



Vibrio vulnificus

General Information

What is *Vibrio vulnificus*?

Vibrio vulnificus is a bacterium in the same family as those that cause [cholera](/cholera/index.html) (</cholera/index.html>) and [*Vibrio parahaemolyticus*](/vibrio/vibriop.html) (</vibrio/vibriop.html>). It normally lives in warm seawater and is part of a group of vibrios that are called "halophilic" because they require salt.

What type of illness does *V. vulnificus* cause?

V. vulnificus can cause disease in those who eat contaminated seafood or have an open wound that is exposed to seawater. Among healthy people, ingestion of *V. vulnificus* can cause vomiting, diarrhea, and abdominal pain. In immunocompromised persons, particularly those with chronic liver disease, *V. vulnificus* can infect the bloodstream, causing a severe and life-threatening illness characterized by fever and chills, decreased blood pressure (septic shock), and blistering skin lesions. *V. vulnificus* bloodstream infections are fatal about 50% of the time.

V. vulnificus can cause an infection of the skin when open wounds are exposed to warm seawater; these infections may lead to skin breakdown and ulceration. Persons who are immunocompromised are at higher risk for invasion of the organism into the bloodstream and potentially fatal complications.

How common is *V. vulnificus* infection?

V. vulnificus is a rare cause of disease, but it is also underreported. Between 1988 and 2006, CDC received reports of more than 900 *V. vulnificus* infections from the Gulf Coast states, where most cases occur. Before 2007, there was no national surveillance system for *V. vulnificus*, but CDC collaborated with the states of Alabama, Florida, Louisiana, Texas, and Mississippi to monitor the number of cases of *V. vulnificus* infection in the Gulf Coast region. In 2007, infections caused by *V. vulnificus* and other *Vibrio* species became nationally notifiable.

How do persons get infected with *V. vulnificus*?

Persons who are immunocompromised, especially those with chronic liver disease, are at risk for *V. vulnificus* when they eat raw seafood, particularly oysters. A recent study showed that people with these pre-existing medical conditions were 80 times more likely to develop *V. vulnificus* bloodstream infections than were healthy people. The bacterium is frequently isolated from oysters and other shellfish in warm coastal waters during the summer months. Since it is naturally found in warm marine waters, people with open wounds can be exposed to *V. vulnificus* through direct contact with seawater. There is no evidence for person-to-person transmission of *V. vulnificus*.

How can *V. vulnificus* infection be diagnosed?

V. vulnificus infection is diagnosed by stool, wound, or blood cultures. Notifying the laboratory when this infection is suspected helps because a special growth medium should be used to increase the diagnostic yield. Doctors should have a high suspicion for this organism when patients present with gastrointestinal illness, fever, or shock following the ingestion of raw seafood, especially oysters, or with a wound infection after exposure to seawater.

How is *V. vulnificus* infection treated?

If *V. vulnificus* is suspected, treatment should be initiated immediately because antibiotics improve survival. Aggressive attention should be given to the wound site; amputation of the infected limb is sometimes necessary. Clinical trials for the management of *V. vulnificus* infection have not been conducted. The antibiotic recommendations below come from documents published by infectious disease experts; they are based on case reports and animal models.

- Culture of wound or hemorrhagic bullae is recommended, and all *V. vulnificus* isolates should be forwarded to a public health laboratory
- Blood cultures are recommended if the patient is febrile, has hemorrhagic bullae, or has any signs of sepsis
- Antibiotic therapy:
 - Doxycycline (100 mg PO/IV twice a day for 7-14 days) and a third-generation cephalosporin (e.g., ceftazidime 1-2 g IV/IM every eight hours) is generally recommended
 - A single agent regimen with a fluoroquinolone such as levofloxacin, ciprofloxacin or gatifloxacin, has been reported to be at least as effective in an animal model as combination drug regimens with doxycycline and a cephalosporin
 - Children, in whom doxycycline and fluoroquinolones are contraindicated, can be treated with trimethoprim-sulfamethoxazole plus an aminoglycoside
 - Necrotic tissue should be debrided; severe cases may require fasciotomy or limb amputation


Are there long-term consequences of *V. vulnificus* infection?

V. vulnificus infection is an acute illness, and those who recover should not expect any long-term consequences.

What can be done to improve the safety of oysters?

