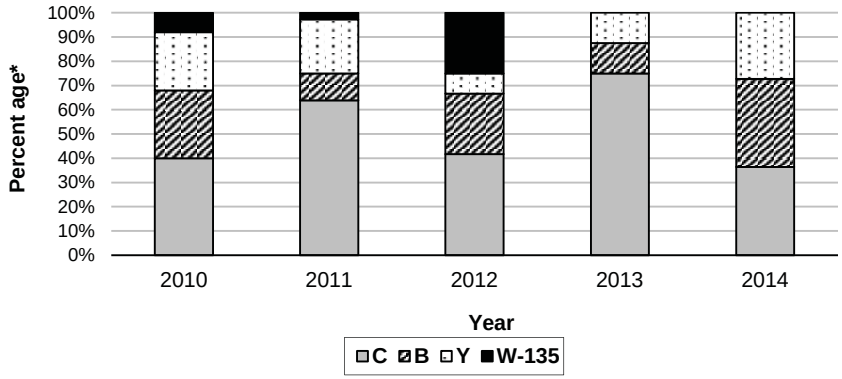


Figure 6. Meningococcal Disease by Serogroup*
LAC, 2010–2014



*Among cases with known serogroup.

MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	17
Annual Incidence[a]	
LA County	0.18
California[b]	0.30
United States[b]	0.18
Age at Diagnosis	
Mean	42.5
Median	38
Range	14-94

[a]Cases per 100,000 population.
[b]Calculated from Final 2013 Reports of Nationally Notifiable Infectious Disease. MMWR 63(32); 702-716.

DESCRIPTION

Meningococcal disease (MD) occurs most often as meningitis, an infection of the cerebrospinal fluid (CSF), or meningococcemia, an infection of the bloodstream. It is transmitted through direct or droplet contact with nose or throat secretions of persons colonized in the upper respiratory tract with the *Neisseria meningitidis* bacterium. Common 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% and 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. Of the 13 serogroups, A, B, C, Y, and W-135 are responsible for causing nearly all cases of meningococcal disease.

For the purpose of surveillance, the Los Angeles County (LAC) Department of Public Health (DPH) defines reports of invasive meningococcal disease as confirmed when *N. meningitidis* has been isolated from a normally sterile site (e.g., blood or CSF). In the absence of a positive culture, reports are defined as probable if there is evidence of the bacteria in a normally sterile site by polymerase chain reaction (PCR) analysis or CSF antigen test. Reports are classified as suspected cases when they present with clinical diagnosis of purpura fulminans or demonstrate gram-negative diplococci by gram staining.[1]

Both suspected clinical cases of MD and laboratory findings consistent with MD are immediately reportable to the public health department. All cases are investigated by public health nurses within the district corresponding to home of residence. A standardized case report is completed. In December 2012, in addition to the standardized case report form a supplemental form documenting additional risk factors was included in the investigation. Additional risk factors such as sexual history (men who have sex with men [MSM]) and travel history were documented due to the ongoing outbreak of MD among MSM in New York City in 2011-2012[2].

Three vaccines are available in the US that protect against serogroups A, C, Y, and W-135 but not B. A quadrivalent unconjugated polysaccharide meningococcal vaccine (Menomune®) is licensed for persons >55 years and for those ≥2 years old when quadrivalent conjugated-polysacharide vaccine is not available. Two quadrivalent conjugate vaccines, MenACWY-D (Menactra®) and MenACWY-CRM (Menveo®), are licensed for use in persons aged 2 to 55 years; MenACWY-D is also licensed for used in children age 9 through 23 months. Both vaccines are recommended for all adolescents between ages 11-18 years, preferably at 11 or 12 years, and for those between 2 and 55 years who are at increased risk for meningococcal disease. An additional booster dose is needed if the primary dose was given before 16 years old. Routine vaccination is recommended for college freshman living in dormitories, persons at increased risk for meningococcal disease. An additional conjugate vaccine, Hib-MenCY-TT (MenHibrix®), has been licensed for infants 6 weeks to 18 months old, but only protects against serogroups C and Y disease.[3]

Antimicrobial chemoprophylaxis of close contacts of sporadic cases of meningococcal disease remains the primary means for prevention of meningococcal disease among close contacts, who include: a) household members, b) daycare center contacts, and c) anyone directly exposed to the patient's oral secretions (e.g., through kissing, mouth-to-mouth resuscitation, endotracheal intubation, or endotracheal tube management). 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 >10 days after onset of illness in the index case-patient is

1. Centers for Disease Control and Prevention. National Notifiable Disease Surveillance System. Meningococcal Disease (Neisseria meningitidis), 2010 Case Definition. http://wwwn.cdc.gov/NNDSS/script/casedef.aspx?CondYrID=774&DatePub=1/1/2010 12:00:00 AM. Accessed: May 29, 2013.
2. Centers for Disease Control and Prevention. Notes from the field: serogroupo C invasive meningococcal disease among men who have sex with men – New York City, 2010-2012. Morbidity and Mortality Weekly Report. 4 Jan 2013; 61(51): 1048.

probably of limited or no value. Prophylactic treatment and follow-up of close contacts are routinely handled by the LAC DPH Community Health Services.

2013 TRENDS AND HIGHLIGHTS

- The incidence of meningococcal disease increased slightly from 0.13 cases per 100,000 in 2012 to 0.18 cases per 100,000 in 2013. LAC documented its lowest case count in 2012, only 12 cases. The incidence rate in 2013 remains low (under 0.20 per 100,000). This continues a decline since 2001 when there was a peak of 0.64 cases per 100,000 (Figure 1).
- There were no cases reported among persons less than 14 years old (Figure 2). The highest number of cases occurred among those 15 to 34 years old and 65 years and older. In a typical distribution curve depicting incidence for meningococcal disease the peak incidence occurs among infants <1 year old. There have been no cases of meningococcal disease in children <1 year old since 2010.
- The monthly onset of disease did not follow the typical seasonal trend of peaks in the winter season. The highest numbers of cases usually occur in January and February. In 2013, cases occurred throughout the year (Figure 4).
- Fifteen (88%) of seventeen MD cases were culture-confirmed: 11 (73%) were cultured from blood, three from (18%) from cerebrospinal fluid (CSF), and one from synovial fluid (7%). The two cases not culture-confirmed were diagnosed by PCR and were classified as probable MD. All cases, including those diagnosed by PCR, had serogroup identified; 12 (71%) were serogroup C, 2 (12%) were serogroup B, 2 (12%) were serogroup Y, and one (6%) was serogroup W-135 (Figure 6). One of the serogroup B and one of the serogroup C isolates was identified by PCR.
- The case fatality rate, 24% (n=4), is much higher than what has been usually recorded for LAC. All fatalities were due to serogroup C disease.
- A cluster of four cases beginning October 2012 and extending through 2013, occurred among cases who reported travel to Tijuana or high risk contact with travelers to Tijuana. They were all serogroup C, non-MSM males aged 30 to 69 years. Three were fatal (75%). Molecular analysis showed that the strains affecting three of the four Tijuana-associated cases matched each other as well as other cases in California associated with travel to Tijuana. However, none of the cases had direct social links to each other. Tijuana was experiencing a local outbreak at the time. Public health officials from Mexico and the Centers for Disease Control and Prevention determined the increase in cases was localized to Tijuana.
- A second cluster of seven cases beginning December 2012 and extending through 2013 occurred among MSM. They were aged 21 to 49 years. All but one were serogroup C (86%); there was a single serogoup B case. Only one was HIV positive (14%). None had a travel history to NYC. Two were fatal (29%). Molecular analysis by pulsed field gel electrophoresis (PFGE) showed that the strains affecting two MSM, the first two reported December 2012-January 2013 were related to each other and to strain involved in the concurrent NYC outbreak. However, none of the MSM, including the two with a PFGE match, had direct social links to each other (see 2013 ACDC Special Studies report).[3]

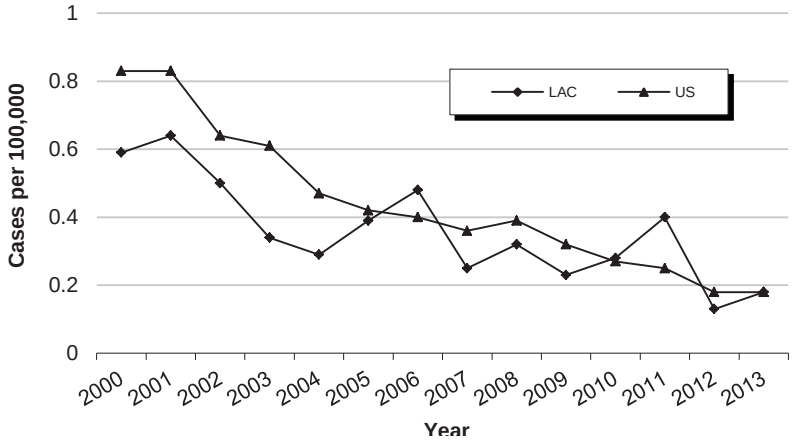
3. Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report. Prevention and Control of Meningococcal Disease, Recommendations of the Advisory Committee on Immunization Practices (ACIP). 22 Mar 2013, 62 (2): 1-28.

Reported Meningococcal Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=21)			2010 (N=26)			2011 (N=37)			2012 (N=12)			2013 (N=17)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	1	4.8		2	7.7		0	0.0		0	0.0		0	0.0	
1-4	1	4.8		2	7.7		1	2.7		0	0.0		0	0.0	
5-14	1	4.8		1	3.8		1	2.7		0	0.0		1	5.9	
15-34	10	47.6		8	30.8		12	32.4		4	33.3		7	41.2	
35-44	0	0.0		4	15.3		10	27.0		0	0.0		3	17.9	
45-54	4	19.0		5	19.2		3	8.1		2	16.7		2	11.8	
55-64	4	19.0		1	3.8		5	13.5		2	16.7		1	5.9	
65+	0	0.0		3	11.5		5	13.5		4	33.3		3	17.6	
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	0	0.0		1	3.8		4	10.8		2	16.7		0	0.0	
Black	4	19.0		7	26.9		12	32.4		2	16.7		4	23.5	
Hispanic	9	42.9		11	42.3		11	29.7		5	41.7		6	35.3	
White	7	33.3		7	26.9		10	27.0		3	25.0		6	35.3	
Other	0	0.0		0	0.0		0	0.0		0	0.0		1	5.9	
Unknown	1	4.8		0	0.0		0	0.0		0	0.0		0	0.0	
SPA															
1	1	4.8		1	3.8		1	2.7		0	0.0		0	0.0	
2	5	23.8		3	11.5		9	24.3		2	16.7		5	29.4	
3	1	4.8		3	11.5		2	5.4		0	0.0		1	5.9	
4	2	9.5		2	7.7		5	13.5		5	41.7		4	23.5	
5	2	9.5		2	7.7		1	2.7		2	16.7		2	11.8	
6	5	23.8		6	23.1		9	24.3		3	25.0		1	5.9	
7	2	9.5		3	11.5		4	10.8		0	0.0		3	17.9	
8	3	14.3		6	23.1		6	16.2		0	0.0		1	5.9	
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates* of Meningococcal Disease LAC and US, 2000-2013



*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 2. Meningococcal Disease Cases by Age Group, LAC, 2013 (N=17)

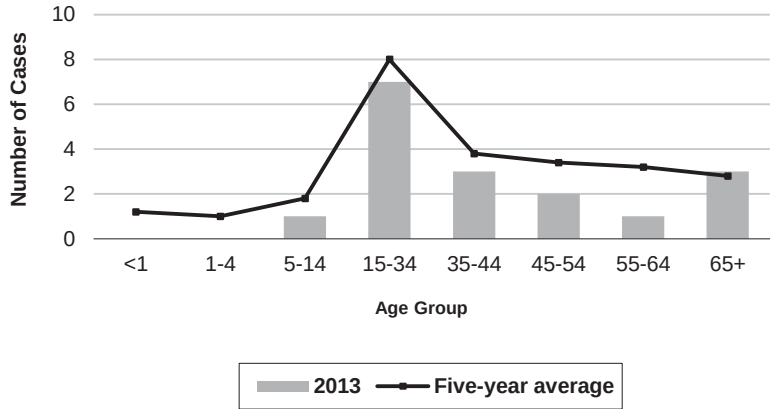


Figure 3. Meningococcal Disease Cases by Race/Ethnicity, LAC, 2009-2013

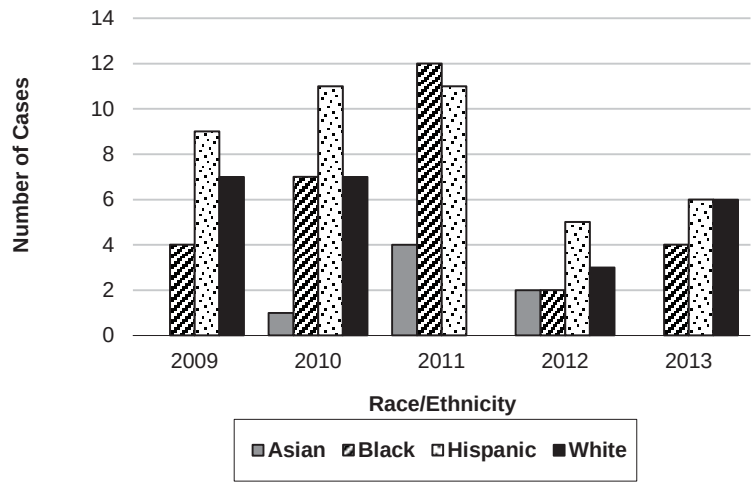
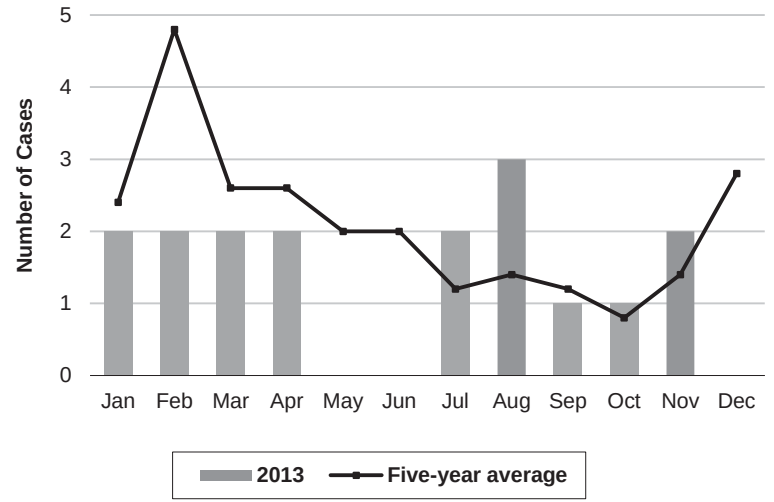


Figure 4. Reported Meningococcal Disease Cases by Month of Onset, LAC, 2013 (N=17)



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.

**Figure 5. Meningococcal Disease Cases by SPA
LAC, 2013 (N=17)**

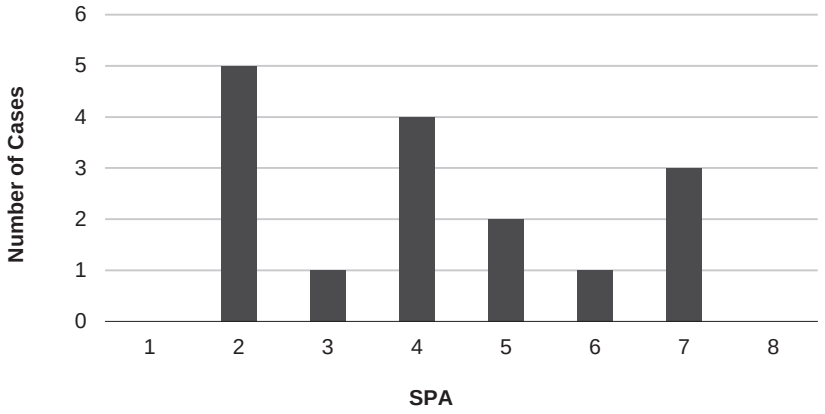
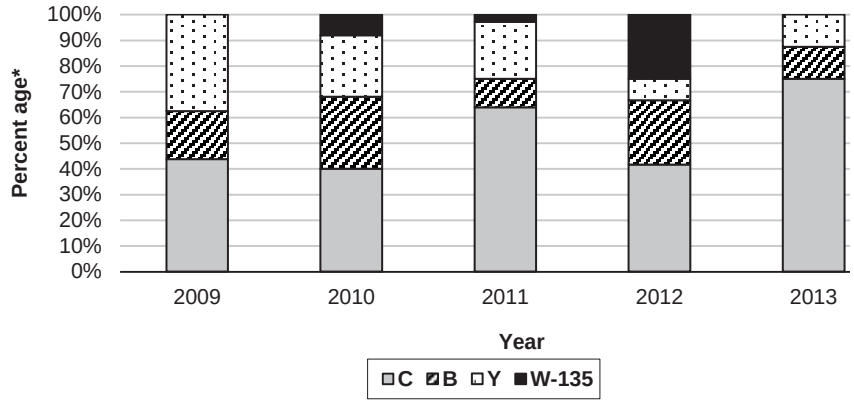


**Figure 6. Meningococcal Disease by Serogroup
LAC, 2009–2013**



*Among cases with known serogroup.

MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	12
Annual Incidence[a]	
LA County	0.13
California[b]	0.23
United States[b]	0.18
Age at Diagnosis	
Mean	52.8
Median	51
Range	21-94

[a]Cases per 100,000 population.
[b]Calculated from Final 2012 Reports of Nationally Notifiable Infectious Disease. MMWR 62(33);669-682.

DESCRIPTION

Meningococcal disease occurs most often as meningitis, an infection of the cerebrospinal fluid (CSF), or meningococcemia, an infection of the bloodstream. It is transmitted through direct or droplet contact with nose or throat secretions of persons colonized in the upper respiratory tract with the *Neisseria meningitidis* bacterium. Common 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% and 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. Of the 13 serogroups, A, B, C, Y, and W-135 are responsible for causing nearly all cases of meningococcal disease.

For the purpose of surveillance, the Los Angeles County (LAC) Department of Public Health (DPH) defines reports of invasive meningococcal disease as confirmed when *N. meningitidis* has been isolated from a normally sterile site (e.g., blood or CSF). In the absence of a positive culture, reports are defined as probable if there is evidence of the bacteria in a normally sterile site by polymerase chain reaction (PCR) analysis or CSF antigen test. Reports are classified as suspected cases when they present with clinical diagnosis of purpura fulminans or demonstrate gram-negative diplococci by gram staining.[1]

Three vaccines are available in the US that protect against serogroups A, C, Y, and W-135 but not B. A quadrivalent unconjugated polysaccharide meningococcal vaccine (Menomune®) is licensed for persons > 55 years and for those ≥2 years old when quadrivalent conjugated-polysacharide vaccine are not available. Two quadrivalent conjugate vaccines, MenACWY-D (Menactra®) and MenACWY-CRM (Menveo®), are licensed for use in persons aged 2 to 55 years; MenACWY-D is also licensed for used in children age 9 through 23 months. Both vaccines are recommended for all adolescents between ages 11-18 years, preferably at 11 or 12 years, and for those between 2-55 years who are at increased risk for meningococcal disease. An additional booster dose is needed if the primary dose was given before 16 years old. Routine vaccination is recommended for college freshman living in dormitories, persons at increased risk for meningococcal disease. An additional conjugate vaccine, Hib-MenCY-TT (MenHibrix®), has been licensed for infants 6 weeks to 18 months old, but only protects against serogroups C and Y disease.[2]

Antimicrobial chemoprophylaxis of close contacts of sporadic cases of meningococcal disease remains the primary means for prevention of meningococcal disease among close contacts, who include: a) household members, b) daycare center contacts, and c) anyone directly exposed to the patient's oral secretions (e.g., through kissing, mouth-to-mouth resuscitation, endotracheal intubation, or endotracheal tube management). 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 >10 days after onset of illness in the index case-patient 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.

2012 TRENDS AND HIGHLIGHTS

- The incidence of meningococcal disease declined by 60% from 0.38 cases per 100,000 in 2011 to 0.13 cases per 100,000 in 2012. The incidence rate has declined consistently since 2001 when there was a peak of 0.64 cases per 100,000 (Figure 1).
- There were no cases reported among persons less than 21 years old (Figure 2). The highest number of cases occurred among those 15 to 34 years old and 65 years and older. However, in a typical distribution curve for meningococcal disease the peak incidence occurs among infants <1 year old.

1. Centers for Disease Control and Prevention. National Notifiable Disease Surveillance System. Meningococcal Disease (Neisseria meningitidis), 2010 Case Definition. http://wwwn.cdc.gov/NNDSS/script/casedef.aspx?CondYrID=774&DatePub=1/1/2010 12:00:00 AM. Accessed: May 29, 2013.
2. 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.

