

Key Findings

Wound botulism is caused when *Clostridium botulinum* (*C. botulinum*) bacteria get into a wound or opening in the skin and produce the botulinum toxin. The botulinum toxin attacks the nervous system and causes paralysis, beginning with the muscles of the eyes, face, and throat. People who have botulism have symptoms such as droopy eyelids, blurred or double vision, or slurred speech. Muscle weakness can then spread downwards, making breathing difficult, and can eventually cause total paralysis and even death. People who inject illicit drugs (like black tar heroin) are more likely to get wound botulism because the drugs may be contaminated with *C. botulinum*, and the bacteria can get in through the injection site in the skin. Wound botulism is rare but can be deadly and requires immediate medical care. Treatment with botulinum antitoxin will stop the toxin from causing more harm.

Wound Botulism in California from 2013 through 2019

Total Cases: There were a total of 184 wound botulism cases from 2013 through 2019. This is an average of 26 cases each year.

Rate: The average annual rate of wound botulism cases during 2013-2019 was less than 1 case per 100,000 people in California.

- **By County:** About 1 out every 3 cases was reported in Los Angeles County (28 cases) and San Bernardino County (27 cases), but both counties had an average rate of less than 1 case per 100,000 people.
- **By Sex:** Most cases (about 78%) were in males (about 22% were in females), but the average rates in both males and females were less than 1 case per 100,000 people.
- **By Age Group:** The average rates were highest in adults aged 45 to 64 years, but rates were less than 1 case per 100,000 people in this age group.
- **By Race/Ethnicity:** For cases where race and ethnicity information was available, the highest percentages of cases were in people who reported non-Hispanic White (50%) and Hispanic/Latino (48%) race/ethnicity.

To reduce the risk of wound botulism, people who use injection drugs should be aware of the signs and symptoms of botulism so they can seek immediate medical care if they have symptoms. Those seeking medical care should share information about any recent injection drug use so a medical provider can provide the right treatment. It is important to keep wounds from an injury clean so they don't become infected. Even if a wound is not visible, an injection site on the skin can be a source of toxin. If someone has symptoms of botulism, seek medical care at a hospital immediately. Botulinum antitoxin for the treatment of wound botulism is available only from public health authorities.

For more information about wound botulism in California, please visit the [CDPH Botulism webpage](#). For details about key infectious diseases in California, please visit the [CDPH Surveillance and Statistics Section webpage](#).

Background

Clostridium botulinum is an anaerobic, spore-forming bacterium that is ubiquitous in the environment. Under specific conditions, *C. botulinum* can grow and produce a potent neurotoxin. Wound botulism is caused when *C. botulinum* colonizes a wound and produces the neurotoxin in situ.¹ Wound botulism occurred primarily in the setting of traumatic injury (when dirt gets into a wound) until the early 1990s, when California began experiencing an epidemic of wound botulism among injection drug users, particularly of black tar heroin.^{2, 3} *C. botulinum* toxin is listed among the U.S. Centers for Disease Control and Prevention (CDC) category A bioterrorism agents.⁴

Wound botulism is a rare but severe neuromuscular illness, and each case should be considered a medical and public health emergency. Initial neurologic signs and symptoms result from paralysis of muscles of the eyes, face, and throat, such as droopy eyelids (ptosis), blurred or double vision, or slurred speech, and may appear from several days to 2 weeks after the wound is infected.^{1, 5} Illness can progress to a symmetric, descending weakness and, if untreated, can lead to respiratory paralysis and death. Botulinum antitoxin and supportive medical care are the mainstay of treatment. If administered early in the course of illness, botulinum antitoxin can stop the progression of, but cannot reverse, paralysis. Antitoxin is available exclusively from public health authorities.^{6, 7}

This report describes the epidemiology of confirmed and probable wound botulism cases in California from 2013 through 2019. Incidence rates presented in this report are based on surveillance data and should be considered estimates of true disease incidence. For a complete discussion of the definitions, methods, and limitations associated with this report, please refer to the *Technical Notes*.⁸ The epidemiologic description of wound botulism for earlier surveillance periods can be found in the *Epidemiologic Summary of Wound Botulism in California, 2001-2008 and 2009-2012*.^{9, 10}