Although oysters can be harvested legally only from waters free from fecal contamination, even legally harvested oysters can be contaminated with *V. vulnificus* because the bacterium is naturally present in marine environments. *V. vulnificus* does not alter the appearance, taste, or odor of oysters. Timely, voluntary reporting of *V. vulnificus* infections to CDC and to regional offices of the Food and Drug Administration (FDA) will help collaborative efforts to improve investigation of these infections. Regional FDA specialists with expert knowledge about shellfish assist state officials with tracebacks of shellfish and, when notified rapidly about cases, are able to sample harvest waters to discover possible sources of infection and to close oyster beds when problems are identified. Ongoing research may help us to predict environmental or other factors that increase the chance that oysters carry pathogens.

How can I learn more about *V. vulnificus*?

You can discuss your medical concerns with your doctor or other health care provider. Your local city or county health department can provide information about this and other public health problems that are occurring in your area. Information about the potential dangers of raw oyster consumption is available 24 hours a day from the FDA's Seafood Hotline (telephone 1-800-332-4010); FDA public affairs specialists are available at this number between 12 and 4 p.m. Monday through Friday. Information is also available on the world wide web at <http://vm.cfsan.fda.gov> (<http://vm.cfsan.fda.gov>)  (<http://www.cdc.gov/Other/disclaimer.html>).

Some tips for preventing *V. vulnificus* infections, particularly among immunocompromised patients, including those with underlying liver disease:

- Do not eat raw oysters or other raw shellfish.
- Cook shellfish (oysters, clams, mussels) thoroughly.
- For shellfish in the shell, either a) boil until the shells open and continue boiling for 5 more minutes, or b) steam until the shells open and then continue cooking for 9 more minutes. Do not eat those shellfish that do not open during cooking. Boil shucked oysters at least 3 minutes, or fry them in oil at least 10 minutes at 375°F.
- Avoid cross-contamination of cooked seafood and other foods with raw seafood and juices from raw seafood.
- Eat shellfish promptly after cooking and refrigerate leftovers.
- Avoid exposure of open wounds or broken skin to warm salt or brackish water, or to raw shellfish harvested from such waters.
- Wear protective clothing (e.g., gloves) when handling raw shellfish.

Technical Information

Clinical Features

Wound or soft tissue infections. In persons with underlying medical conditions, especially liver disease, can cause bloodstream infections characterized by fever, chills, decreased blood pressure, blistering skin lesions, and often, death. In otherwise healthy persons, causes diarrhea, vomiting, and abdominal pain.

Etiologic Agent

Vibrio vulnificus, a halophilic (salt-requiring) gram-negative bacterium naturally and commonly found in marine and estuarine environments.

Incidence

An average of 50 culture-confirmed cases, 45 hospitalizations, and 16 deaths are reported each year from the Gulf Coast region (reporting states are Alabama, Florida, Louisiana, Mississippi, and Texas). Nationwide, there are as many as 95 cases (half of which are culture confirmed), 85 hospitalizations, and 35 deaths.

Sequelae

Bloodstream infections in persons with liver disease are fatal approximately 50% of the time. Persons who recover suffer no long-term consequences.

Transmission

Eating raw or undercooked shellfish, particularly oysters harvested from warmer waters. Wound infections may occur when wounds or soft tissues are exposed to warm seawater.

Risk Groups

All persons. Persons with underlying medical conditions, especially liver disease, may be at increased risk of infection and serious complications.

Surveillance

Surveillance for infections has been conducted in the Gulf Coast states of Alabama, Florida, Louisiana, Mississippi, and Texas since 1988, and expanded to include [FoodNet](http://www.cdc.gov/foodnet) (<http://www.cdc.gov/foodnet>) sites in 1996. In January 2007, infections caused by *V. vulnificus* and other *Vibrio spp.* became nationally notifiable. Thirty-three states have now implemented this reporting to state public health officials and CDC.

Trends

Infections are seasonal; over 85% occur between May and October. Environmental factors, such as warm water and moderate salinity, can increase the number of *V. vulnificus* organisms in shellfish.

Challenges

Many persons prefer to consume oysters and other shellfish raw. Many persons with liver disease are unaware of the hazards of raw oyster consumption and exposure to warm seawater.




Opportunities

Education focusing on the risks associated with consumption of raw and undercooked shellfish, especially in warm months. Implement refrigeration from harvesting to consumption. Timely reporting of *V. vulnificus* infections. Revision of the standards used for closing and re-opening of oyster beds to take into account the role of environmental factors.

Additional Information

CDC Surveillance Reports

Cholera and Other *Vibrio* (/nationalsurveillance/cholera_vibrio_surveillance.html) Illnesses Surveillance (COVIS) (/nationalsurveillance/cholera_vibrio_surveillance.html): These surveillance summaries provide a national picture of the occurrence of several species of *Vibrio* illnesses.