- The monthly onset of disease did not follow the typical seasonal trend of peaks in the winter season. The highest numbers of cases usually occur in January and February. In 2012, the highest numbers of cases were recorded in December and May (Figure 4).
- Nearly all of the cases were culture-confirmed (n=11, 92%): 10 (83%) were cultured from blood and one from (8%) from cerebrospinal fluid (CSF). One case was probable by PCR. Of the culture-confirmed cases all cases had serogroup identified; 5 (42%) were serogroup C, 3 (25%) were serogroup B, and 3 (25%) were serogroup W-135. The probable case was serogroup Y. Serogroup W-135 accounted for more cases than usual (Figure 6).
- The case fatality rate, 33% (n=4), is much higher than what has been usually recorded for LAC. Three of the fatalities were serogroup C disease and one was serogroup W-135.
- Beginning mid-December 2012, three cases of serogroup C meningococcal disease occurred among males aged 30 to 51 years. Two were men who have sex with men (MSM), of which one was fatal. The third case had recent travel history to Tijuana, Mexico. These three cases became associated with two separate clusters that extended into 2013, one among MSM and the other among cases who reported travel to Tijuana or high risk contact with travelers to Tijuana. Molecular analysis showed that the strains affecting the two MSM were related, and strain affecting the traveler to Tijuana matched other cases associated with Tijuana. However, within each of the two clusters, none of the MSM or Tijuana cases had direct social links to each other.[3]

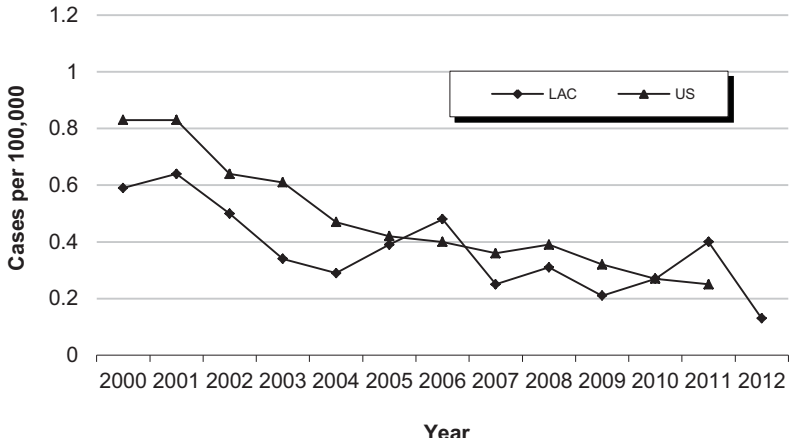
3. Centers for Disease Control and Prevention. Notes from the field: serogroupo C invasive meningococcal disease among men who have sex with men – New York City, 2010-2012. Morbidity and Mortality Weekly Report. 4 Jan 2013; 61(51): 1048.

Reported Meningococcal Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2008-2012

	2008 (N=30)			2009 (N=21)			2010 (N=26)			2011 (N=37)			2012 (N=12)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	3	10.0		1	4.8		2	7.7		0	0.0		0	0.0	
1-4	1	3.3		1	4.8		2	7.7		1	2.7		0	0.0	
5-14	6	20.0		1	4.8		1	3.8		1	2.7		0	0.0	
15-34	6	20.0		10	47.6		8	30.8		12	32.4		4	33.3	
35-44	5	16.7		0	0.0		4	15.3		10	27.0		0	0.0	
45-54	3	10.0		4	19.0		5	19.2		3	8.1		2	16.7	
55-64	4	13.3		4	19.0		1	3.8		5	13.5		2	16.7	
65+	2	6.7		0	0.0		3	11.5		5	13.5		4	33.3	
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	1	3.3		0	0.0		1	3.8		4	10.8		2	16.7	
Black	4	13.3		4	19.0		7	26.9		12	32.4		2	16.7	
Hispanic	20	66.7		9	42.9		11	42.3		11	29.7		5	41.7	
White	4	13.3		7	33.3		7	26.9		10	27.0		3	25.0	
Other	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Unknown	1	3.3		1	4.8		0	0.0		0	0.0		0	0.0	
SPA															
1	2	6.6		1	4.8		1	3.8		1	2.7		0	0.0	
2	3	10.0		5	23.8		3	11.5		9	24.3		2	16.7	
3	4	13.3		1	4.8		3	11.5		2	5.4		0	0.0	
4	6	20.0		2	9.5		2	7.7		5	13.5		5	41.7	
5	5	16.7		2	9.5		2	7.7		1	2.7		2	16.7	
6	7	23.3		5	23.8		6	23.1		9	24.3		3	25.0	
7	2	6.7		2	9.5		3	11.5		4	10.8		0	0.0	
8	1	3.3		3	14.3		6	23.1		6	16.2		0	0.0	
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates* of Meningococcal Disease LAC and US, 2000-2012



*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 2. Meningococcal Disease Cases by Age Group, LAC, 2012 (N=12)

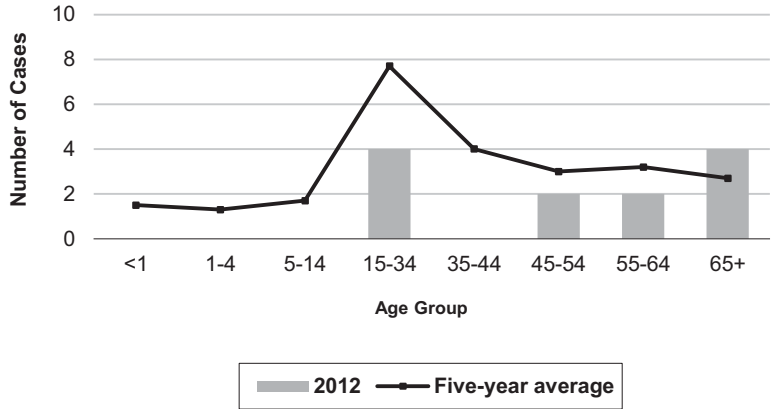
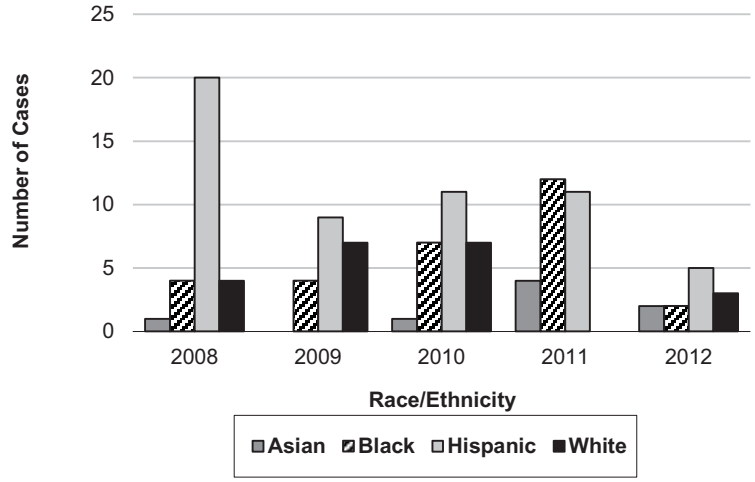


Figure 3. Meningococcal Disease Cases by Race/Ethnicity, LAC, 2008-2012



3. Centers for Disease Control and Prevention. Notes from the field: serogroupo C invasive meningococcal disease among men who have sex with men – New York City, 2010-2012. Morbidity and Mortality Weekly Report. 4 Jan 2013; 61(51): 1048.

Figure 4. Reported Meningococcal Disease Cases by Month of Onset, LAC, 2012 (N=12)

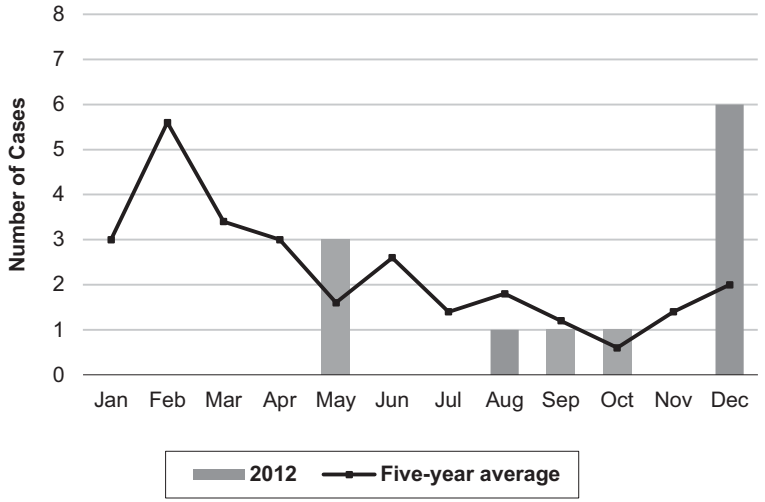


Figure 5. Meningococcal Disease Cases by SPA LAC, 2012 (N=12)

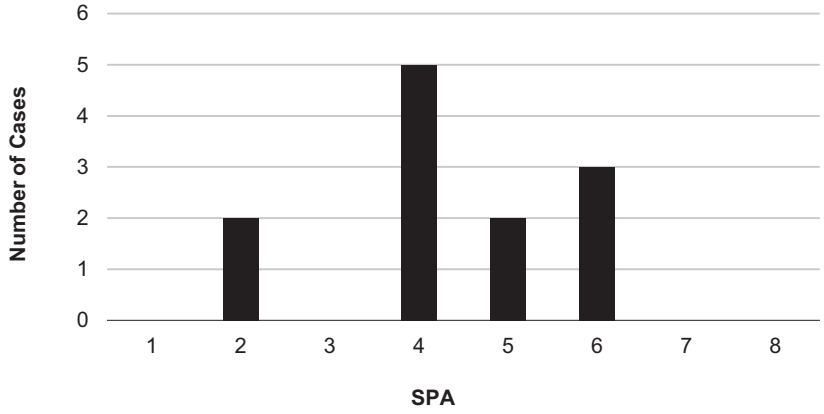
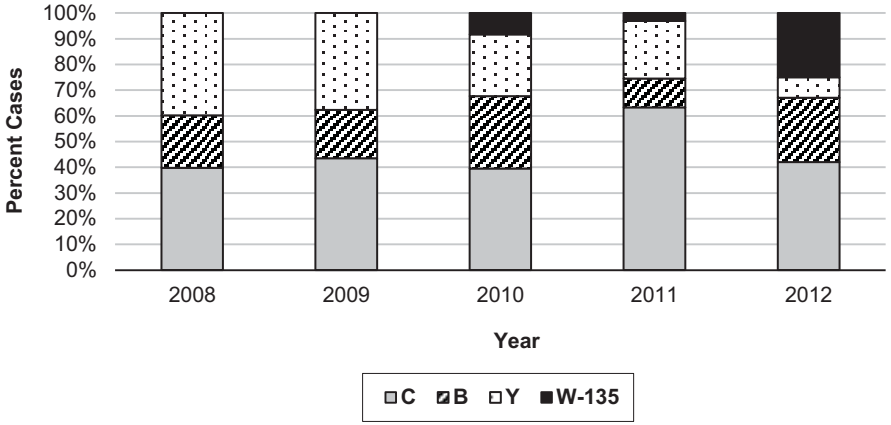


Figure 6. Meningococcal Disease by Serogroup LAC, 2008–2012



MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	37
Annual Incidence[a]	
LA County	0.38
California	0.30
United States	0.25
Age at Diagnosis	
Mean	41.5
Median	40.5
Range	3-80

[a]Cases per 100,000 population.

DESCRIPTION

Meningococcal disease occurs most often as meningitis, an infection of the cerebrospinal fluid (CSF), or meningococcemia, an infection of the bloodstream. It is transmitted through direct or droplet contact with nose or throat secretions of persons colonized in the upper respiratory tract with the *Neisseria meningitidis* bacterium. Common 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. Of the 13 serogroups, only A, B, C, Y, and W-135 are vaccine-preventable in the US.

For the purpose of surveillance, the LAC DPH defines reports of invasive meningococcal disease as confirmed when *N. meningitidis* has been isolated from a normally sterile site (e.g., blood or CSF). In the absence of a positive culture, reports are defined as probable in the setting of consistent clinical symptoms and evidence of the bacteria in a normally sterile site by gram staining, polymerase chain reaction (PCR) analysis, or CSF antigen test.

Three vaccines are available in the US that protect against serogroups A, C, Y, and W-135 but not B. Two quadrivalent conjugate vaccines, MenACWY-D (Menactra®) and MenACWY-CRM (Menveo®), are licensed for use in persons aged 2 to 55 years; MenACWY-D is also licensed for used in children age 9 through 23 months. Both vaccines are recommended for all adolescents between ages 11-18 years, preferably at 11 or 12 years, and for those between 2-55 years who are at increased risk for meningococcal disease. An additional booster dose is needed if the primary dose was given before 16 years old. Routine vaccination is recommended for college freshman living in dormitories, persons at increased risk for meningococcal disease. Quadrivalent meningococcal polysaccharide vaccine (Menomune®) is approved for use among those ≥2 years old and is acceptable for use when MCV4 and MenACWY-CRM are not available (e.g., for those >55 years old).

Antimicrobial chemoprophylaxis of close contacts of sporadic cases of meningococcal disease remains the primary means for prevention of meningococcal disease among close contacts, who include: a) household members, b) daycare center contacts, and c) anyone directly exposed to the patient's oral secretions (e.g., through kissing, mouth-to-mouth resuscitation, endotracheal intubation, or endotracheal tube management). 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 >10 days after onset of illness in the index case-patient 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.

2011 TRENDS AND HIGHLIGHTS

- The incidence of meningococcal disease rose 37% this past year from 0.27 per 100,000 in 2010 to 0.38 per 100,000, reversing a general decline occurring since 2001 when there was a peak of 0.64 cases per 100,000 (Figure 1).
- There were no cases reported among infants <1 year old. The highest incidence occurred among 35-44 year old adults. This deviates from the typical distribution curve for meningococcal disease, where the peak incidence occurs among <1 year old. (Figure 2).
- The incidence of meningococcal disease among blacks, 1.4 per 100,000, is at its highest in recent decades (Figure 4). There was a 75% increase from 2010, when there were 0.08 cases per 100,000. Of note, an outbreak occurred this year in which 3 of 4 patients were black (see 2011 Special Reports for details). The exclusion of these outbreak cases does

not diminish the increasing trend.

- There were 36 (97%) culture-confirmed cases: 26 (3%) cultured from blood, 6 (16.7%) from cerebrospinal fluid (CSF), and 4 (11%) from both CSF. One case was probable by PCR. Thirty-five of the culture-confirmed cases (97%) had serogroup identified; 23 (66%) were serogroup C, 8 (23%) serogroup Y, 4 (11%) serogroup B, and 1 (3%) serogroup W-135. Serogroup C accounted for more cases than usual (Figure 7).
- The case fatality rate, 16% (n=6), is higher than what has been usually recorded for LAC.
- In March 2011, an outbreak of serogroup C meningococcal disease occurred among 4 individuals with associations to the homeless. One fatality occurred. Antibiotic prophylaxis was disseminated to close contacts and homeless shelter staff; health alerts were distributed to local shelters and emergency care providers (see 2011 Special Reports for details).

Reported Meningococcal Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=24)			2008 (N=30)			2009 (N=21)			2010 (N=26)			2011 (N=37)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	3	12.5	2.0	3	10.0	2.1	1	4.8	0.7	2	7.7	1.4	0	0.0	0.0
1-4	3	12.5	0.5	1	3.3	0.2	1	4.8	0.2	2	7.7	0.3	1	2.7	0.2
5-14	1	4.2	0.1	6	20.0	0.4	1	4.8	0.1	1	3.8	0.1	1	2.7	0.1
15-34	6	25.0	0.2	6	20.0	0.2	10	47.6	0.4	8	30.8	0.3	12	32.4	0.4
35-44	5	20.8	0.3	5	16.7	0.3	0	0.0	0.0	4	15.3	0.3	10	27.0	0.7
45-54	1	4.2	0.1	3	10.0	0.2	4	19.0	0.3	5	19.2	0.4	3	8.1	0.2
55-64	3	12.5	0.3	4	13.3	0.4	4	19.0	0.4	1	3.8	0.1	5	13.5	0.5
65+	2	8.3	0.2	2	6.7	0.2	0	0.0	0.0	3	11.5	0.3	5	13.5	0.5
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	1	4.2	0.1	1	3.3	0.1	0	0.0	0.0	1	3.8	0.1	4	10.8	0.3
Black	3	12.5	0.4	4	13.3	0.5	4	19.0	0.5	7	26.9	0.8	12	32.4	1.4
Hispanic	11	45.8	0.2	20	66.7	0.4	9	42.9	0.2	11	42.3	0.2	11	29.7	0.2
White	9	37.5	0.3	4	13.3	0.1	7	33.3	0.2	7	26.9	0.2	10	27.0	0.3
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	
Unknown	0	0.0		1	3.3		1	4.8		0	0.0		0	0.0	
SPA															
1	1	4.2	0.3	2	6.6	0.6	1	4.8	0.3	1	3.8	0.3	1	2.7	0.3
2	4	16.7	0.2	3	10.0	0.1	5	23.8	0.2	3	11.5	0.1	9	24.3	0.4
3	1	4.2	0.1	4	13.3	0.2	1	4.8	0.1	3	11.5	0.2	2	5.4	0.1
4	3	12.5	0.2	6	20.0	0.5	2	9.5	0.2	2	7.7	0.2	5	13.5	0.4
5	1	4.2	0.2	5	16.7	0.8	2	9.5	0.3	2	7.7	0.3	1	2.7	0.2
6	7	29.2	0.7	7	23.3	0.7	5	23.8	0.5	6	23.1	0.6	9	24.3	0.8
7	4	16.7	0.3	2	6.7	0.1	2	9.5	0.1	3	11.5	0.2	4	10.8	0.3
8	3	12.5	0.3	1	3.3	0.1	3	14.3	0.3	6	23.1	0.5	6	16.2	0.5
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of Meningococcal Disease LAC and US, 1999-2011

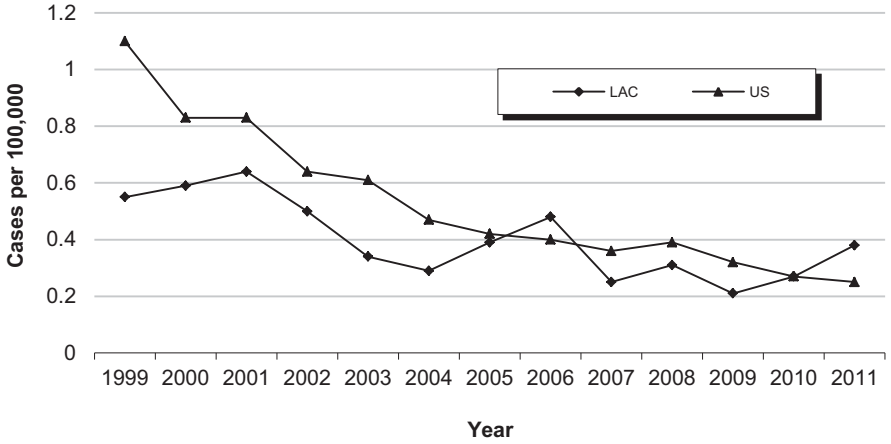


Figure 2. Incidence Rates of Meningococcal Disease Cases by Age Group, LAC, 2011 (N=37)

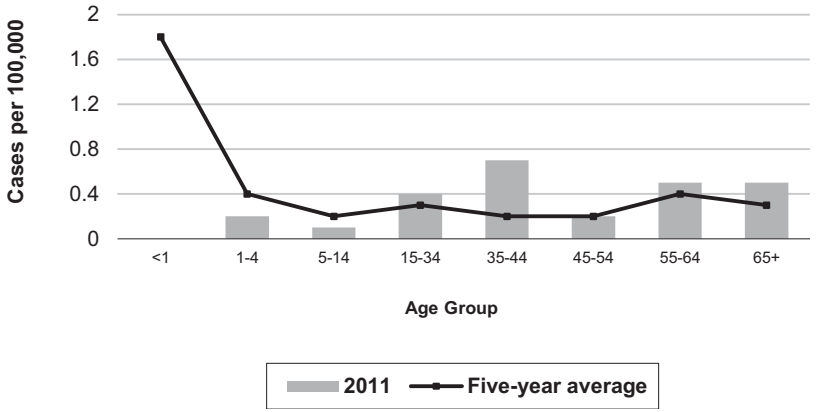


Figure 3. Percent Cases of Meningococcal Disease by Race/Ethnicity, LAC, 2011 (N=37)