California Reporting Requirements and Surveillance Case Definition

California Code of Regulations (CCR), Title 17, Section 2500 requires health care providers to report suspected cases of wound botulism to their local health department immediately by telephone.¹¹ Laboratories must immediately communicate by telephone with the California Department of Public Health (CDPH) Microbial Diseases Laboratory for instruction whenever a specimen for laboratory diagnosis of suspected botulism is received. Per CCR, Title 17, Section 2505, laboratories also must report to the local health department in the health jurisdiction where the patient resides when laboratory testing yields evidence suggestive of *C. botulinum*; notification must occur by telephone within one hour after the health care provider has been notified.¹²

CDPH counted cases of botulism that satisfied the CDC/Council of State and Territorial Epidemiologists surveillance case definition of a confirmed or probable case. During the 2013-2019 surveillance period, a confirmed case of wound botulism was defined as a clinically compatible illness and either detection of botulinum toxin in serum or isolation of *C. botulinum* from the wound in a patient who has no suspected exposure to contaminated food and who has either a history of a fresh contaminated wound during the 2 weeks before onset of symptoms or a history of injection drug use within the 2 weeks before onset of symptoms. A probable case of wound botulism was defined as a clinically compatible illness in a patient who

has no suspected exposure to contaminated food and who has either a history of a fresh, contaminated wound during the 2 weeks before onset of symptoms or a history of injection drug use within the 2 weeks before onset of symptoms.¹³

Epidemiology of Wound Botulism in California, 2013-2019

CDPH received reports of 184 cases of wound botulism with estimated symptom onset dates from 2013 through 2019. This corresponds to an average of 26 cases per year and an average annual incidence rate of 0.1 cases per 100,000 population. Wound botulism incidence rates increased gradually during the surveillance period, with the exception of 2018, when the rate increased to 0.13 per 100,000 (50 cases) [Figure 1]. All wound botulism case-patients were hospitalized. Deaths were reported for 5 (2.7%) case-patients at the time of case report. The large majority of wound botulism case-patients reported injection drug use (172 cases; 93.5%); of the total cases, 162 (88.0%) case-patients reported injecting heroin, with 134 (72.8%) case-patients specifying black tar heroin.

From 2013 through 2019, 29.9% of wound botulism cases occurred in two California counties: Los Angeles County (0.04 per 100,000; 28 cases) and San Bernardino County (0.2 per 100,000; 27 cases). The average annual rate in Northern California (1.0 per 100,000; 78 cases) was similar to the average annual rate in Southern California (1.0 per 100,000; 106 cases) (see *Technical Notes*).