- [Cholera and Other Vibrio Illness Surveillance \(COVIS\) Overview](/ncezid/dfwed/PDFs/nat-covis-surv-overview-508c.pdf)  [PDF - 3 pages] (</ncezid/dfwed/PDFs/nat-covis-surv-overview-508c.pdf>)
 - [COVIS Annual Summary, 2011](/ncezid/dfwed/PDFs/covis-annual-report-2011-508c.pdf)  [PDF - 10 pages] (</ncezid/dfwed/PDFs/covis-annual-report-2011-508c.pdf>)
 - [COVIS Annual Summary, 2010](/ncezid/dfwed/PDFs/covis-annual-report-2010-508c.pdf)  [PDF - 9 pages] (</ncezid/dfwed/PDFs/covis-annual-report-2010-508c.pdf>)
 - [COVIS Surveillance Summaries](/nationalsurveillance/cholera_vibrio_surveillance.html) (/nationalsurveillance/cholera_vibrio_surveillance.html), 1998-2009

[Foodborne Diseases Active Surveillance Network \(FoodNet\)](/foodnet/index.html) (</foodnet/index.html>): These






surveillance reports provide the information necessary for measuring the progress in foodborne disease prevention. Foodnet tracks laboratory-confirmed data about several species of *Vibrio* (</foodnet/data/trends/tables/table7.html>) and other foodborne infections in 10 surveillance sites (</foodnet/sites.html>). FoodNet sites also report *Vibrio* infections to COVIS.

- [FoodNet Surveillance \(/foodnet/about.html\)](/foodnet/about.html)
 - [Foodnet Data Reports \(/foodnet/data/reports.html\)](/foodnet/data/reports.html)
 - [Trends, Data Tables, and Figures \(/foodnet/data/trends/index.html\)](/foodnet/data/trends/index.html)

Select MMWR Articles

- [Vibrio vulnificus \(/mmwr/preview/mmwrhtml/00043142.htm\)](/mmwr/preview/mmwrhtml/00043142.htm) Infections Associated with Eating Raw Oysters - Los Angeles, 1996 (</mmwr/preview/mmwrhtml/00043142.htm>). MMWR July 26, 1996 / Vol. 45 / No. 29
- [Vibrio vulnificus \(/mmwr/preview/mmwrhtml/00043142.htm\)](/mmwr/preview/mmwrhtml/00043142.htm) Infections Associated with Raw Oyster Consumption - Florida, 1981-1992 (</mmwr/preview/mmwrhtml/00043142.htm>). MMWR June 4, 1993 / Vol. 42 / No. 21

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- Klontz KC, Lieb S, Schreiber M, Janowski HT, Baldy LM, Gunn RA. Syndromes of *Vibrio vulnificus* infections (<http://www.ncbi.nlm.nih.gov/pubmed/3260760>)  (<http://www.cdc.gov/Other/disclaimer.html>). Clinical and epidemiologic features in Florida cases, 1981-1987. Ann Intern Med 1988; 109: 318-323.
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- Daniels NA, Evans MC, Griffin PM. Noncholera *Vibriosis*. Chapter 10, Emerging Infections 4, ASM Press, Washington, D.C., 2000.

Related Web Sites

- [Enteric Diseases Epidemiology Branch \(/ncezid/dfwed/edeb/index.html\)](/ncezid/dfwed/edeb/index.html)
- [CDC National Surveillance Team \(/nationalsurveillance\)](/nationalsurveillance)

- [CDC Features \(/ncezid/dfwed/features.html#food-safety\)](/ncezid/dfwed/features.html#food-safety): includes information about *Vibrio* illness
 - [Incidence and Trends in Foodborne Illness, 2012 \(/features/dsfoodnet2012/\)](/features/dsfoodnet2012/)
 - [Incidence and Trends in Foodborne Illness, 2011 \(/features/dsfoodnet/\)](/features/dsfoodnet/)
 - [Incidence and Trends in Foodborne Illness, 2010 \(/Features/dsFoodborneIllness/\)](/Features/dsFoodborneIllness/)
- [Digital Press Kit: New Food Safety Data for 2012 \(/media/dpk/2013/dpk-foodnet-2013.html\)](/media/dpk/2013/dpk-foodnet-2013.html)
- [Podcast - Dangerous Raw Oysters \(http://www2c.cdc.gov/podcasts/player.asp?f=8629455\)](http://www2c.cdc.gov/podcasts/player.asp?f=8629455)
- [CDC and Food Safety \(/foodsafety/\)](/foodsafety/)

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