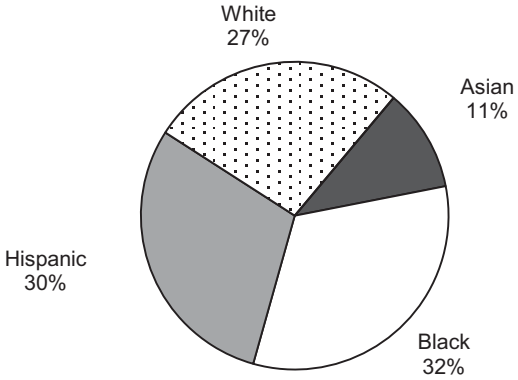


Figure 4. Incidence Rates of Meningococcal Disease Cases by Race/Ethnicity, LAC, 2006-2011

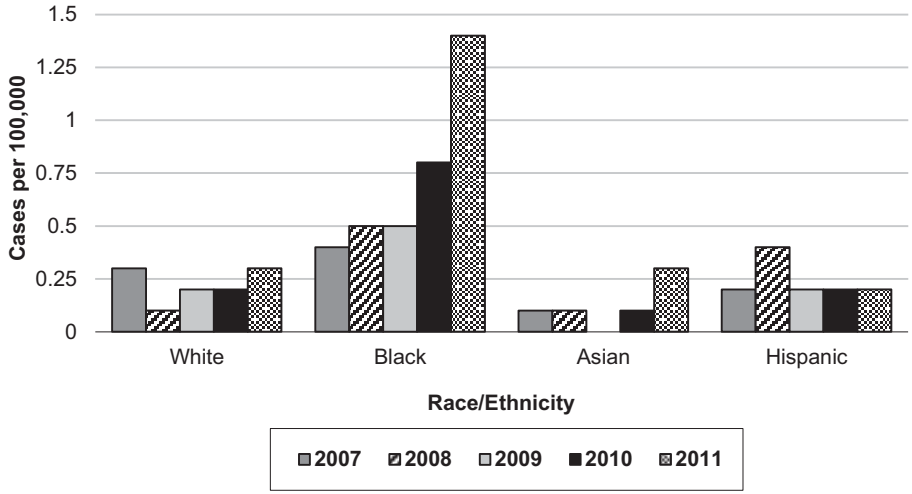


Figure 5. Reported Meningococcal Disease Cases by Month of Onset, LAC, 2011 (N=37)

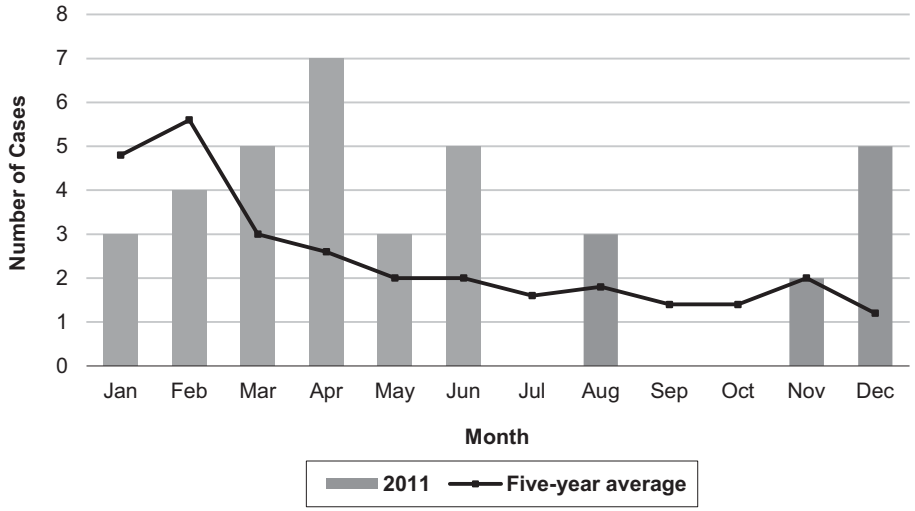


Figure 6. Incidence Rates of Meningococcal Disease by SPA LAC, 2011 (N=37)

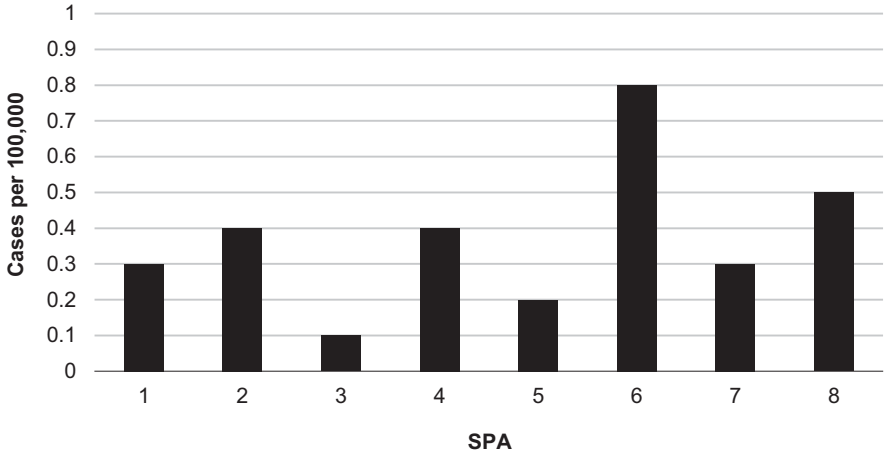
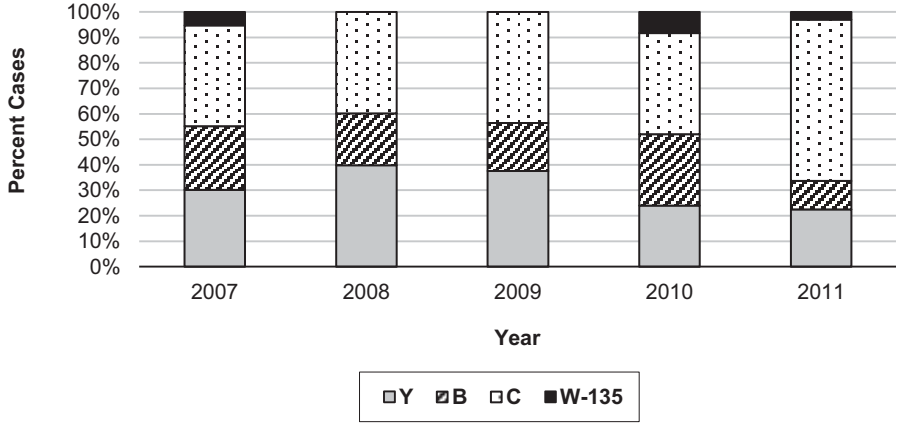


Figure 7. Meningococcal Disease by Serogroup LAC, 2007–2011



MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	26
Annual Incidence[a]	
LA County	0.27
California[b]	--
United States[b]	--
Age at Diagnosis	
Mean	34.6
Median	32
Range	0-83

[a]Cases per 100,000 population.
[b]See Final Summary of Nationally Notifiable Infectious Diseases, United States on MMWR website http://www.cdc.gov/mmwr/mmwr_nd/index.html.

DESCRIPTION

Meningococcal disease occurs most often as meningitis, an infection of the cerebrospinal fluid (CSF) or meningococcemia, an infection of the bloodstream. It is transmitted through direct or droplet contact with nose or throat secretions of persons colonized in the upper respiratory tract with the *Neisseria meningitidis* bacterium. Common 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. Of the 13 serogroups, only A, C, Y, and W-135 are vaccine-preventable.

For the purpose of surveillance, the LAC DPH defines reports of invasive meningococcal disease as confirmed when *N. meningitidis* has been isolated from a normally sterile site (e.g., blood or CSF). In the absence of a positive culture, reports are defined as probable in the setting of clinical symptoms consistent with invasive meningococcal disease and when there is evidence of the bacteria in a normally sterile site by gram staining, polymerase chain reaction (PCR) analysis, or CSF antigen test.

Three vaccines are available in the US that protect against serogroups A, C, Y, and W-135 but not B. Two quadrivalent conjugate vaccines, MenACWY-D (Menactra®) and MenACWY-CRM (Menveo®), are licensed for use in persons aged 2 to 55 years; MenACWY-D is also licensed for used in children age 9 through 23 months. Both vaccines are recommended for all adolescents between ages 11-18 years, preferably at 11 or 12 years, and for those between 2-55 years who are at increased risk for meningococcal disease. An additional booster dose is needed if the primary dose was given before 16 years old. Routine vaccination is recommended for college freshman living in dormitories, persons at increased risk for meningococcal disease. Quadrivalent meningococcal polysaccharide vaccine (Menomune®) is approved for use among those ≥2 years old and is acceptable for use when MCV4 and MenACWY-CRM are not available (e.g., for those >55 years old).

Antimicrobial chemoprophylaxis of close contacts of sporadic cases of meningococcal disease remains the primary means for prevention of meningococcal disease among close contacts, who include: a) household members, b) daycare center contacts, and c) anyone directly exposed to the patient's oral secretions (e.g., through kissing, mouth-to-mouth resuscitation, endotracheal intubation, or endotracheal tube management). 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 > 10 days after onset of illness in the index case-patient 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.

2010 TRENDS AND HIGHLIGHTS

- There were 24 (92%) culture-confirmed cases: 15 (63%) cultured from blood, 3 (12.5%) from cerebrospinal fluid (CSF), 3 (12.5%) from both CSF and blood, 2 (8.3%) from synovial fluid, and 1 (4.2%) from meningeal tissue. Two cases were probable by PCR. Twenty- five cases (96%) had serogroup identified; 7 (28%) were serogroup B, 10 (40%) serogroup C, 6 (24%) serogroup Y, and 2 (8%) serogroup W-135.
- The incidence of meningococcal disease continued to decline (0.27 per 100,000) and slowly declining since 2001 (a peak of 0.64 cases per 100,000).
- No secondary cases or outbreaks were detected.
- Three deaths were documented (11.5%), which is consistent as in previous years.

Reported Meningococcal Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=46)			2007 (N=24)			2008 (N=30)			2009 (N=21)			2010 (N=26)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	4	8.7	2.8	3	12.5	2.0	3	10.0	2.1	1	4.8	0.7	2	7.7	1.4
1-4	5	10.9	0.9	3	12.5	0.5	1	3.3	0.2	1	4.8	0.2	2	7.7	0.3
5-14	8	17.4	0.5	1	4.2	0.1	6	20.0	0.4	1	4.8	0.1	1	3.8	0.1
15-34	9	19.6	0.3	6	25.0	0.2	6	20.0	0.2	10	47.6	0.4	8	30.8	0.3
35-44	2	4.3	0.1	5	20.8	0.3	5	16.7	0.3	0	0.0	0.0	4	15.3	0.3
45-54	3	6.5	0.2	1	4.2	0.1	3	10.0	0.2	4	19.0	0.3	5	19.2	0.4
55-64	7	15.2	0.8	3	12.5	0.3	4	13.3	0.4	4	19.0	0.4	1	3.8	0.1
65+	8	17.4	0.8	2	8.3	0.2	2	6.7	0.2	0	0.0	0.0	3	11.5	0.3
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	2	4.3	0.2	1	4.2	0.1	1	3.3	0.1	0	0.0	0.0	1	3.8	0.1
Black	3	6.5	0.4	3	12.5	0.4	4	13.3	0.5	4	19.0	0.5	7	26.9	0.8
Hispanic	28	60.9	0.6	11	45.8	0.2	20	66.7	0.4	9	42.9	0.2	11	42.3	0.2
White	13	28.3	0.5	9	37.5	0.3	4	13.3	0.1	7	33.3	0.2	7	26.9	0.2
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		1	3.3		1	4.8		0	0.0	
SPA															
1	0	0.0	0.0	1	4.2	0.3	2	6.6	0.6	1	4.8	0.3	1	3.8	0.3
2	11	23.9	0.5	4	16.7	0.2	3	10.0	0.1	5	23.8	0.2	3	11.5	0.1
3	4	8.7	0.2	1	4.2	0.1	4	13.3	0.2	1	4.8	0.1	3	11.5	0.2
4	4	8.7	0.3	3	12.5	0.2	6	20.0	0.5	2	9.5	0.2	2	7.7	0.2
5	1	2.2	0.2	1	4.2	0.2	5	16.7	0.8	2	9.5	0.3	2	7.7	0.3
6	14	30.4	1.3	7	29.2	0.7	7	23.3	0.7	5	23.8	0.5	6	23.1	0.6
7	6	13.0	0.4	4	16.7	0.3	2	6.7	0.1	2	9.5	0.1	3	11.5	0.2
8	4	8.7	0.4	3	12.5	0.3	1	3.3	0.1	3	14.3	0.3	6	23.1	0.5
Unknown	2	4.3		0	0.0		0	0.0		0	0.0		0	0.0	

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of Meningococcal Disease LAC and US, 1999-2010

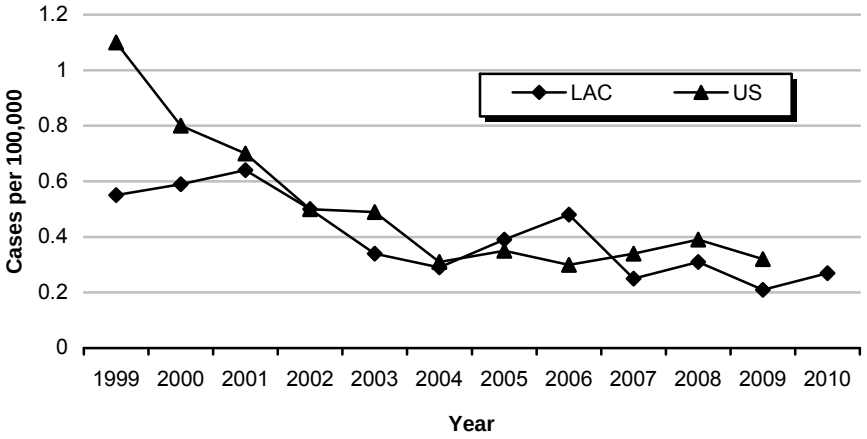


Figure 2. Incidence Rates of Meningococcal Disease by Age Group LAC, 2010 (N=26)

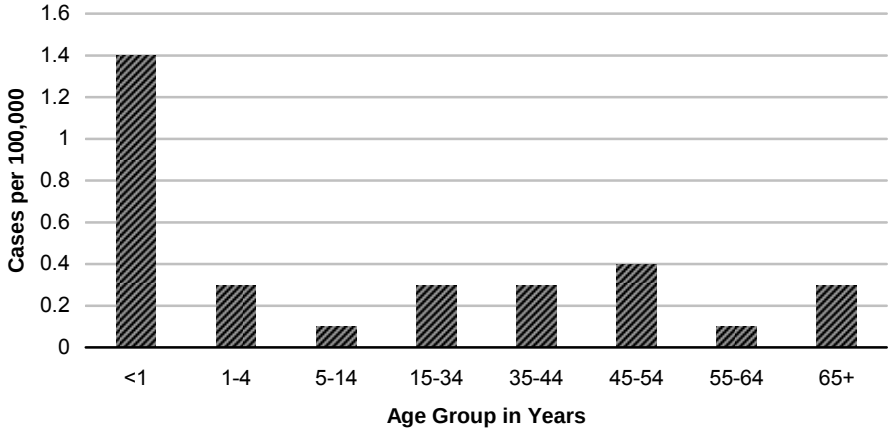


Figure 3. Percent Cases of Meningococcal Disease by Race/Ethnicity, LAC, 2010 (N=26)

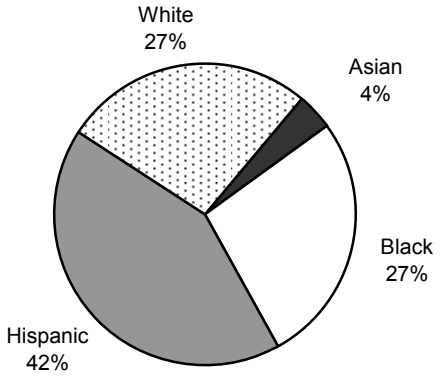


Figure 4. Incidence Rates of Meningococcal Disease Cases by Race/Ethnicity, LAC, 2005-2010

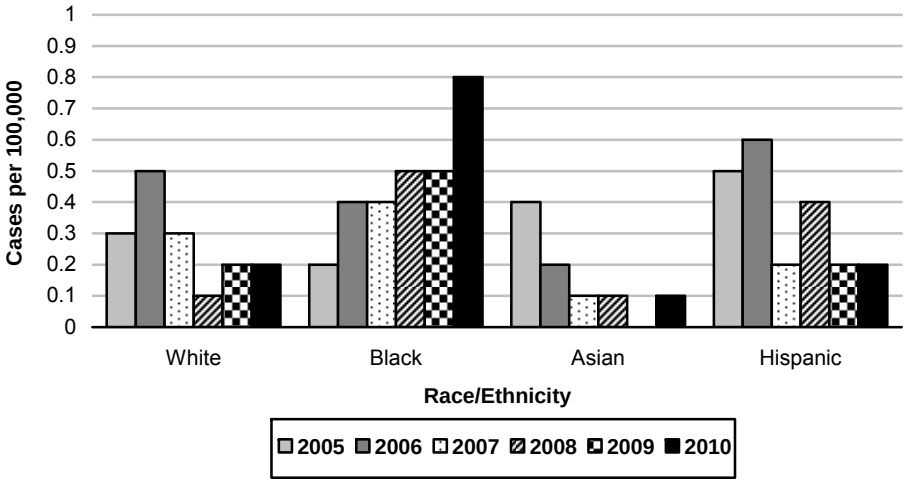


Figure 5. Reported Meningococcal Disease Cases by Month of Onset, LAC, 2010 (N=26)

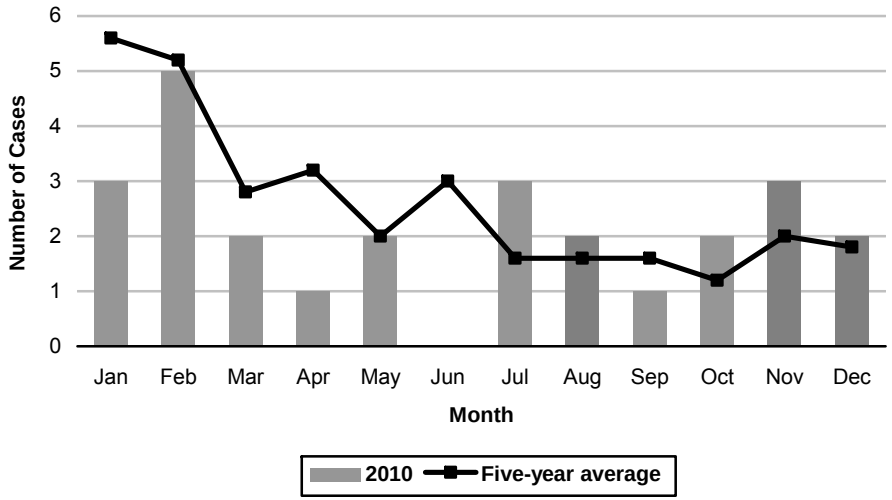


Figure 6. Incidence Rates of Meningococcal Disease by SPA LAC, 2010 (N=26)

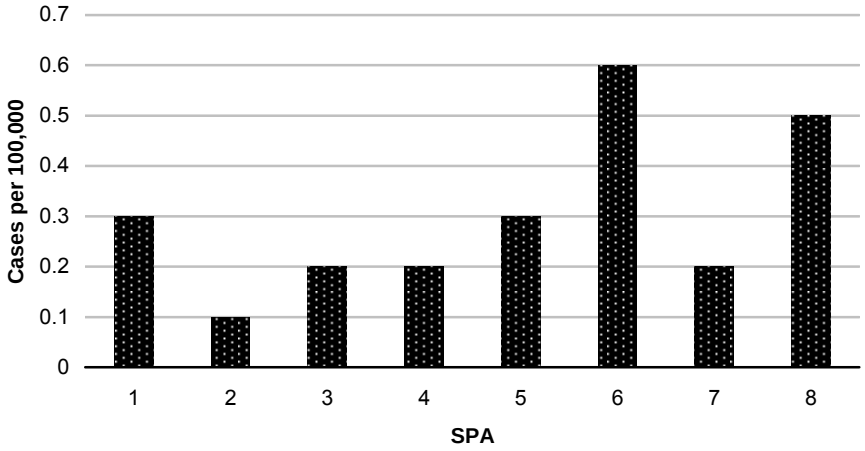
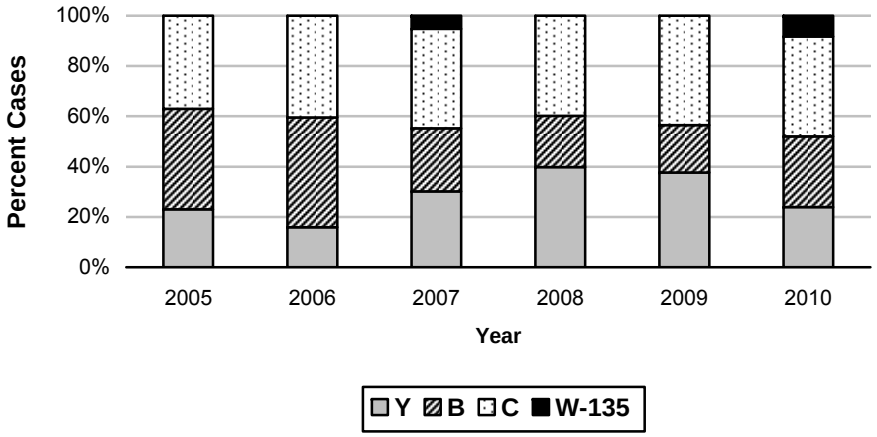


Figure 7. Meningococcal Disease by Serogroup LAC, 2005–2010



MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	21
Annual Incidence[a]	
LA County	0.21
California[b]	0.59
United States[b]	0.39
Age at Diagnosis	
Mean	32.5
Median	31
Range	0-62

[a]Cases per 100,000 population.
[b]Calculated from Final 2008 Reports of Nationally Notifiable Infectious Disease. MMWR 58(31);856-857;859-869.