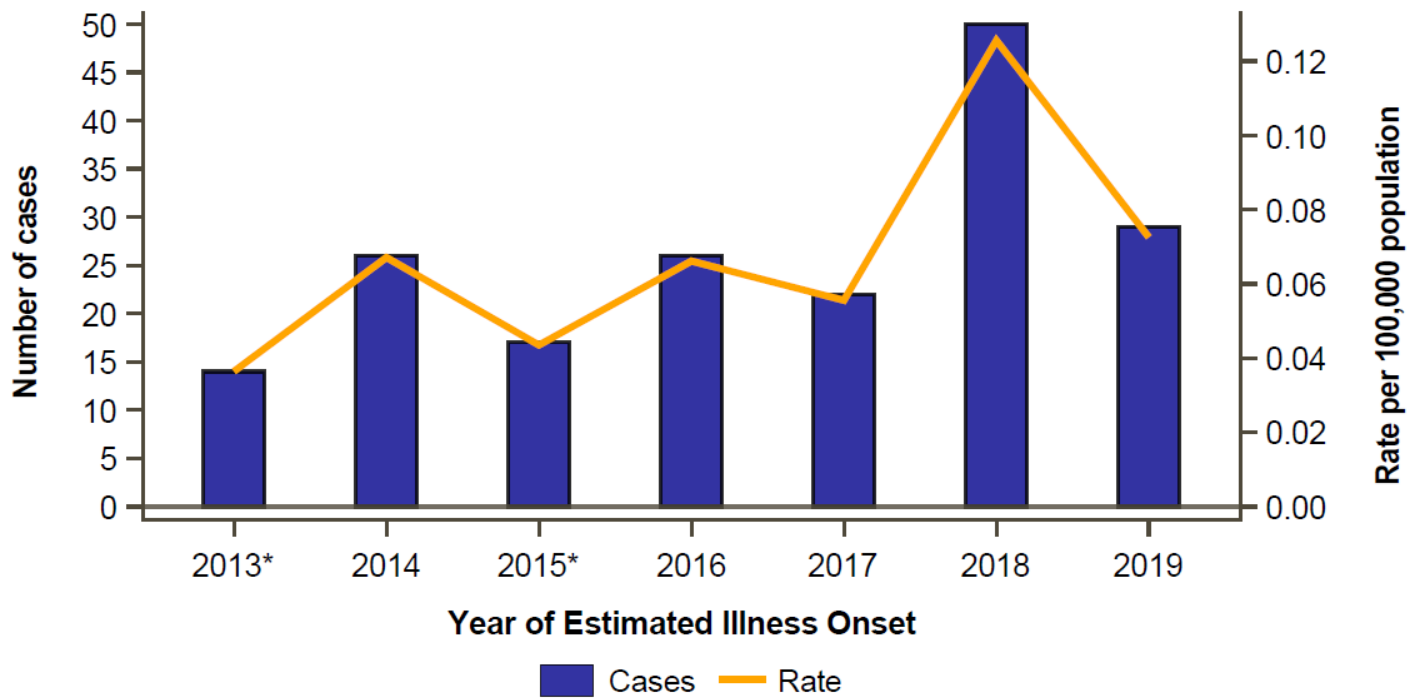
During the surveillance period, 77.7% of cases were among males and 22.3% were among females. The average annual incidence rate was higher among males (0.1 per 100,000; 143 cases) than among females (0.03 per 100,000; 41 cases).

Average annual incidence rates of wound botulism from 2013 through 2019 were highest among adults aged 55 to 64 years (0.2 per 100,000; 53 cases) and 45 to 54 years (0.1 per 100,000; 49 cases). During the surveillance period, 99.5% of case-patients were aged 21 years and older.

For wound botulism cases with complete race/ethnicity information (see *Technical Notes*), non-Hispanic White (50.0%) and Hispanic/Latino (48.0%) were reported more frequently than would be expected compared to the percentage of these groups in California during the same time period (38.0% and 38.5%, respectively) [Figure 2].