DESCRIPTION

Meningococcal disease occurs most often as meningitis, an infection of the cerebrospinal fluid (CSF) or meningococcemia, an infection of the bloodstream. It is transmitted through direct or droplet contact with nose or throat secretions of persons colonized in the upper respiratory tract with the *Neisseria meningitidis* bacterium. Common 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. 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. Of the 12 serogroups, only A, C, Y, and W-135 are vaccine-preventable.

For the purpose of surveillance, the LAC DPH defines reports of invasive meningococcal disease as confirmed when *N. meningitidis* has been isolated from a normally sterile site (e.g., blood or CSF). In the absence of a positive culture, reports are defined as probable in the setting of clinical symptoms consistent with invasive meningococcal disease and when there is evidence of the bacteria in a normally sterile site by gram staining, polymerase chain reaction (PCR) analysis, or CSF antigen test.

In 2004, a new quadrivalent meningococcal conjugate (MCV4), Menactra®, was approved for use in the US. This vaccine protects against serogroups A, C, Y, and W-135, the same serogroups as quadrivalent meningococcal polysaccharide vaccine meningococcal conjugated vaccine (MPSV4), but provides longer lasting immunity. MCV4 is recommended for use in persons aged 11 to 55 years, although the use of MPSV4 is acceptable when MCV4 is not available. Generally, only a single dose of either vaccine is recommended. As of 2006, MCV4 is part of the childhood vaccination schedule and recommended for all children between ages 11-12 years. Additionally, unvaccinated college freshman who live in dormitories are at higher risk for meningococcal disease and should be vaccinated with MCV4.

Antimicrobial chemoprophylaxis of close contacts of sporadic cases of meningococcal disease remains the primary means for prevention of meningococcal disease among close contacts, who include: a) household members, b) daycare center contacts, and c) anyone directly exposed to the patient's oral secretions (e.g., through kissing, mouth-to-mouth resuscitation, endotracheal intubation, or endotracheal tube management). 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 greater than 14 days after onset of illness in the index case-patient 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.

2009 TRENDS AND HIGHLIGHTS

- There were 19 (90%) confirmed cases: one (5%) from cerebrospinal fluid (CSF), 12 (63%) from blood, and six from both CSF and blood (32%); two cases were probable. Of the 16 (76%) cases that were serogrouped, three (19%) were identified as serogroup B, seven (38%) serogroup C, and six (44%) serogroup Y.
- The incidence of meningococcal disease in LAC (0.21 per 100,000) has been slowly declining since 2001 when it reached 0.64 per 100,000.
- Nearly 50% of cases (n=10) occurred among 15-34 year olds, the highest percentage of any age group in the last five years. The vaccination rate in this group is unknown as vaccination coverage data are poor (48% of cases have unknown status).
- Two deaths were documented (10%) in 2009, compared to four in 2008 (13%) and three in 2007(12%).

Reported Meningococcal Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=37)			2006 (N=46)			2007 (N=24)			2008 (N=30)			2009 (N=21)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	3	8.1	2.1	4	8.7	2.8	3	12.5	2.0	3	10.0	2.1	1	4.8	0.7
1-4	2	5.4	0.3	5	10.9	0.9	3	12.5	0.5	1	3.3	0.2	1	4.8	0.2
5-14	6	16.2	0.4	8	17.4	0.5	1	4.2	0.1	6	20.0	0.4	1	4.8	0.1
15-34	12	32.4	0.4	9	19.6	0.3	6	25.0	0.2	6	20.0	0.2	10	47.6	0.4
35-44	3	8.1	0.2	2	4.3	0.1	5	20.8	0.3	5	16.7	0.3	0	0	0
45-54	3	8.1	0.2	3	6.5	0.2	1	4.2	0.1	3	10.0	0.2	4	19.0	0.3
55-64	5	13.5	0.6	7	15.2	0.8	3	12.5	0.3	4	13.3	0.4	4	19.0	0.4
65+	3	8.1	0.3	8	17.4	0.8	2	8.3	0.2	2	6.7	0.2	0	0	0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0	
Race / Ethnicity															
Asian	5	13.5	0.4	2	4.3	0.2	1	4.2	0.1	1	3.3	0.1	0	0	0
Black	2	5.4	0.2	3	6.5	0.4	3	12.5	0.4	4	13.3	0.5	4	19.0	0.5
Hispanic	21	56.8	0.5	28	60.9	0.6	11	45.8	0.2	20	66.7	0.4	9	42.9	0.2
White	9	24.3	0.3	13	28.3	0.5	9	37.5	0.3	4	13.3	0.1	7	33.3	0.2
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
Unknown	0	0.0		0	0.0		0	0.0		1	3.3		1	4.8	
SPA															
1	0	0.0	0.0	0	0.0	0.0	1	4.2	0.3	2	6.6	0.6	1	4.8	0.3
2	7	18.9	0.3	11	23.9	0.5	4	16.7	0.2	3	10.0	0.1	5	23.8	0.2
3	7	18.9	0.4	4	8.7	0.2	1	4.2	0.1	4	13.3	0.2	1	4.8	0.1
4	9	24.3	0.7	4	8.7	0.3	3	12.5	0.2	6	20.0	0.5	2	9.5	0.2
5	0	0.0	0.0	1	2.2	0.2	1	4.2	0.2	5	16.7	0.8	2	9.5	0.3
6	5	13.5	0.5	14	30.4	1.3	7	29.2	0.7	7	23.3	0.7	5	23.8	0.5
7	6	16.2	0.4	6	13.0	0.4	4	16.7	0.3	2	6.7	0.1	2	9.5	0.1
8	3	8.1	0.3	4	8.7	0.4	3	12.5	0.3	1	3.3	0.1	3	14.3	0.3
Unknown	0	0.0		2	4.3		0	0.0		0	0.0		0	0	

*Rates calculated based on less than 19 cases or events are considered unreliable.

**Figure 1. Incidence Rates of Meningococcal Disease
LAC and US, 1999-2009**

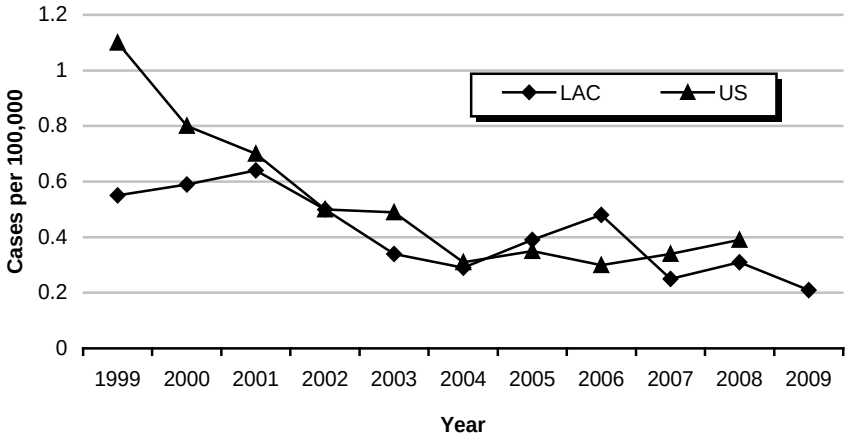


**Figure 2. Incidence Rates of Meningococcal Disease by Age Group
LAC, 2009 (N=21)**

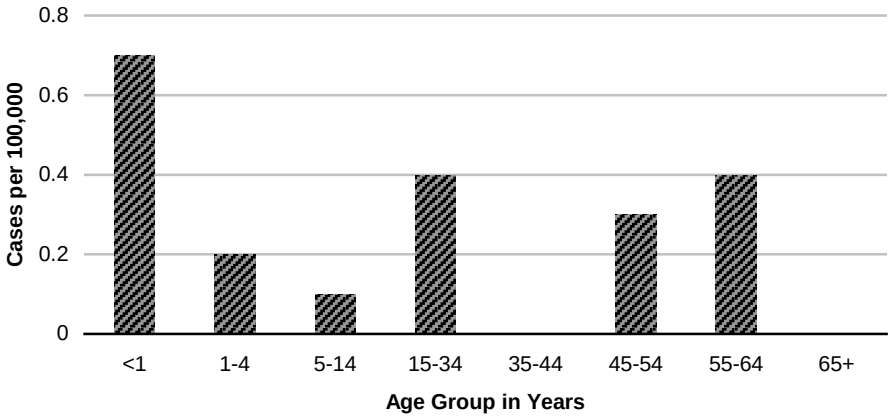


**Figure 3. Percent Cases of Meningococcal Disease
by Race/Ethnicity, LAC, 2009 (N=21)**

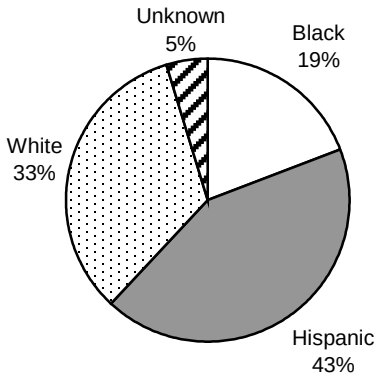


**Figure 4. Incidence Rates of Meningococcal Disease by SPA
LAC, 2009 (N=21)**

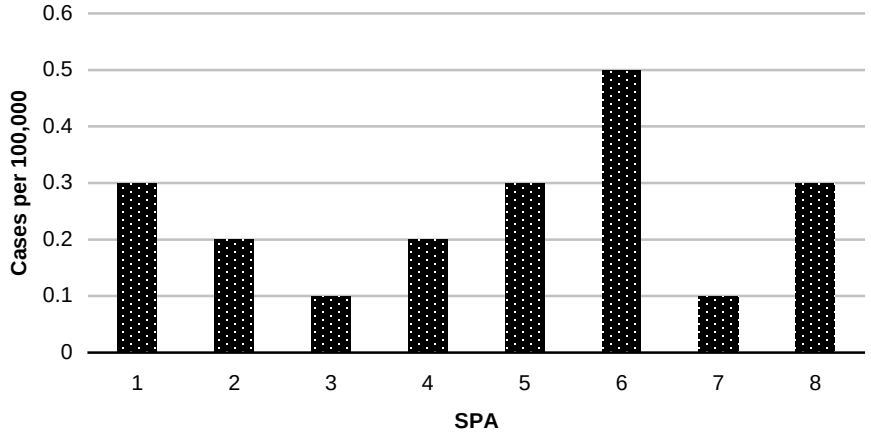


Figure 5. Reported Meningococcal Disease Cases by Month of Onset, LAC, 2009 (N=21)

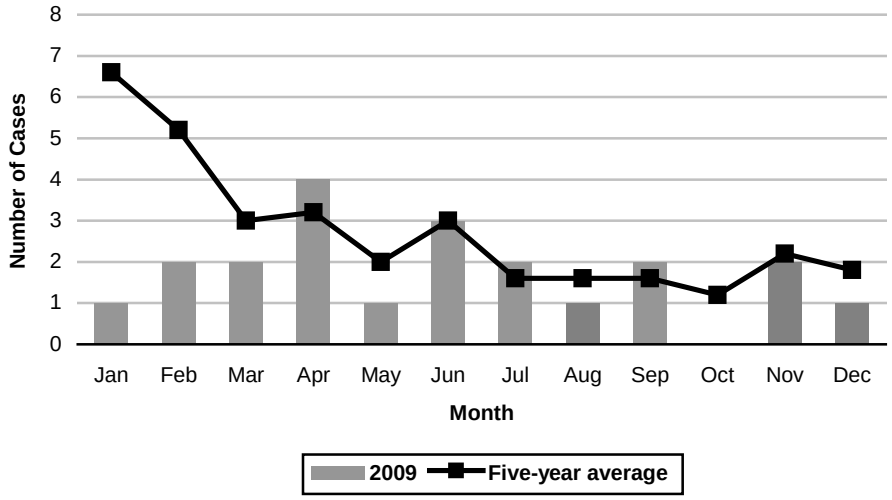


Figure 6. Reported Meningococcal Disease Cases by Race/Ethnicity, LAC, 2004-2009

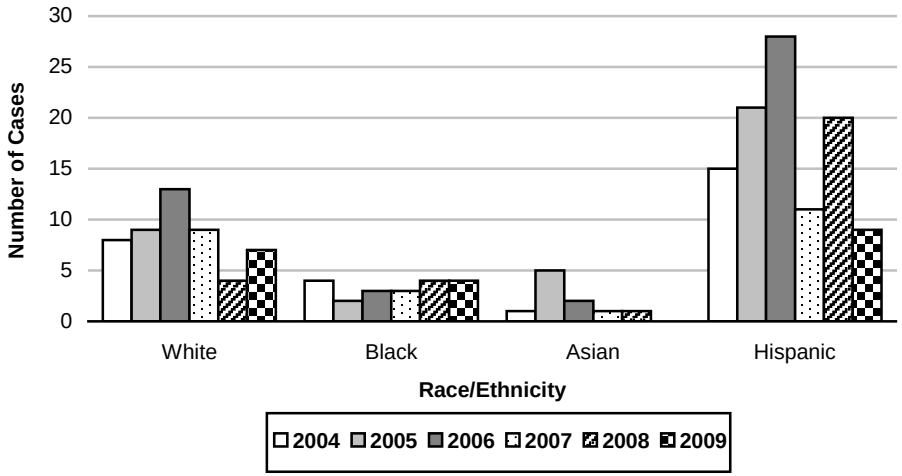
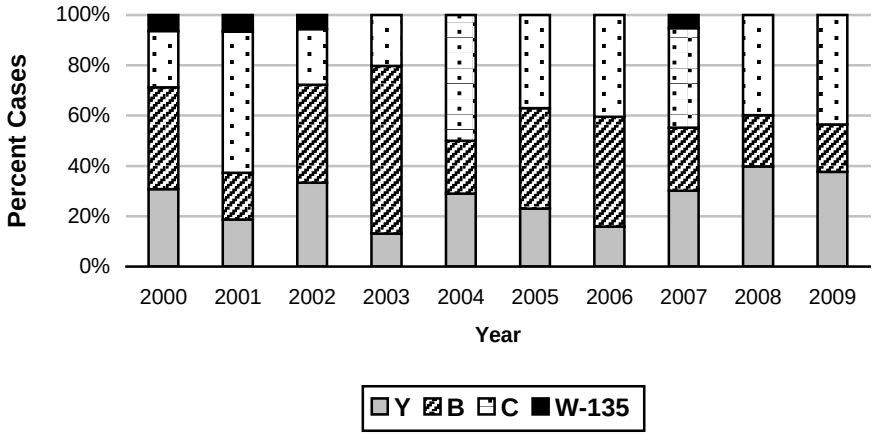


Figure 7. Meningococcal Disease by Serogroup LAC, 2000–2009



MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	30
Annual Incidence[a]	
LA County	0.31
California[b]	0.59
United States[b]	0.39
Age at Diagnosis	
Mean	32
Median	33
Range	0-87

[a]Cases per 100,000 population.
[b]Calculated from Final 2008 Reports of Nationally Notifiable Infectious Disease. MMWR 58(31);856-857;859-869.

DESCRIPTION

Meningococcal disease occurs most often as meningitis, an infection of the cerebrospinal fluid (CSF) or meningococcemia, an infection of the bloodstream. It is transmitted through direct or droplet contact with nose or throat secretions of persons colonized in the upper respiratory tract with the *Neisseria meningitidis* bacterium. Common symptoms include sudden onset of fever, headache, nausea, vomiting, stiff neck, petichial rash and lethargy which can progress to overwhelming sepsis, shock and death within hours. 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. Of the 12 serogroups, only A, C, Y, and W-135 are vaccine-preventable.

For the purpose of surveillance, the LAC DPH defines reports of invasive meningococcal disease as confirmed when *N. meningitidis* has been isolated from a normally sterile site (e.g., blood or CSF). In the absence of a positive culture, reports are defined as probable in the setting of clinical symptoms consistent with invasive meningococcal disease and when there is evidence of the bacteria in a normally sterile site by gram staining, polymerase chain reaction (PCR) analysis, or CSF antigen test.

Antimicrobial chemoprophylaxis of close contacts of sporadic cases of meningococcal disease remains the primary means for prevention of meningococcal disease. Close contacts include: a) household members, b) daycare center contacts, and c) anyone directly exposed to the patient's oral secretions (e.g., through kissing, mouth-to-mouth resuscitation, endotracheal intubation, or endotracheal tube management). 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 greater than 14 days after onset of illness in the index case-patient 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.

In 2004, a new quadrivalent meningococcal conjugate (MCV4), Menactra®, was approved for use in the U.S. This vaccine protects against serogroups A, C, Y, and W-135, the same serogroups as MPSV4, but provides longer lasting immunity. MCV4 is recommended for use in persons aged 11 to 55 years, although the use of MPSV4 is acceptable when MCV4 is not available. Generally, only a single dose of either vaccine is recommended. As of 2006, MCV4 is part of the childhood vaccination schedule and recommended for all children between ages 11-12 years. Additionally, unvaccinated college freshman who live in dormitories are at higher risk for meningococcal disease and should be vaccinated with MCV4.

2008 TRENDS AND HIGHLIGHTS

- The incidence of meningococcal disease in LAC (0.31 per 100,000) has been stable since 2003 and similar to the overall US incidence.
- Four deaths were documented (13%) in 2008, compared to three in 2007(12%) and one in 2006 (2%).
- There were 27 (90%) culture-confirmed cases: 6 (20%) from cerebrospinal fluid (CSF), 18 (60%) from blood, and 3 from both CSF and blood (10%). Of the twenty-seven (90%) cases that were serogrouped, 5 (19%) were identified as serogroup B, 12 (44%) serogroup C, and 10 (37%) serogroup Y.
- The first documented secondary meningococcal case in LAC was recorded in February 2008. The case was a relative who visited the index case and was not a household contact. He already displayed symptoms by the time he was brought in for prophylaxis. His onset was four days after his last contact with the index and three days after the index case became ill.

Reported Meningococcal Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=28)			2005 (N=37)			2006 (N=46)			2007 (N=24)			2008 (N=30)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	2	7.1	1.4	3	8.1	2.1	4	8.7	2.8	3	12.5	2.0	3	10.0	2.1
1-4	2	7.1	0.3	2	5.4	0.3	5	10.9	0.9	3	12.5	0.5	1	3.3	0.2
5-14	4	14.3	0.3	6	16.2	0.4	8	17.4	0.5	1	4.2	0.1	6	20.0	0.4
15-34	9	32.1	0.3	12	32.4	0.4	9	19.6	0.3	6	25.0	0.2	6	20.0	0.2
35-44	3	10.7	0.2	3	8.1	0.2	2	4.3	0.1	5	20.8	0.3	5	16.7	0.3
45-54	3	10.7	0.2	3	8.1	0.2	3	6.5	0.2	1	4.2	0.1	3	10.0	0.2
55-64	3	10.7	0.4	5	13.5	0.6	7	15.2	0.8	3	12.5	0.3	4	13.3	0.4
65+	2	7.1	0.2	3	8.1	0.3	8	17.4	0.8	2	8.3	0.2	2	6.7	0.2
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	1	3.6	0.1	5	13.5	0.4	2	4.3	0.2	1	4.2	0.1	1	3.3	0.1
Black	4	14.3	0.5	2	5.4	0.2	3	6.5	0.4	3	12.5	0.4	4	13.3	0.5
Hispanic	15	53.6	0.3	21	56.8	0.5	28	60.9	0.6	11	45.8	0.2	20	66.7	0.4
White	8	28.6	0.3	9	24.3	0.3	13	28.3	0.5	9	37.5	0.3	4	13.3	0.1
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		1	3.3	
SPA															
1	1	3.6	0.3	0	0.0	0.0	0	0.0	0.0	1	4.2	0.3	1	3.3	0.3
2	8	28.6	0.4	7	18.9	0.3	11	23.9	0.5	4	16.7	0.2	3	10.0	0.1
3	6	21.4	0.4	7	18.9	0.4	4	8.7	0.2	1	4.2	0.1	4	13.3	0.2
4	4	14.3	0.3	9	24.3	0.7	4	8.7	0.3	3	12.5	0.2	6	20.0	0.5
5	1	3.6	0.2	0	0.0	0.0	1	2.2	0.2	1	4.2	0.2	5	16.7	0.8
6	2	7.1	0.2	5	13.5	0.5	14	30.4	1.3	7	29.2	0.7	7	23.3	0.7
7	4	14.3	0.3	6	16.2	0.4	6	13.0	0.4	4	16.7	0.3	2	6.7	0.1
8	2	7.1	0.2	3	8.1	0.3	4	8.7	0.4	3	12.5	0.3	1	3.3	0.1
Unknown	0	0.0		0	0.0		2	4.3		0	0.0		1	3.3	

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of Meningococcal Disease LAC and US, 1999-2008

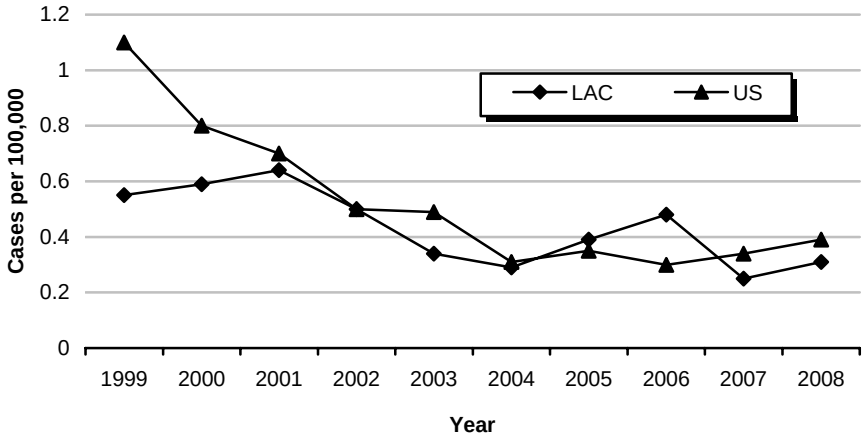


Figure 2. Incidence Rates of Meningococcal Disease by Age Group, LAC, 2008

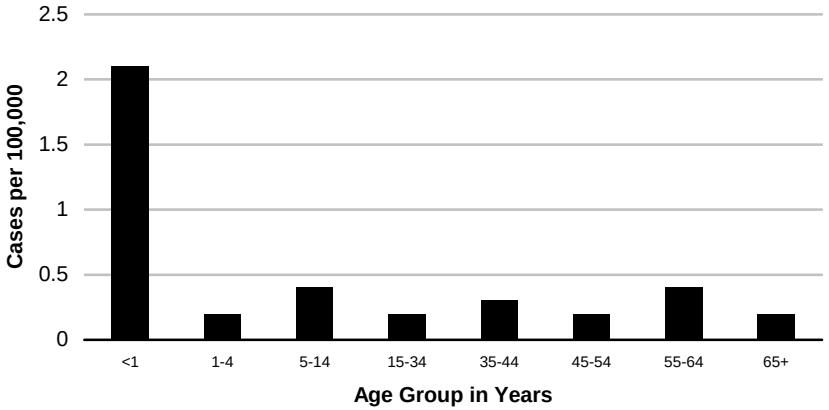


Figure 3. Percent Cases of Meningococcal Disease by Race/Ethnicity, LAC, 2008

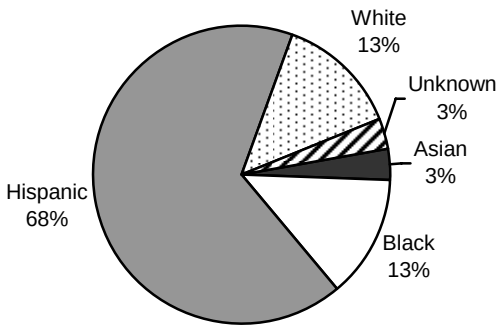


Figure 4. Incidence Rates of Meningococcal Disease by SPA LAC, 2008

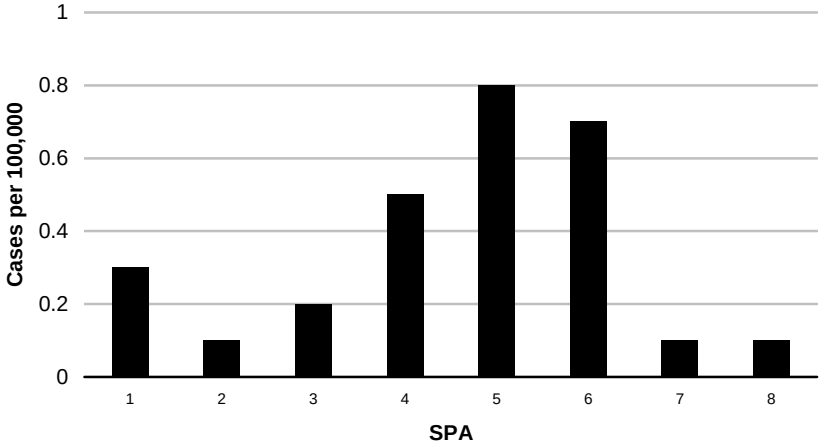


Figure 5. Reported Meningococcal Disease Cases by Month of Onset, LAC, 2008

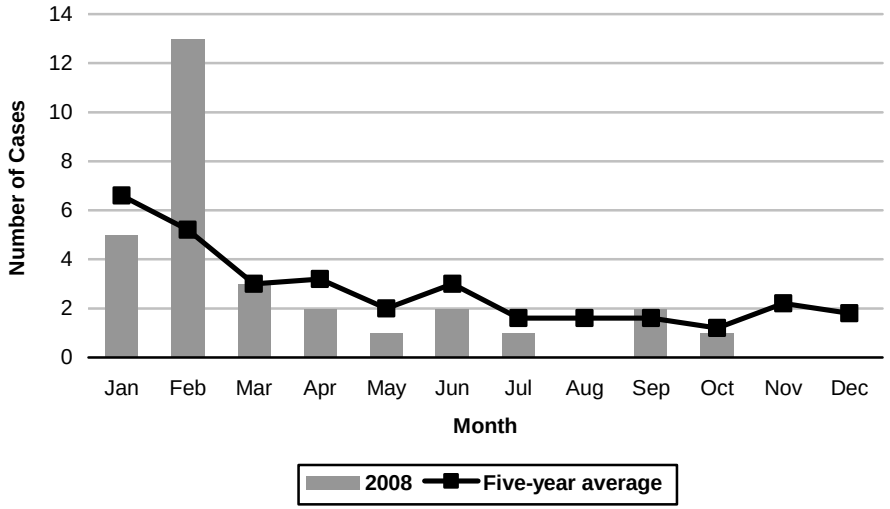


Figure 6. Reported Meningococcal Disease Cases by Race/Ethnicity, LAC, 2004-2008

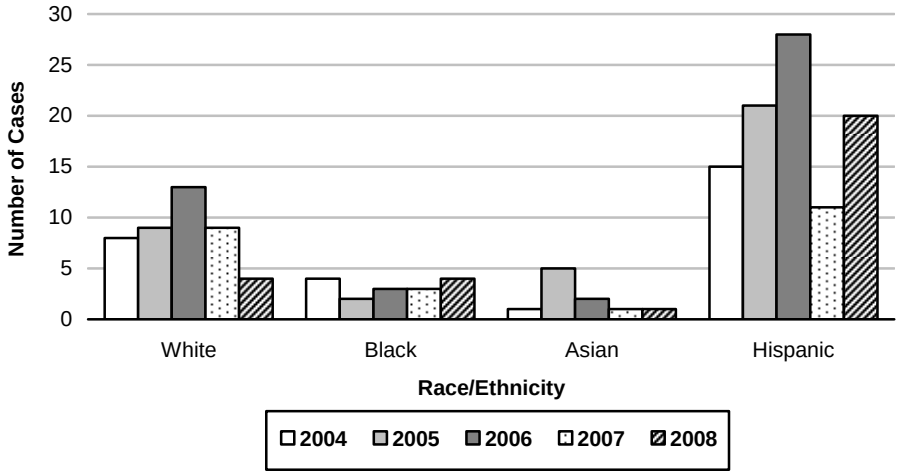
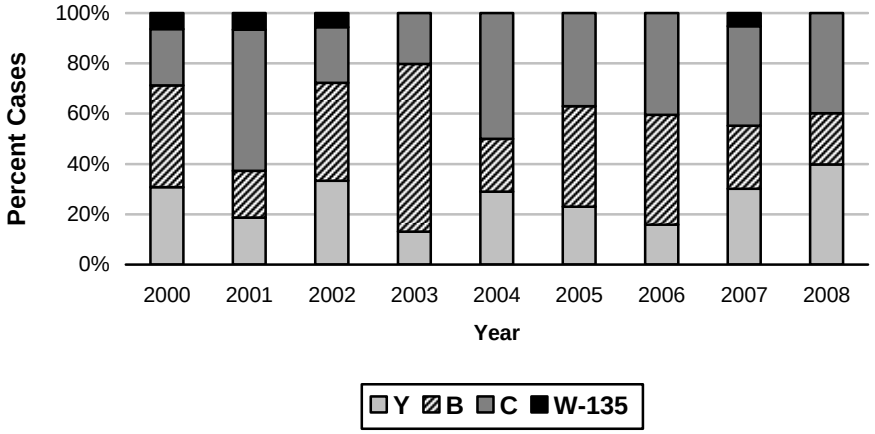


Figure 7. Meningococcal Disease by Serogroup LAC, 2000–2008



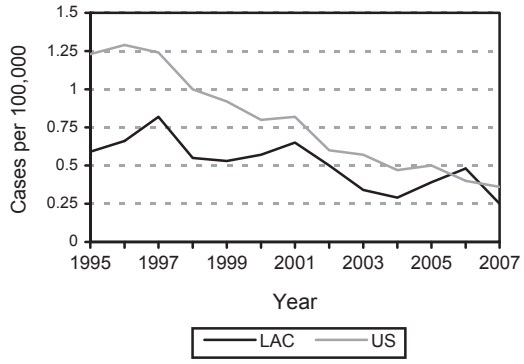
MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	24
Annual Incidence[a]	
LA County	0.25
California	0.48[b]
United States	0.36[b]
Age at Diagnosis	
Mean	31
Median	28
Range	0–85 years

[a] Cases per 100,000 population.

[b] Calculation based on the MMWR 2007 Final Report of Nationally Notifiable Infectious Diseases and the 2007 estimate of populations at www.census.gov.

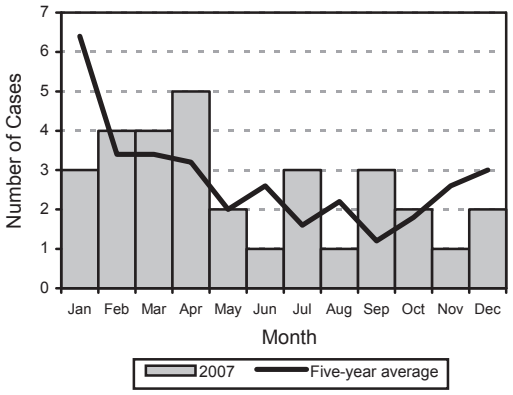
Figure 1
Meningococcal Disease
Incidence Rates by Year of Onset
LAC and US, 1995–2007



DESCRIPTION

Meningococcal disease occurs most often as meningitis, an infection of the cerebrospinal fluid (CSF) or meningococcemia, an infection of the bloodstream. It is transmitted through direct or droplet contact with nose or throat secretions of persons colonized in the upper respiratory tract with the *Neisseria meningitidis* bacterium. Common symptoms include sudden onset of fever, headache, nausea, vomiting, stiff neck, petichial rash, and lethargy which can progress to overwhelming sepsis, shock, and death within hours. Long-term sequelae include significant neurologic or orthopedic complications such as deafness or amputation secondary to disseminated intravascular coagulation and thromboses. Meningococcal disease affects all age groups but occurs most often in infants. Of the 12 serogroups, only A, C, Y, and W-135 are vaccine-preventable.

Figure 2
Meningococcal Disease
by Month of Onset
LAC, 2007 (N=24)



For the purpose of surveillance, Los Angeles County Department of Public Health (LAC DPH) defines a confirmed case invasive meningococcal disease when *N. meningitidis* has been isolated from a normally sterile site (e.g., blood or CSF). In the absence of a positive culture, reports are defined as probable in the setting of clinical symptoms consistent with invasive meningococcal disease and when there is evidence of the bacteria in a normally sterile site by gram staining, polymerase chain reaction (PCR) analysis, or CSF antigen test.

DISEASE ABSTRACT

- Confirmed invasive meningococcal disease cases decreased by 50% in 2007 compared to 2006 with 24 and 46 cases reported, respectively.
- Three deaths were documented in 2007 compared to 1 in 2006.
- There were 17 (71%) culture-confirmed cases: 5 (29%) from CSF, 9 (53%) from blood, and 3 from

both CSF and blood (18%). Twenty-one (88%) cases were serogrouped: 5 (24%) were identified as serogroup B, 8 (38%) serogroup C, 6 (29%) serogroup Y, 1 (5%) was W135, and 1 CSF isolate was untypeable.

- No outbreaks were documented in 2007.

STRATIFIED DATA

Trends: The incidence of invasive meningococcal disease decreased by nearly 50% to 0.25 per 100,000 population in 2007 (N=24) from 0.48 per 100,000 in 2006 (N=46) (Figure 1). Seventy-one percent (n=17) of the cases were culture-confirmed in 2007 compared to 83% (n=38) in 2006. The incidence rate has been slowly decreasing in LAC since 2003 and is below the national rate of 0.33 per 100,000 estimated for 2007. Despite the decrease in cases, more deaths were documented in 2007: three deaths (13%) compared to one in 2006 (2%).

Seasonality: Most cases were reported during winter and early spring (Figure 2). There were no cases reported in October and November.

Age: The age-specific incidence rates declined in all age groups with the exception of the 35-44 year old group. Infants <1 year decreased in 2007 (2.0 versus 2.8 per 100,000) compared to 2006. The rates among 15-34 years were also lower (0.2 versus 0.3 per 100,000). The rate among adults > 65 also decreased in 2007 (0.8 versus 0.2 per 100,000).

Sex: The male-to-female rate ratio was 1.1:1.

Race/Ethnicity: Invasive meningococcal cases were reported most frequently in Hispanics (n=11, 46%) followed by whites (n=9, 38%), blacks (n=3, 13%), and Asians (n=1, <1%). The incidence rates by race/ethnicity are unstable.

Location: Cases were reported from all eight Service Planning Areas (SPA). No significance noted.

COMMENTS

As a part of public health meningococcal disease surveillance, clinical laboratories are requested to send isolates of every culture-confirmed case to the LAC Public Health Laboratory (PHL) for serotyping**.** In 2007, 21 isolates were serogrouped: 16 (76%) were culture-confirmed and 4 (19%) isolates were serogrouped using whole blood or CSF PCR. The remaining cases (n=3, 14%) had positive CSF antigen tests or gram stains. Most isolates were serogroup C, 8 (38%), followed by serogroup Y (n=6, 29%), serogroup B (n=5, 24%), and 1 (5%) isolate was W135. A larger proportion of isolates were serogroup

Figure 3
Meningococcal Disease
Incidence Rates by Age Group
LAC, 2007

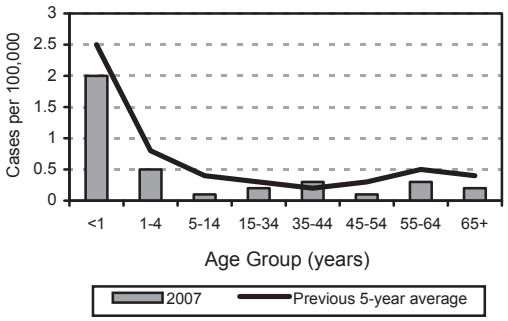


Figure 4
Meningococcal Disease
Incidence Rates by Race/Ethnicity
LAC, 2007

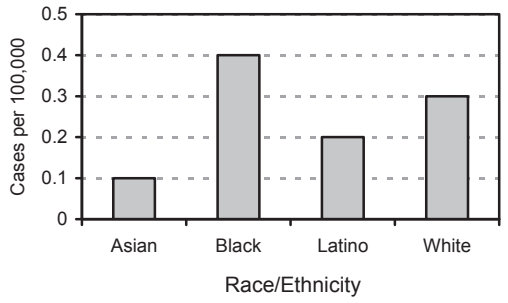
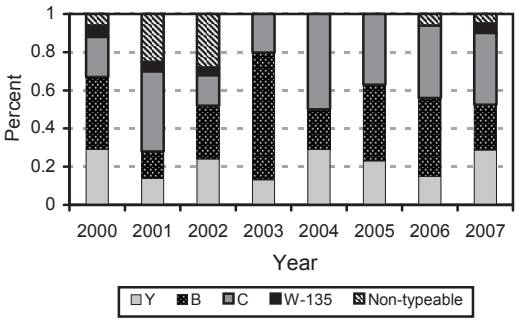


Figure 5
Meningococcal Disease
by Serogroup
LAC, 2000–2007



C compared to previous surveillance years (Figure 5). The mean and median ages of the vaccine preventable cases (n=15) were 33.4 and 21 years, respectively, and ranged from 0–85 years. Non-vaccine preventable serogroup B cases (n=5) had a mean age of 16, median age of 18, and range of 0–39. With greater widespread use of the MCV4 vaccine, the incidence of serogroups C, Y, and W-135 is expected to decline. However, due to the lack of universal vaccine protection against invasive meningococcal disease, clinicians must still maintain diagnostic clinical acumen.

LAC DPH and the California Department of Public Health have continued to conduct enhanced meningococcal disease surveillance with the goals of (1) monitoring the epidemiology changes of meningococcal disease; (2) assisting with identification and management of cases and outbreaks; (3) assessing vaccine effectiveness; (4) ascertaining the usefulness of PCR in culture negative cases, particularly in patients treated with antibiotics prior to culture; and (5) helping contribute to improvements in the overall diagnosis and management of invasive meningococcal disease.

PREVENTION

Antimicrobial chemoprophylaxis of close contacts of sporadic cases of meningococcal disease remains the primary means for prevention of meningococcal disease. Close contacts include: a) household members, b) daycare center contacts, and c) anyone directly exposed to the patient's oral secretions (e.g., through kissing, mouth-to-mouth resuscitation, endotracheal intubation, or endotracheal tube management). 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 greater than 14 days after onset of illness in the index case-patient 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.

In 2004, a new quadrivalent meningococcal conjugate (MCV4), Menactra®, was approved for use in the U.S. This vaccine protects against serogroups A, C, Y, and W-135, the same serogroups as MPSV4, but provides longer lasting immunity. MCV4 is recommended for use in persons aged 11 to 55 years, although the use of MPSV4 is acceptable when MCV4 is not available. Generally, only a single dose of either vaccine is recommended. As of 2006, MCV4 is part of the childhood vaccination schedule and recommended for all children between ages 11-12 years. Additionally, unvaccinated college freshman who live in dormitories are at higher risk for meningococcal disease and should be vaccinated with MCV4.

ADDITIONAL RESOURCES

Centers for Disease Control and Prevention (2007). Active Bacterial Core Surveillance Report, Emerging Infections Program Network, *Neisseria meningitidis*, 2007-*Provisional*. Retrieved December 15, 2008, from the CDC Web site: http://www.cdc.gov/ncidod/dbmd/abcs/survreports/MEN_2007_provisional.pdf

Centers for Disease Control and Prevention (2005). Prevention and control of meningococcal disease. Recommendations of the Advisory Committee on Immunization Practices. *Morbidity and Mortality Weekly Report*, 54(RR07), 1-21. Retrieved October 29, 2008, from the CDC Web site: http://www.cdc.gov/mmwr/PDF/rr/rr5407.pdf

Centers for Disease Control and Prevention (2007). Recommended immunization schedules for persons aged 0-18 years—United States, 2007. *Morbidity and Mortality Weekly Report*, 55(51), Q1-4. Retrieved October 29, 2008, from the CDC Web site: http://www.cdc.gov/mmwr/PDF/wk/mm5551-Immunization.pdf

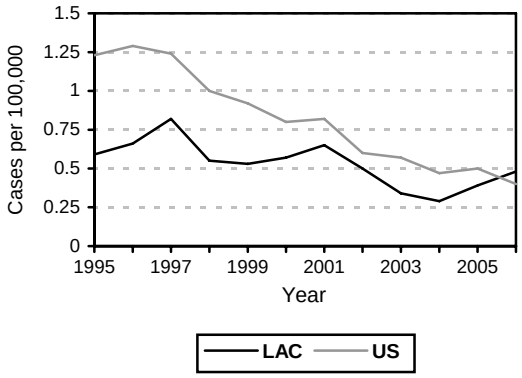
Raghunathan, P.L., Bernhardt, S.A., & Rosenstein, N.E. (2004). Opportunities for control of meningococcal disease in the United States. *Annual Review of Medicine*, 55, 333-353.

MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	46
Annual Incidence[a]	
LA County	0.48
California	0.51[c]
United States[b]	0.40[c]
Age at Diagnosis	
Mean	32
Median	18.5
Range	<0–82 years

[a] Cases per 100,000 population.
[b] Based on 2005 population estimates and the Active Bacterial Core Surveillance Report.
[c] Calculated from 2007 Summary of notifiable diseases issue of MMWR (56:853-863).

Figure 1
Meningococcal Disease
Incidence Rates by Year of Onset
LAC and US, 1995–2006

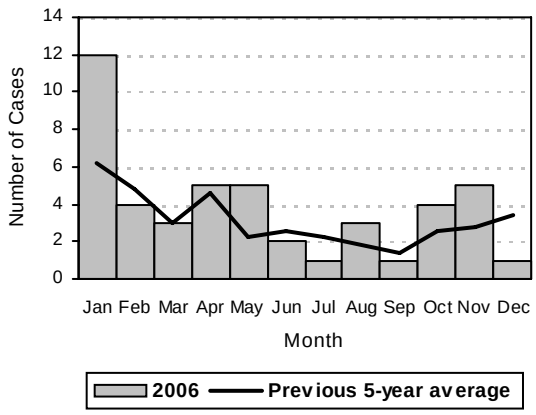


DESCRIPTION

Meningococcal disease occurs most often as meningitis, an infection of the cerebrospinal fluid (CSF) or meningococcemia, an infection of the bloodstream. It is transmitted through direct or droplet contact with nose or throat secretions of persons colonized in the upper respiratory tract with the *Neisseria meningitidis* bacterium. Common symptoms include sudden onset of fever, headache, nausea, vomiting, stiff neck, petichial rash and lethargy which can progress to overwhelming sepsis, shock and death within hours. Long-term sequelae include significant neurologic or orthopedic complications such as deafness or amputation secondary to disseminated intravascular coagulation and thromboses. Meningococcal disease affects all age groups but occurs most often in infants. Of the 12 serogroups, only A, C, Y, and W-135 are vaccine-preventable.

For the purpose of surveillance, the LAC DPH defines reports of invasive meningococcal disease as confirmed when *N. meningitidis* has been isolated from a normally sterile site (e.g., blood or CSF). In the absence of a positive culture, reports are defined as probable in the setting of clinical symptoms consistent with invasive meningococcal disease and when there is evidence of the bacteria in a normally sterile site by gram staining, polymerase chain reaction (PCR) analysis, or CSF antigen test.

Figure 2
Meningococcal Disease
by Month of Onset
LAC, 2006 (N=46)



DISEASE ABSTRACT

- Confirmed invasive meningococcal disease cases increased by 24% in 2006 compared to 2005 with 46 and 37 cases reported, respectively.
- Fewer deaths were documented in 2006: one death compared to two in 2005.
- There were 38 (83%) culture-confirmed cases:

11 (29%) from CSF, 22 (58%) from blood, and 5 (13%) from both blood and CSF (Figure 5). Thirty-four (74%) cases were serogrouped: 14 were identified as serogroup B (41%), 13 serogroup C, 5 serogroup Y, and 2 untypeable.

- A cluster of two cases reported in a high school prompted mass distribution of antimicrobial prophylaxis to students and staff .

STRATIFIED DATA

Trends: The incidence of invasive meningococcal disease increased by 23% to 0.48 per 100,000 population in 2006 (N=46) from 0.39 per 100,000 in 2005 (N=37) (Figure 1). Eighty-three percent (n=38) of cases were culture-confirmed in 2006 compared to 93% in 2005. The incidence rate has been slowly increasing in LAC since 2003 and is above the national rate of 0.35 per 100,000 estimated for 2005. Despite the increase, fewer deaths were documented in 2006: one death (2%) compared to two in 2005 (5%).

Seasonality: Most cases were reported during winter and early spring (Figure 2).

Age: The incidence rates among infants <1 year increased in 2006 (2.8 versus 2.1 per 100,000) compared to 2005. The rates among 15-34 years were similar to last year (0.3 versus 0.4 per 100,000). The rate among adults 55-64 increased slightly in 2006 (0.8 versus 0.6 per 100,000).

Sex: The male-to-female rate ratio was 1.1:1.

Race/Ethnicity: Invasive meningococcal cases were reported most frequently in Latinos (n=28, 61%) followed by whites (n=13, 28%), blacks (n=3, 6%), and Asians (n=2, 4%). The incidence rates by race/ethnicity are noted in Figure 4.

Location: Cases were reported from all eight Service Planning Areas (SPA). The number of cases was highest in SPA 6 (n=14) and SPA 2 (n=11), followed by SPA 7 (n=6); and finally SPAs 4, 5, 8 with 4 cases each.

Figure 3
Meningococcal Disease
Incidence Rates by Age Group
LAC, 2006

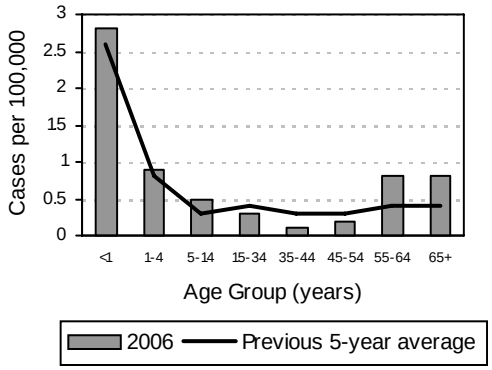
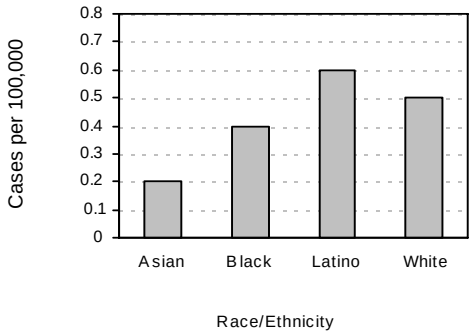


Figure 4
Meningococcal Disease
Incidence Rates by Race/Ethnicity
LAC, 2006



PREVENTION

Antimicrobial chemoprophylaxis of close contacts of sporadic cases of meningococcal disease remains the primary means for prevention of meningococcal disease. Close contacts include a) household members, b) day care center contacts, and c) anyone directly exposed to the patient's oral secretions (e.g., through kissing, mouth-to-mouth resuscitation, endotracheal intubation, or endotracheal tube management). 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 greater than 14 days after onset of illness in the index case-patient is probably of limited or no value. Prophylactic treatment and follow-up of close contacts are routinely handled by the respective health district in LAC.

In 2004, a new quadrivalent meningococcal conjugate (MCV4), Menactra®, was approved for use in the United States. This vaccine protects against serogroups A, C, Y, and W-135, the same serogroups as MPSV4, but provides longer lasting immunity. MCV4 is recommended for use in persons aged 11 to 55 years, although the use of MPSV4 is acceptable when MCV4 is not available. Generally, only a single dose of either vaccine is recommended. As of 2006, MCV4 is part of the childhood vaccination schedule and recommended for all children between ages 11-12 years. Additionally, unvaccinated college freshman who live in dormitories are at higher risk for meningococcal disease and should be vaccinated with MCV4.

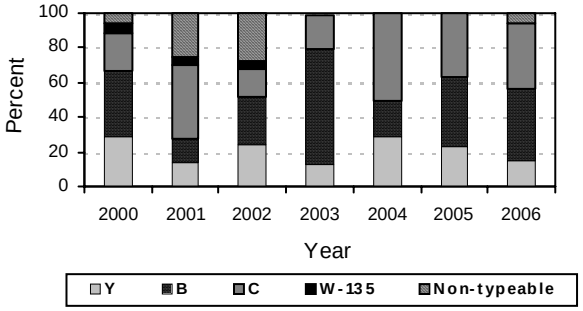
Although no noticeable changes were found with respect to the serogroup distribution of invasive meningococcal isolates from 2005 to 2006 and the introduction of MCV4 in 2004, enhanced surveillance for invasive *N. meningitidis* infections remains important (Figure 5). LAC DPH and the California Department of Health Services (CDHS) have continued to participate in enhanced meningococcal disease surveillance with the goals of (1) monitoring the epidemiology changes of meningococcal disease; (2) assisting with identification and management of cases and outbreaks; (3) assessing vaccine effectiveness; (4) ascertaining the usefulness of PCR in culture negative cases, particularly in patients treated with antibiotics prior to culture; and (5) helping contribute to improvements in the overall diagnosis and management of invasive meningococcal disease.

An analysis of two years of statewide meningococcal surveillance data is expected to be published in the coming year.

COMMENTS

As a part of public health meningococcal disease surveillance, for every culture-confirmed case reported to DPH, clinical laboratories are requested to send isolates to the LAC Public Health Laboratory (PHL) for serotyping**.** In 2006, the LAC PHL received 34 case isolates (89% of all culture-confirmed cases) for serogroup identification. Of these, 14 (41%) were serogroup B; 13 (38%) serogroup C; and 5 (15%) serogroup Y, and 2 (6%) were not typeable (Figure 5). As in 2004 and 2005, no serogroup W-135 isolates were identified. Whereas, in 2005 of the 25 isolates that were serogrouped, 10 (40%) were serogroup B, 10 (40%) serogroup C, and 5 (20%) serogroup Y. Therefore, the distribution of serogroups did not change substantially between 2005 and 2006 (Figure 5). The mean and median ages of the vaccine preventable cases were 44.2 and 55 years, respectively, and ranged from 0–82 years. Non-vaccine preventable serogroup B cases had a mean age of 25.7, a median age of 17.5 and range of 0–56. With greater widespread use of the MCV4 vaccine, the incidence of serogroups C, Y, and W-135 is expected to decline. However, due to the lack of universal vaccine protection against invasive meningococcal disease, clinicians must still maintain diagnostic clinical acumen.

Figure 5
Meningococcal Disease
by Serogroup
LAC, 2000–2006



Two students from the same high school in SPA 2 were reported with serogroup B meningococcal disease: one was a confirmed meningococcemia diagnosed by culture and the other a probable meningitis diagnosed by PCR. The cluster prompted to set up a point of distribution (POD) clinic at the high school where the cases attended. Antimicrobial prophylaxis was provided over a period of two days by LAC DPH to 2861 students and staff. Full details of this investigation are detailed in an accompanying 2006 Special Studies Report.

ADDITIONAL RESOURCES

CDC. Recommended immunization schedules for persons aged 0-18 years—United States, 2007. MMWR 2007; 55(51):Q1-4. Available at: www.cdc.gov/mmwr/PDF/wk/mm5551-Immunization.pdf

CDC. Active Bacterial Core Surveillance Report, Emerging Infections Program Network, *Neisseria meningitidis*, 2005. Available at: www.cdc.gov/ncidod/dbmd/abcs/survreports/mening05.pdf.

CDC. Prevention and control of meningococcal disease. Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2005; 54(RR07):1-21. Available at: www.cdc.gov/mmwr/PDF/rr/rr5407.pdf

Meningococcal Disease Prevention Plan, Division of Communicable Disease, California Department of Health Services. Available at: www.dhs.ca.gov/ps/dcdc/disb/pdf/Meningococcal%20Plan%20Final%202003.pdf

CDC. Control and prevention of meningococcal disease. Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2000; 49(RR07):1–10. Available at: www.cdc.gov/mmwr/preview/mmwrhtml/rr4907a1.htm

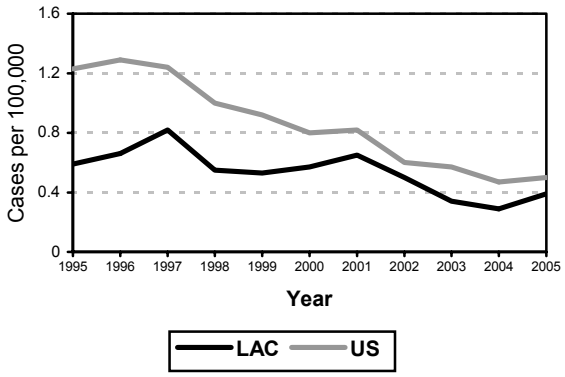
CDC. Prevention and control of meningococcal disease and meningococcal disease and college students. Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2000; 49(RR07):1–10. Available at: www.cdc.gov/mmwr/PDF/rr/rr4907.pdf

Raghunathan PL, Bernhardt SA, Rosenstein NE. Opportunities for control of meningococcal disease in the United States. Annu Rev Med 2004; 55:333-353.

MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	37
Annual Incidence[a]	
LA County	0.39
California	N/A
United States[b]	0.35
Age at Diagnosis	
Mean	25
Median	15
Range	<0–79 years
Case Fatality	
LA County	5%
United States[b]	7%

Figure 1
Meningococcal Disease
Incidence Rates by Year of Onset
LAC and US, 1995–2005



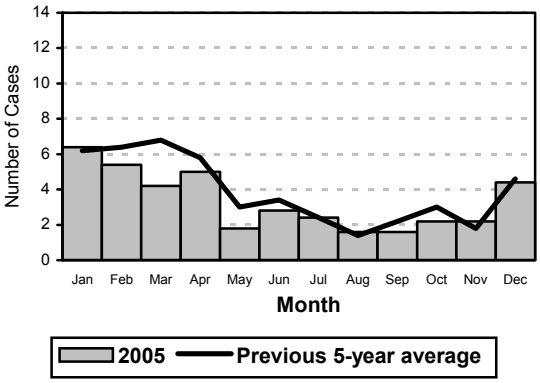
[a] Cases per 100,000 population.

[b] Based on 2005 population estimates and the Active Bacterial Core Surveillance Report [1].

DESCRIPTION

Meningococcal disease occurs most often as meningitis or bloodstream infection (meningococcemia) and is transmitted through direct or droplet contact with nose or throat secretions of persons infected with the *Neisseria meningitidis* bacterium. Common symptoms include sudden onset of fever, headache, nausea, vomiting, stiff neck and lethargy, which can progress to overwhelming sepsis, shock and death within hours. Long-term sequelae include significant neurologic or orthopedic complications such as deafness or amputation secondary to disseminated intravascular coagulation and thromboses. Meningococcal disease affects all age groups but occurs most often in infants. Of the 12 serogroups, only A, C, Y, and W-135 are vaccine-preventable.

Figure 2
Meningococcal Disease
by Month of Onset
LAC, 2005 (N=37)



DISEASE ABSTRACT

- Reported invasive meningococcal disease cases increased by 32% in 2005 compared to 2004 with 37 and 28 cases reported, respectively.
- No outbreaks were documented in 2005.
- In 2005, *N. meningitidis* was culture-confirmed in 34 (92%) cases: 18 (49%) from cerebrospinal fluid (CSF), 15 (41%) from blood, and 1 (2%) from both blood and CSF (Figure 5). Invasive meningococcal disease was diagnosed most frequently in the serogroups B, C, and Y.

STRATIFIED DATA

Trends: A greater proportion of cases were culture-confirmed in 2005 compared to 2004. Most (n=25, 74%) culture-positive isolates were submitted for serogrouping. Serogroup Y isolates decreased from 2004 to 2005 and were outnumbered by serogroups B or C by 1:2 (Figure 5).

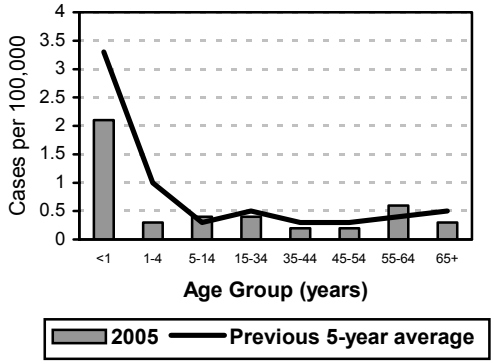
Seasonality: Most cases were reported during winter and early spring (Figure 2).

Age: The incidence rates among infants <1 year increased in 2005 (2.1 vs. 1.4 per 100,000) compared to 2004. The rate among 5-14 and 15-34 were similar to last year (0.4 vs. 0.3 per 100,000). The rate among adults 55-64 increased in 2005 (0.6 vs. 0.4 per 100,000) (Incidence data from 2004 not shown).

Sex: The male-to-female rate ratio was 1:1.

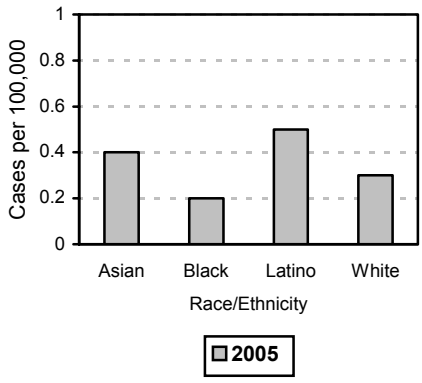
Race/Ethnicity: Invasive meningococcal cases were reported most frequently in Hispanics (n=21, 57%) followed by Whites (n=9, 24%), Asians (n=5, 14%) and 2 (5%) cases in Blacks. The number of cases in each of these groups is too low for reliable incidence rate calculation (Figure 4).

Figure 3
Meningococcal Disease
Incidence Rates by Age Group
LAC, 2005



Location: The number of cases was highest were in SPA 3 (n=7) and SPA 2 (n=6), followed by SPA 4 (n=4) and SPA 7 (n=4), respectively.

Figure 4
Meningococcal Disease
Incidence Rates by Race/Ethnicity
LAC, 2005



PREVENTION

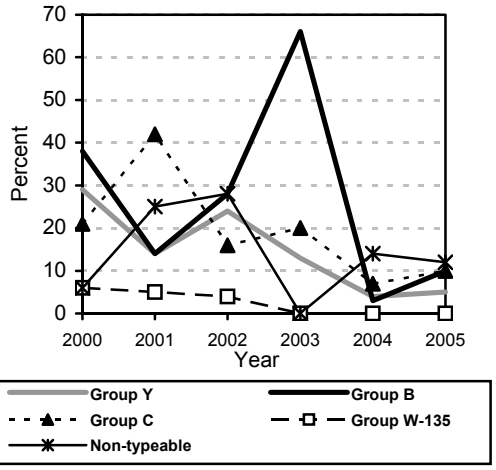
Antimicrobial chemoprophylaxis of close contacts of sporadic cases of meningococcal disease remains the primary means for prevention of meningococcal disease. Close contacts include a) household members, b) day care center contacts, and c) anyone directly exposed to the patient's oral secretions (e.g., through kissing, mouth-to-mouthresuscitation, endotracheal intubation, or endotracheal tube management). 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 greater than 14 days after onset of illness in the index case-patient is probably of limited or no value. Prophylactic treatment and follow-up of close contacts are routinely handled by the respective health district in LAC.

The polysaccharide-based meningococcal vaccine (MPSV4), Menomune®, protects against sergroups A, C, Y, and W-135 and can be given to persons aged two years and older. The vaccine is recommended for the following: persons with terminal complement deficiencies, anatomic or functional asplenia, research and clinical laboratory personnel who are routinely exposed to *N. meningitidis* in solutions that may be aerosolized, and travelers or US citizens residing in countries where *N. meningitidis* is hyperendemic or epidemic. The vaccine is also used to control serogroup C meningococcal outbreaks.

In 2004, a new quadrivalent meningococcal conjugate (MCV4), Menactra®, was approved for use in the United States. College freshman who live in dormitories are at higher risk for meningococcal disease and should be vaccinated with MCV4. This vaccine protects against the same serogroups as MPSV4 but provides longer lasting immunity. MCV4 is recommended for use in persons aged 11 to 55 years, although the use of MPSV4 is acceptable when MCV4 is not available. Generally, only a single dose of either vaccine is recommended.

Even though no noticeable changes in the distribution of invasive meningococcal cases since the introduction of MCV4 in 2004, enhanced surveillance for invasive *N. meningitidis* infections remains important. LAC DHS and the California Department of the Health (CDHS) have continued to participate in enhanced meningoccal disease surveillance with the goals of: (1) monitoring the epidemiology changes of meningococcal disease (2) assisting with identification and management of cases and outbreaks and (3) assessing vaccine effectiveness, (4) ascertaining the usefulness of polymerase chain reaction (PCR) in culture negative cases, particularly in patients treated with antibiotics prior to culture and (5) helping contribute to improvements in the overall diagnosis and management of invasive meningococcal disease.