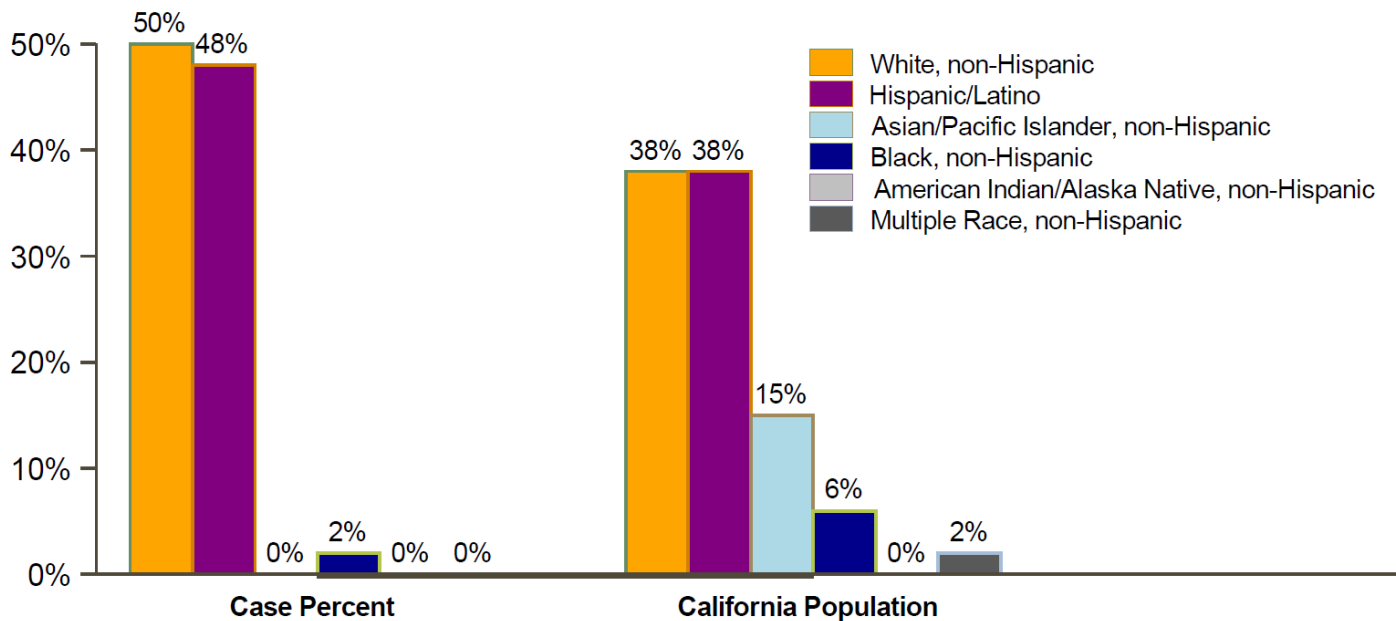
From 2013 through 2019, rare geographic and temporal clusters of wound botulism were identified, necessitating public health response measures, including alerting healthcare providers of the signs and symptoms of botulism and emphasizing educational outreach to at-risk persons. During September 2017 through April 2018, 9 cases of wound botulism were reported in San Diego County. All case-patients reported a history of injecting heroin; 7 (78%) specifically reported black tar heroin use. All patients required hospitalization in intensive care units. A common source of drugs was not identified.¹⁴

Figure 1. Wound Botulism Cases and Incidence Rates by Year of Estimated Illness Onset, California, 2013-2019



*Potentially unreliable rate: relative standard error 23 percent or more.

Figure 2. Wound Botulism Cases and Population by Race/Ethnicity, California, 2013-2019



19% (n=35) of reported incidents of Botulism, Wound did not identify race/ethnicity and 1.1% (n=2) of incidents identified as 'Other' race/ethnicity and are not included in the Case Percent calculation. Information presented with a large percentage of missing data should be interpreted with caution.

Comments

Although wound botulism during 2013-2019 was a rare occurrence in California, each case represented a medical and public health emergency. A slight increase in numbers and incidence rates of wound botulism was observed during the surveillance period. Cases occurred almost exclusively among injection drug users. More than half of all case-patients were adults aged 45 to 64 years, and cases were more likely to be male than female.

Rapid diagnosis and treatment, including administration of botulinum antitoxin obtained from public health authorities, provide the best opportunities for minimizing the morbidity and mortality associated with wound botulism. Additionally, educating injection drug users to seek immediate medical care at a hospital if typical symptoms of botulism develop and to be honest about recent drug use may enable more timely diagnosis and administration of antitoxin.⁵ Counseling drug users about safer injection practices may further reduce risk; persons can prevent wound botulism by not injecting illicit drugs. Wound botulism can also be prevented by keeping wounds from an injury clean; persons with wounds (such as from traumatic injuries and surgeries) should seek immediate medical care if experiencing symptoms of wound botulism.

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¹¹ [Reportable Diseases and Conditions: Reporting to the Local Health Authority, 17 CCR § 2500 \(2021\).](#)

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¹² [Reportable Diseases and Conditions: Notification by Laboratories, 17 CCR § 2505 \(2021\).](#)

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