Figure 5
Meningococcal Disease
by Serogroup
LAC, 2000–2005



COMMENTS

For every culture-confirmed case, clinical laboratories are requested to send isolates to the LAC Public Health Laboratory (PHL) for serotyping. In 2005, the LAC PHL received 25 case isolates (74% of all culture-confirmed cases) for serogroup identification. Of these, 10 (40%) were serogroup B; 10 (40%) serogroup C; and 5 (20%) serogroup Y (Figure 5). As in 2004, no serogroup W-135 isolates were identified. In twelve (32%) cases, serogroup information could not be determined. The race, gender, and age of non-serogrouped cases were comparable to those with identified serogroups. The mean and median ages of the vaccine preventable cases were 28 and 23 years, respectively, and ranged from 0–73, compared to non-vaccine preventable serogroup B cases with a mean age of 25.9, a median age of 18.5 and range of 0–66. With greater widespread use of the MCV4 vaccine, the incidence of serogroups C, Y, and W-135 is expected to decline. However, due to the lack of universal vaccine protection against invasive meningococcal disease, clinicians must still maintain diagnostic clinical acumen.

ADDITIONAL RESOURCES

1. CDC. Active Bacterial Core Surveillance Report, Emerging Infections Program Network, *Neisseria meningitidis*, 2005-provisional. Available at: www.cdc.gov/ncidod/dbmd/abcs/survreports/mening05.pdf
2. CDC. Prevention and Control of Meningococcal Disease Recommendations of the Advisory Committee on Immunization Practices (ACIP) MMWR 2005;54: No.RR-7.
3. Meningococcal Disease Prevention Plan, Division of Communicable Disease, California Department of Health Services. Available at: www.dhs.ca.gov/ps/dcdc/disb/pdf/Meningococcal%20Plan%20Final%202003.pdf
4. CDC. Control and Prevention of Meningococcal Disease: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2000; 46(RR–07):1–10. Available at: www.cdc.gov/mmwr/preview/mmwrhtml/rr4907a1.htm

5. CDC. Prevention and control of meningococcal disease among college students: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2000; 49 (RR–7):1–20. Available at: www.cdc.gov/mmwr/PDF/rr/rr4907.pdf
6. Raghunathan PL, Bernhardt SA, Rosenstein NE. Opportunities for control of meningococcal disease in the United States. Annu Rev Med. 2004; 55:333-53.

MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	28
Annual Incidence[a]	
LA County	0.29
California	0.57
United States	0.47
Age at Diagnosis	
Mean	31
Median	29
Range	<0–79 years
Case Fatality	
LA County	11%
United States	N/A

[a] Cases per 100,000 population

Figure 1
Meningococcal Disease
Incidence Rates by Year of Onset
LAC and US, 1994–2004

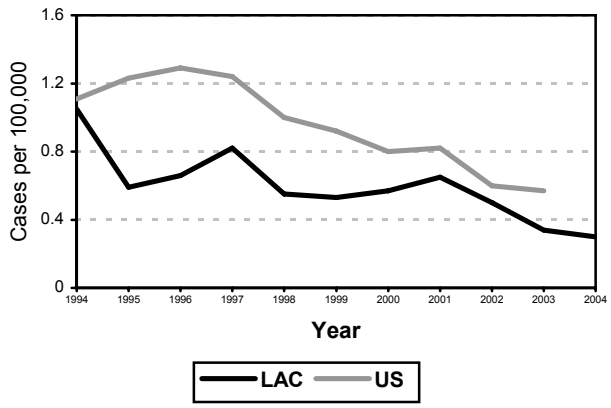
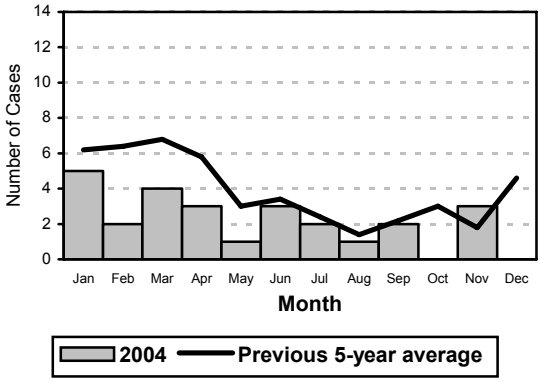


Figure 2
Meningococcal Disease
by Month of Onset
LAC, 2004 (N=28)



DESCRIPTION

Meningococcal disease occurs most often as meningitis or bloodstream infection (meningococcemia) and is transmitted through direct or droplet contact with nose or throat secretions of persons infected with the *Neisseria meningitidis* bacterium. Common symptoms include sudden onset of fever, headache, nausea, vomiting, stiff neck and lethargy which can progress to overwhelming sepsis, shock and death within hours. Long-term sequelae include significant neurologic or orthopedic complications such as deafness or amputation secondary to disseminated intravascular coagulation and thromboses. Meningococcal disease affects all age groups but occurs most often in infants. Of the 12 serogroups, only A, C, Y, and W-135 are vaccine-preventable.

DISEASE ABSTRACT

Reported invasive meningococcal disease cases continued to decline from 2004 to 2003 with 28 and 32 cases reported respectively; there were fewer deaths than in the previous year, 3 and 5 deaths in respective years. Invasive meningococcal disease was diagnosed most frequently in the serogroups B, C, and Y. In 2004, *N. meningitidis* was confirmed by culture in 18 (64%) of 28 cases: 11 (61%) from blood, 3 (17%) from cerebrospinal fluid (CSF), 4 (22%) from both blood and CSF (Figure 5).

STRATIFIED DATA

Trends: Cases were sporadic and continued to decline (Figure 1). Serogroup B isolates decreased from 2003 to 2004 among those submitted for serogroup identification (n=15) and were outnumbered by

serogroups C or Y almost 1:4 (Figure 6).

Seasonality: Cases were characteristically highest during winter and early spring (Figure 2).

Age: The rate among children age 1 - 4 decreased from 2003 (0.4 vs. 1.5 per 100,000). The rate of cases in infants aged <1 year were similar to last year (1.5 vs. 1.5 per 100,000). The rate among adolescents age 15-19 also stayed the same for both years (2.5 vs. 2.5 per 100,000)

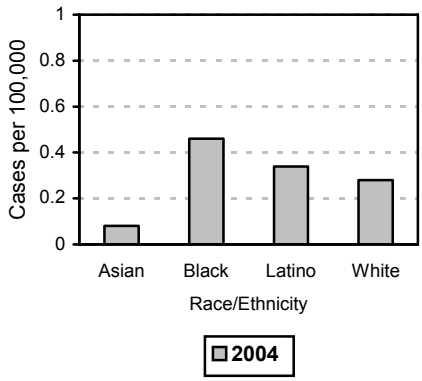
Sex: The male-to-female rate ratio was 1.2:1**.**

Race/Ethnicity: The most invasive meningococcal cases were reported in Hispanics (N= 15 (54%)) followed by Whites (N=8 (29%), Blacks (N= 4 (14%)), and only 1 (4%) in Asians. The number of cases in each of these groups is too low for the rates to be reliable.

Figure 3
Meningococcal Disease
Incidence Rates by Age Group
LAC, 2004

Location: The number of cases was highest were in SPA 3 (n=7) and SPA 2 (n=6), followed by SPA 4 (n=4) and SPA 7 (n=4) respectively.

Figure 4
Meningococcal Disease
Incidence Rates by Race/Ethnicity
LAC, 2004



PREVENTION

Antimicrobial chemoprophylaxis of close contacts of sporadic cases of meningococcal disease remains the primary means for prevention of meningococcal disease. Close contacts include a) household members, b) day care center contacts, and c) anyone directly exposed to the patient's oral secretions (e.g., through kissing, mouth-to-mouth resuscitation, endotracheal intubation, or endotracheal tube management). 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 greater than 14 days after onset of illness in the index case-patient is probably of limited or no value. Prophylactic treatment and follow-up of close contacts are routinely being handled by the respective health district in the County.

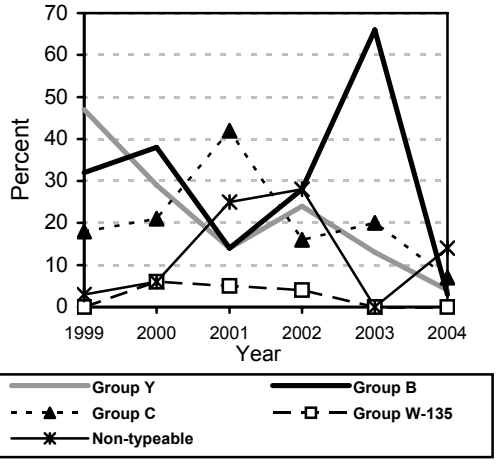
The current polysaccharide-based meningococcal vaccine (MPSV4), *Menomune*, which protects against sergroups A, C, Y, and W-135 and can only be given to persons aged 2 and older, is recommended for persons with terminal complement deficiencies, persons with anatomic or functional asplenia, research and clinical laboratory personnel who are routinely exposed to *N. meningitides* in solutions that may be aerosolized, and travelers or US citizens residing in countries where N. meningitides is hyperendemic or epidemic. The vaccine is also used to control serogroup C meningococcal outbreaks. College freshman who live in dormitories are at higher risk for meningococcal disease and should be educated about the availability and effectiveness of the new quadrivalent meningococcal conjugate, MCV4, in preventing disease that is caused by the covered serogroups.

In 2005, a new quadrivalent meningococcal conjugate (MCV4) vaccine will be introduced. This new vaccine will protect against the same serogroups as MPSV4 but will provide longer lasting immunity and

have different age indications. MCSV4 will be recommended for use in persons aged 11 to 55 years, although the use of MPSV4 is also acceptable. Generally, only a single dose of either vaccine is recommended.

Surveillance for invasive meningococcal disease will be especially critical during the periods pre- and post-introduction of the new quadrivalent conjugate vaccine. In preparation, LAC DHS and the California Department of Health Services (CDHS) are initiating enhanced surveillance for invasive *N. meningitidis* infections. Enhanced surveillance will help: (1) monitor the changing epidemiology of meningococcal disease; (2) assist with identification and management of cases and outbreaks; and (3) assess vaccine effectiveness, (4) ascertain the usefulness of polymerase chain reaction (PCR) in culture-negative cases, particularly in patients treated with antibiotics prior to culture, and (5) help contribute to improvements in the overall diagnosis and management of invasive meningococcal disease.

Figure 5
Meningococcal Disease
by Serogroup
LAC, 1999–2004



COMMENTS

For every culture-confirmed case, laboratories are requested to have the LAC public health lab perform serotyping**.** The LAC Public Health Laboratory received 15 case isolates (54% of all cases) for serogroup identification. Of these, 20% (n=3) were serogroup B; 47% (n=7) were serogroup C; 30% (n=5) were serogroup Y (Figure 5). As in 2003, no serogroup W-135 were identified. Forty-five percent (n= 13) of the isolates did not have serogroup information, but did not differ significantly by race, gender, or age from the identified group. The decline in the number of serogroup B was striking in 2004; twenty percent of the cases in which serogroup identification was completed were serogroup B**,** (compared to 65% in 2003) and thus were not vaccine preventable.

ADDITIONAL RESOURCES

Prevention and Control of Meningococcal Disease Recommendations of the Advisory Committee on Immunization Practices (ACIP) MMWR 2005;54: No.RR-7.

Meningococcal Disease Prevention Plan, Division of Communicable Disease, California Department of Health Services. Available at:
www.dhs.ca.gov/ps/dcdc/disb/pdf/Meningococcal%20Plan%20Final%202003.pdf

Control and Prevention of Meningococcal Disease: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2000; 46(RR–07):1–10. Available at:
www.cdc.gov/mmwr/preview/mmwrhtml/rr4907a1.htm

Prevention and control of meningococcal disease among college students: recommendations of the Advisory Committee on Immunization Practices (ACIP).
MMWR 2000; 49 (RR–7):1–20. Available at:
www.cdc.gov/mmwr/PDF/rr/rr4907.pdf

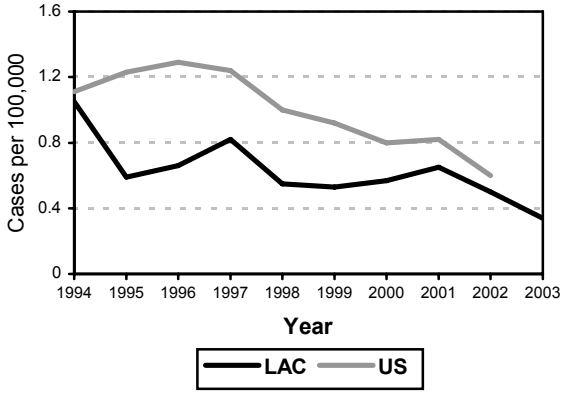
Opportunities for control of meningococcal disease in the United States. Raghunathan PL, Bernhardt SA, Rosenstein NE. Annu Rev Med. 2004; 55:333-53.

MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	32
Annual Incidence[a]	
LA County	0.34
California	0.69
United States	0.61
Age at Diagnosis	
Mean	24
Median	19
Range	<1–90 years
Case Fatality	
LA County	16%
United States	N/A

[a] Cases per 100,000 population.

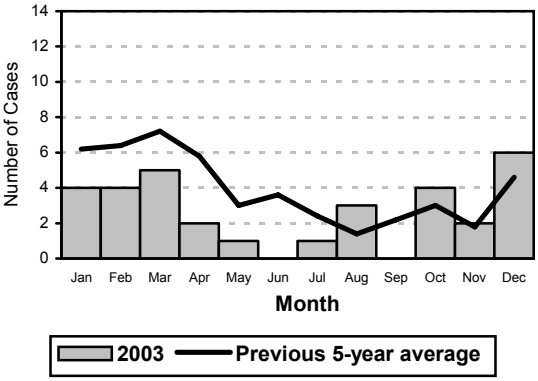
Figure 1
Meningococcal Disease
Incidence Rates by Year of Onset
LAC and US, 1994–2003



DESCRIPTION

Meningococcal disease occurs most often as meningitis or bloodstream infection (meningococcemia) and is transmitted through direct or droplet contact with nose or throat secretions of persons infected with the *Neisseria meningitidis* bacterium. Common symptoms include sudden onset of fever, headache, nausea, vomiting, stiff neck and lethargy which can progress to overwhelming sepsis, shock and death within hours. Long-term sequelae include significant neurologic or orthopedic complications such as deafness or amputation secondary to disseminated intravascular coagulation and thromboses. Meningococcal disease affects all age groups but occurs most often in infants. Of the 12 serogroups, only A, C, Y, and W-135 are vaccine-preventable.

Figure 2
Meningococcal Disease
by Month of Onset
LAC, 2003 (N=32)



DISEASE ABSTRACT

Meningococcal disease cases remained low and decreased by 30% (n=14); however, there were more deaths (n=5) than in the previous year. Groups B, C, and Y were the serogroups identified from case isolates.

STRATIFIED DATA

Trends: Cases were sporadic and continued to decline (Figure 1). Serogroup B isolates increased among those submitted for serogroup identification and outnumbered serogroups C or Y by more than 3:1 (Figure 5).

Seasonality: Cases were characteristically highest during winter and early spring (Figure 2).

Age: Although there was a decrease in the number and rate of cases in infants aged <1 year, rates were characteristically highest in both this group and children aged 1–4(1.5 per 100,000 in each). Combined, these age groups accounted for 38% (n=10) of all cases. Over half of all cases occurred in those of college age or younger (<23 years). With the exception of infants <1 year, the rate among all other age groups remained relatively stable in comparison to the five-year average (Figure 3).

Sex: The male-to-female rate ratio was 1.3:1.

Race/Ethnicity: Sixty percent of cases occurred among Hispanics compared to 31% among Whites. Only 9% of cases occurred among Asians and Blacks. Although rates were the same for Hispanics and Whites (0.4 per 100,000), and at least twice that of Asians and blacks (Figure 4), the actual number of cases in each of these groups is too low for the rates to be reliable.

Location: The number of cases was highest in SPA 2 (n=8), 3 (n=6), and 5 (n=4) respectively.

Figure 3
Meningococcal Disease
Incidence Rates by Age Group
LAC, 2003

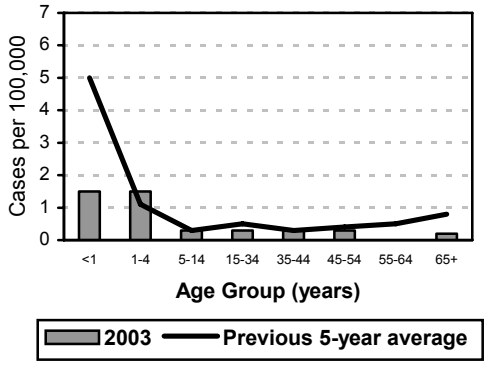
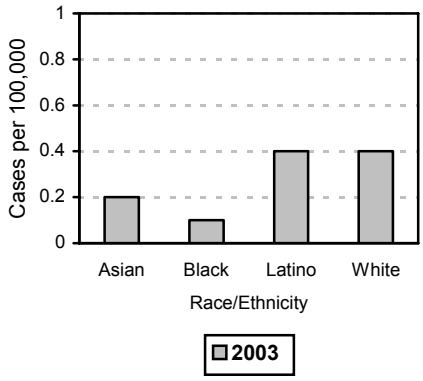


Figure 4
Meningococcal Disease
Incidence Rates by Race/Ethnicity
LAC, 2003



PREVENTION

Meningococcal vaccine (Menomune), which protects against serogroups A, C, Y, and W-135, is routinely given to military recruits and is recommended for those with terminal complement deficiencies or asplenia, travelers to endemic or epidemic areas, and certain lab personnel. Since 2000, the Advisory Committee on Immunization Practices (ACIP) has recommended that college students, especially freshmen and those living in dormitories, be informed about meningococcal disease and the benefits of the vaccine. In 2001, California passed legislation requiring development of a Meningococcal Disease Strategic Prevention Plan which recommends that the ACIP plan be followed and that efforts be increased to educate parents, teens and medical providers about risk reduction, vaccine use and availability. Other states have passed legislation requiring documentation that students entering college have received information about meningococcal disease and have either received or declined immunization.

In 2003, of the cases in which serogroup identification was made, 65% (compared to 15% in 2002) were serogroup B and thus were not vaccine preventable.

COMMENTS

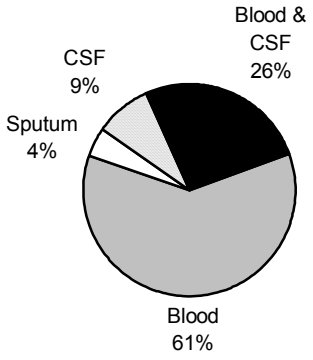
In 2003, *N. meningitidis* was confirmed by culture in 23 (72%) of 32 cases: 14 (61%) from blood, 2 (9%) from cerebrospinal fluid (CSF), 6 (26%) from both blood and CSF, and 1 (4%) from sputum (Figure 5).

The Public Health Laboratory received 17 case isolates (53% of all cases) for serogroup identification. Of these, 65% were serogroup B; 17.5% were serogroup C; 17.5% were serogroup Y (Figure 6). Unlike 2002, no serogroup W-135 or nontypeable strains were identified.

Although most cases in 2003 were sporadic and unassociated, two cases of bacterial meningitis with rapid onset, deterioration, and the death of one, occurred within a day of each other in adolescents who had attended the same social gathering two days earlier. No organism was recovered however the cases were managed as suspected co-infected primary cases of meningococcal disease.

Two cases occurred in community college students. However there were none in students attending four-year institutions.

Figure 5
Meningococcal Disease
by Culture Site
LAC, 2003



ADDITIONAL RESOURCES

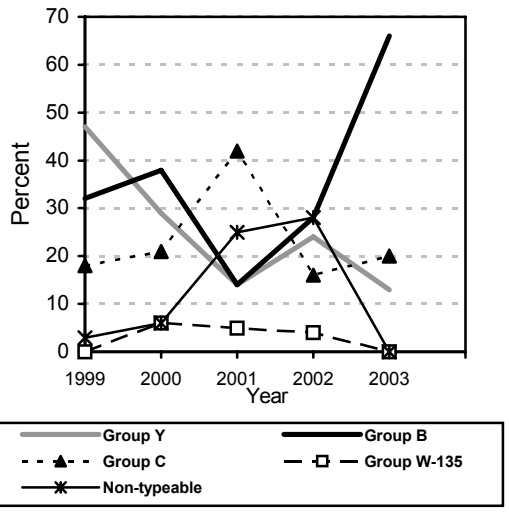
Meningococcal Disease Prevention Plan, Division of Communicable Disease, California Department of Health Services. Available at: www.dhs.ca.gov/ps/dcdc/disb/pdf/Meningococcal%20Plan%20Final%202003.pdf

Control and Prevention of Meningococcal Disease: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2000; 46(RR–07):1–10. Available at: www.cdc.gov/mmwr/preview/mmwrhtml/rr4907a1.htm

Prevention and control of meningococcal disease among college students: recommendations of the Advisory Committee on Immunization Practices (ACIP).
MMWR 2000; 49 (RR–7):1–20. Available at: www.cdc.gov/mmwr/PDF/rr/rr4907.pdf

Opportunities for control of meningococcal disease in the United States. Raghunathan PL, Bernhardt SA, Rosenstein NE. Annu Rev Med. 2004; 55:333-53.

Figure 6
Meningococcal Disease
by Serogroup
LAC, 1999–2003

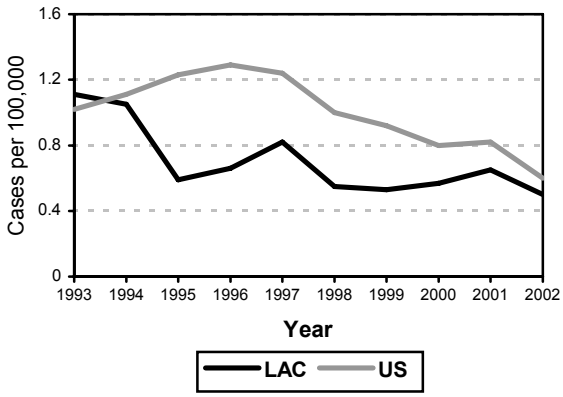


MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	46
Annual Incidence[a]	
LA County	0.5
California	0.7
United States	0.6
Age at Diagnosis	
Mean	28
Median	21
Range	<1–83 years
Case Fatality	
LA County	7.0%
United States	N/A

[a] Cases per 100,000 population.

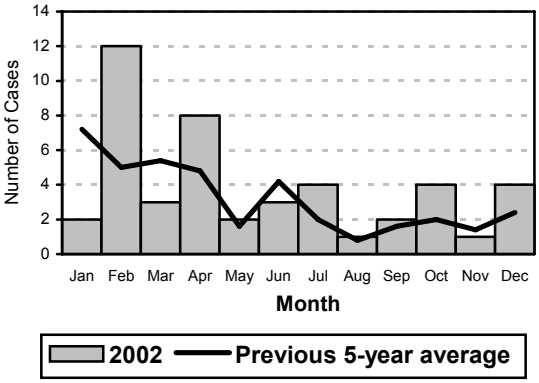
Figure 1
Meningococcal Disease
Incidence Rates by Year of Onset
LAC and US, 1993–2002



DESCRIPTION

Meningococcal disease occurs most often as meningitis or bloodstream infection (meningococcemia) and is transmitted through direct or droplet contact with nose or throat secretions of persons infected with the *Neisseria meningitidis* bacterium. Common symptoms include sudden onset of fever, headache, nausea, vomiting, stiff neck and lethargy which can progress to overwhelming sepsis, shock and death within hours. Long-term sequelae include significant neurologic or orthopedic complications such as deafness or amputation secondary to disseminated intravascular coagulation and thromboses. Meningococcal disease affects all age groups but occurs most often in infants. Of the 12 serogroups, only some (A, C, Y, and W-135) are vaccine-preventable.

Figure 2
Meningococcal Disease
by Month of Onset
LAC, 2002 (N=46)



DISEASE ABSTRACT

The number of cases in 2002 was the lowest in at least 10 years. With one exception, cases were sporadic. There were very few fatalities.

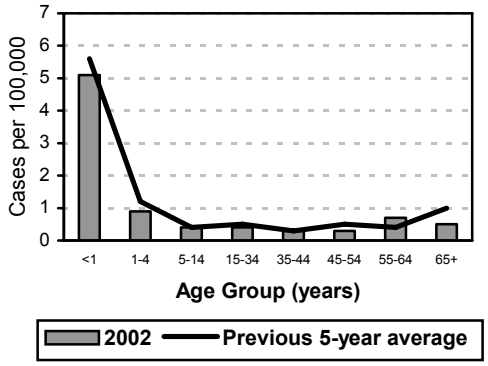
STRATIFIED DATA

Trends: Cases remained low, with serogroup B and non-typeable strains equally predominant among isolates submitted.

Seasonality: Cases were characteristically highest during winter and early spring, with over half occurring in the first four months of the year (Figure 2).

Age: Rates of meningococcal disease are characteristically highest among infants and children aged 1–4 years**.** In 2002, rates in these age groups were again highest (5.1 per 100,000 and 0.9 per 100,000, respectively). Combined, these age groups accounted for 26% of all cases. There was a decrease of over 50% in cases among those aged 15–19 years; however, over 50% of all cases occurred in those of college age or younger (<23 years). The rate among all age groups remained stable in comparison to the five-year average and was relatively low in all groups >1 year of age. (Figure 3).

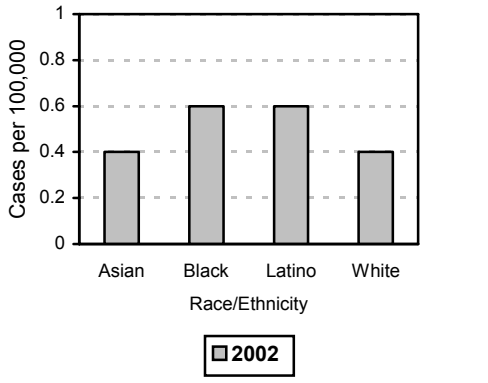
Figure 3
Meningococcal Disease
Incidence Rates by Age Group
LAC, 2002



Sex: The male-to-female rate ratio was 1:1.5.

Race/Ethnicity: There was minimal difference in incidence by race/ethnicity. A shown in Figure 4, the incidence rate among Blacks and Latinos (0.6 per 100,000 for each group) was slightly greater than among Asians and Whites (0.4 per 100,000 for each group). However, the actual number of incident cases in each of these groups is too low for the rates to be reliable; Asian 5 cases, Black 5 cases, Latino 24 cases, White 12 cases.

Figure 4
Meningococcal Disease
Incidence Rates by Race/Ethnicity
LAC, 2002



Location: Rates were highest in SPA 4 (0.7 per 100,000), 3 (0.6 per 100,000), and 2 (0.4 per 100,000). Cases were highest in SPA 3 (n=10), 2 and 4 (n=8, for both locations).

PREVENTION

In 2002, there were three deaths among the 46 cases of meningococcal disease. At least 11 (24%) cases, including one death, were caused by a serogroup covered by the currently licensed polysaccharide vaccine for meningococcal disease (Menomune) and were potentially preventable (Figure 5). Serogroup B accounted for 15% of cases and is not vaccine preventable. Development of an effective vaccine has proved challenging; however, research is ongoing.

Meningococcal vaccine is routinely given to military recruits, and is recommended for those with terminal complement deficiencies or asplenia, travelers to endemic or epidemic areas, and certain lab personnel. The Advisory Committee on Immunization Practices (ACIP) recommends that college students, especially freshmen and those living in dormitories, be informed about meningococcal disease and the benefits of the vaccine. Several states have recently passed legislation requiring documentation that students

entering college have received information about meningococcal disease and have either received or declined immunization.

COMMENTS

In 2002, *N. meningitidis* was confirmed by culture in 37 (80%) of 46 cases: 24 (65%) from blood, 9 (24%) from cerebrospinal fluid (CSF), 3 (8%) from both blood and CSF, and 1 (3%) from synovial fluid (Figure 6). The Public Health Laboratory received 25 case isolates (54% of all cases) and performed serogroup identification. Of these, 28% (n=7) were serogroup B; 16% (n=4) were serogroup C; 24% (n=6) were serogroup Y; 3% (n=1) were serogroup W-135, and 28% (n=7) was non-typeable (Figure 5).

Figure 5
Meningococcal Disease
by Serogroup
LAC, 1998–2002

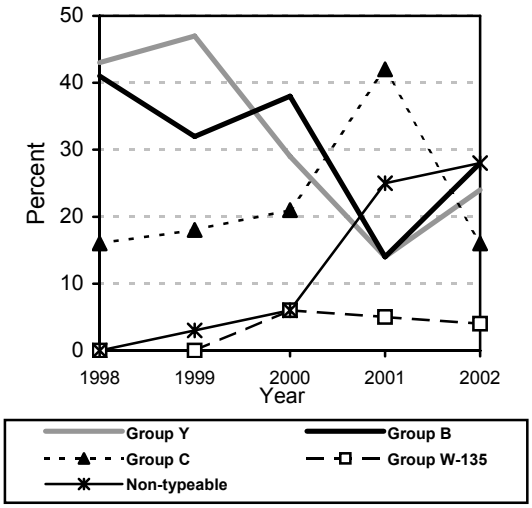
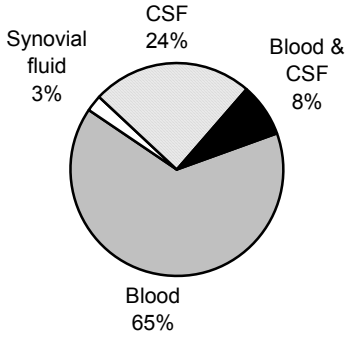


Figure 6
Meningococcal Disease
by Culture Site
LAC, 2002



Although most cases in 2002 were sporadic and unassociated, there was a cluster of two cases in cousins, aged 13 months and 5 years, who were both hospitalized with serogroup B disease within hours of each other. Because they were household contacts to each other and their onset of symptoms could not be determined with certainty, they were considered to be co-infected primary cases, rather than a primary case with secondary transmission.

Fortunately, fewer cases than the previous year were seen in college students or those of college age. However two cases, one fatal, among college students on the same campus, were investigated. The surviving case had a history of immunization. Although gram-negative diplococci were identified in the case fatality, recovery of the organism needed for confirmation was not possible in either case and serogroup identification was not possible.

ADDITIONAL RESOURCES

Prevention and control of meningococcal disease among college students: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2000; 49 (RR–7):1–20. Available at: www.cdc.gov/mmwr/PDF/rr/rr4907.pdf

Control and Prevention of Meningococcal Disease: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 1997; 46(RR–5):1–51. Available at: www.cdc.gov/epo/mmwr/preview/mmwrhtml/00046263.htm

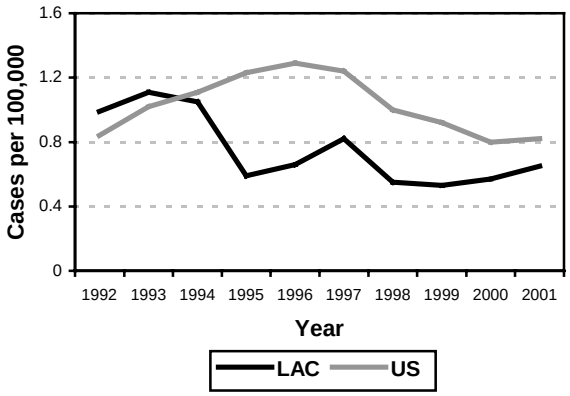
Riedo FX, Plikaytis BD, Broome CV. Epidemiology and prevention of meningococcal disease. Pediatr Infect Dis J 1995; 14:643–57.

Rosenstein NE, Perkins BA, Stephens DS, Popovic T, Hughes JM. Meningococcal disease. N Engl J Med 2001; 344:1378–88.

MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	58
Annual Incidence[a]	
LA County	0.7
California	0.9
United States	0.8
Age at Diagnosis	
Mean	30
Median	22
Range	<1-84 years
Case Fatality	
LA County	16.0%
United States	N/A

Figure 1
Meningococcal Disease
Incidence Rates by Year of Onset
LAC and US, 1992-2001



[a] Cases per 100,000 population.

DESCRIPTION

Meningococcal disease, occurring most often as meningococcal meningitis or meningococcemia, is transmitted through direct or droplet contact with nose or throat secretions of a person infected with the *Neisseria meningitidis* bacterium. It affects all age groups but occurs most often in infants. Common symptoms include sudden onset of fever, headache, nausea and vomiting, stiff neck and lethargy, which can progress to overwhelming sepsis, shock and death within hours. In LAC, a confirmed case is one with clinically compatible signs and symptoms and recovery of the organism from a normally sterile site, usually the blood or cerebrospinal fluid. A presumptive case is one with clinically compatible signs and symptoms, and a positive bacterial antigen test on CSF, or identification of gram-negative diplococci from a normally sterile site. *N. meningitidis* serogroups B, C and Y are the serogroups commonly seen in LAC and the US. Serogroups A, C, Y and W-135 are vaccine-preventable; a vaccine for serogroup B.

DISEASE ABSTRACT

- Meningococcal disease cases increased but overall incidence remained low.
- A cluster of cases occurred among nightclub patrons.
- Serogroup C predominated.

STRATIFIED DATA

Trends: The number of cases increased but remained relatively low in comparison to previous years (Figure 1). Serogroup C replaced B as the predominant serogroup identified. Cases among older teenagers increased (see “Age” below).

Seasonality: Cases were characteristically highest during winter and early spring, with over 50% occurring in the first quarter of the year (Figure 2).

Age: Rates of meningococcal disease are characteristically highest among infants and children aged 1-4 years. In 2001, rates in these age groups were 5.2/100,000 and 1.2/100,000, respectively. Combined, these two age groups accounted for 19% of all cases. The rate among all age groups remained about the same (Figure 3). The rate in persons aged 15-19 years, a subset of the 15-34 year old group (0.6/100,000), was 1.5/100,000. Cases in this age group accounted for 17% of all cases. There has been an increasing incidence in this age group in recent years, associated with outbreaks among high school as well as freshman college students - especially those living in dormitories (see Comments below). This trend has been seen around the country in recent years.

Sex: The male-to-female rate ratio was 1.6:1.

Race/Ethnicity: In 2001, the highest rate (1.01/100,000), and number of cases (n=28), occurred among Whites. Among Latinos the rate increased slightly (0.54/100,000) (n=22), but in Blacks it decreased by 50% (0.73/100,000) (n=6). Among Asians, who historically have the lowest rates, the rate (0.18/100,000) was unchanged from 2000 (n=2) (Figure 4).

Location: The highest number of cases occurred in SPAs 2 (n=13), 3 (n=13) and 4 (n=10). Rates were highest in SPAs 4 and 8 (0.9/100,000 respectively), and SPA 3 (0.8/100,000).

Figure 2
Meningococcal Disease
by Month of Onset
LAC, 2001 (N=58)

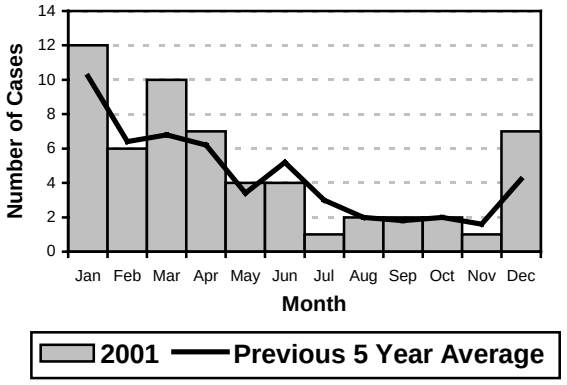


Figure 3
Meningococcal Disease
Incidence Rates by Age Group
LAC, 2001

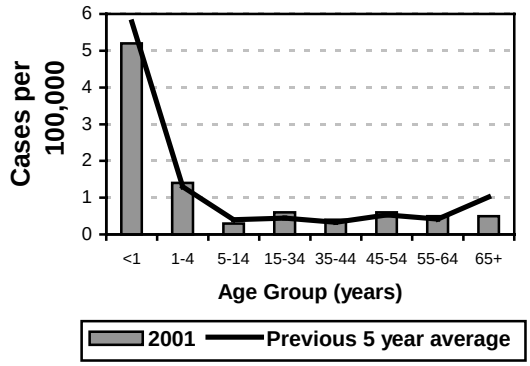
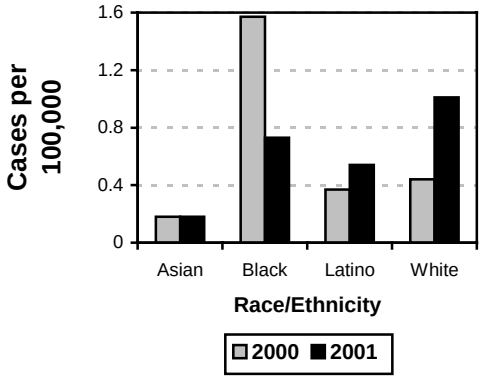


Figure 4
Meningococcal Disease
Incidence Rates by Race/Ethnicity
LAC, 2000 - 2001

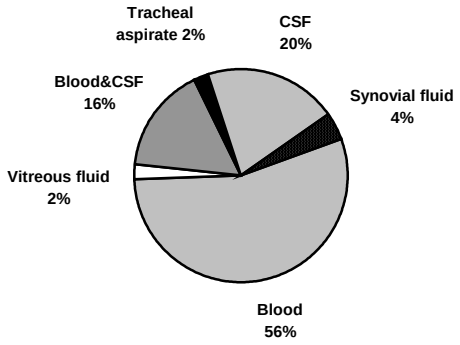


COMMENTS

In 2001, *N. meningitidis* was confirmed by culture in 49 of 58 cases: 27 (56%) from blood, 10 (20%) from cerebrospinal fluid (CSF), 8 (16%) from both blood and CSF, 2 (4%) from synovial fluid, and 1 each (2%) from vitreous fluid and tracheal aspirate (Figure 5). Although tracheal aspirate is not usually considered

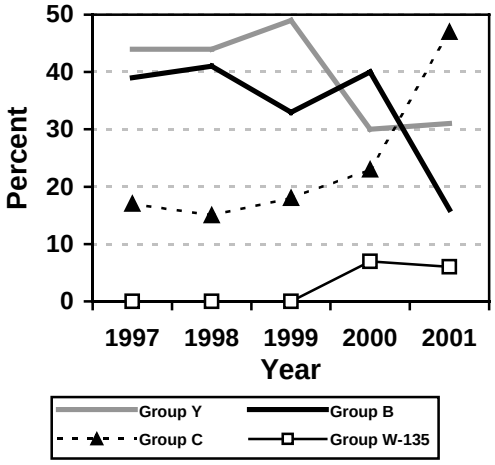
sterile, and the patient, a 25 day old infant, had evidence of respiratory syncytial virus infection as well, this was considered a meningococcal case because the physician considered the infant too sick for RSV infection only. The Public Health Laboratory performed serogroup identification on isolates from 41 confirmed cases. Serogroup identification was made in 32 cases. Of all isolates submitted, 12% were serogroup B; 37% were serogroup C; 24% were serogroup Y; and 5% were serogroup W-135 (Figure 6). Nine case isolates (22%) were nontypeable. In 16% of cases, serogroup information was not obtained.

Figure 5
Meningococcal Disease
by Culture Site
LAC, 2001



There was continued public concern about meningococcal disease among high school and college students in 2001. Several high school clusters occurred in northern California and other states. None occurred in LAC. However, there was a cluster of cases among young men of college age and three unrelated cases in college students. The cluster occurred among three unacquainted men, aged 19-22 years, who attended a popular nightclub on the same night, along with several hundred others. Two of the cases were confirmed as Serogroup C meningococcal disease. The third case was presumptive based on Gram-negative cocci in cerebrospinal fluid and clinical signs and symptoms. Active surveillance in LAC and adjacent counties did not identify additional cases. The college cases, two in unimmunized college freshmen and the third in a graduate student whose immunization status was not determined, occurred at different universities,. Serogroup C was identified in two cases, stimulating renewed interest in meningococcal immunization among students.

Figure 6
Meningococcal Disease
by Serogroup
LAC, 1997 - 2001



PREVENTION

In 2001, at least 47% of the cases and 44% of the deaths from meningococcal disease in LAC were caused by serogroups covered by the vaccine, and thus potentially preventable. Currently, a one-dose polysaccharide vaccine for meningococcal disease, effective against serogroups A,C,Y, and W-135, is available in the U.S. , and research continues on a vaccine effective against serogroup B disease. Meningococcal vaccine is routinely given to military recruits, and is recommended for those with terminal complement deficiencies or asplenia, travelers to endemic or epidemic areas, and certain lab personnel. The Advisory Committee on Immunization Practices (ACIP) recommends that college students, especially freshmen and those living in dormitories, be informed about meningococcal disease and the benefits of the

vaccine.

ADDITIONAL RESOURCES

Centers For Disease Control and Prevention Website: www.cdc.gov/mmwr/PDF/rr/rr4907.pdf
Prevention and control of meningococcal disease and college students: recommendations of the Advisory Committee on Immunization Practices (ACIP).
MMWR 2000;49 (RR-7):1-20.

Centers For Disease Control and Prevention Website:
www.cdc.gov/epo/mmwr/preview/mmwrhtml/00046263.htm
Control and Prevention of Meningococcal Disease: Recommendations of the Advisory Committee on Immunization Practices (ACIP).
MMWR 1997; 46(RR-5):1-51

Riedo FX,Plikaytis BD, Broome CV. Epidemiology and prevention of meningococcal disease. *Pediatr Infect Dis J* 1995;14:643-57.

Rosenstein NE, Perkins BA, Stephens DS, Popovic T, Hughes JM. Meningococcal disease. *N Engl J Med* 2001;344:1378-88.