

Preventing Foodborne and Non-foodborne Illness: *Vibrio parahaemolyticus*¹

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What is *Vibrio parahaemolyticus*?

Vibrio parahaemolyticus is a naturally occurring bacterium that inhabits coastal brackish marine waters throughout the world and is commonly found in the United States and Canada. This organism requires salt to survive and appears in higher concentrations during the warmer summer months. If ingested in sufficient numbers, this bacterium can cause illness such as gastroenteritis with symptoms such as cramps, vomiting, and nausea. Illnesses linked with this organism are usually associated with the consumption of raw or improperly cooked seafood, particularly raw oysters.

What type of illness is caused by *Vibrio parahaemolyticus*?

Watery diarrhea, nausea, vomiting, abdominal cramping, headache, fever, and chills are the most common symptoms after consuming this organism. Symptoms usually occur after 15 hours, but can begin as early as 4 hours or as late as 36 hours after exposure and can continue for up to 3 days. Illnesses caused by *V. parahaemolyticus* are still categorized as short, and, post recovery, typically present no prolonged effects. However, in rare instances, especially for those who are either **immunocompromised, diabetic, alcoholic, or have hemochromatosis (iron overload)**, more severe or prolonged effects may occur that require medical treatment. *V. parahaemolyticus* can also cause skin or soft tissue

infections when an open wound or abrasion is exposed to seawater, fish, or shellfish.

Who is at risk for a *Vibrio parahaemolyticus* infection?

Every person that comes in contact with *V. parahaemolyticus* is at some risk for infection; however, those that are immunocompromised are especially at risk for more severe disease. Those especially at risk include those with HIV, cancer, liver disease, diabetes, hemochromatosis (iron overload), stomach troubles, or prolonged steroid use. Persons with chronic liver disease in particular are actually eighty times more likely to fall ill from *V. parahaemolyticus*. If an individual is in this high-risk group, cooking food properly and avoiding consumption of raw seafood minimizes the risk of infection.

When do I seek medical treatment?

If you experience symptoms beyond simple diarrhea, such as abdominal pain, high fever, and/or chills after having eaten raw oysters or if you have exposed wounds that become swollen and painful, **seek immediate medical attention**. Infection can progress very rapidly, especially if you have any underlying conditions described above. When in doubt, call your physician and explain your exposure.

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How common are infections involving *Vibrio parahaemolyticus*?

Foodborne infections caused by *V. parahaemolyticus* are fairly common in Asia, but until recently few cases were reported annually in the United States. An estimated 4,500 cases of *V. parahaemolyticus* infection occur each year in the United States. However, many cases are not reported, and many of those infected simply assume it was the flu or food poisoning. When patients actually do go to the doctor, many laboratories do not have the proper selective media or equipment to screen for *V. parahaemolyticus*. The Gulf states (Florida, Louisiana, Alabama, and Texas) have traditionally participated in monitoring efforts with the Centers for Disease Control and Prevention (CDC), collectively reporting an average of 30 to 40 diagnosed cases each year. However, many other states do not participate in reporting these foodborne illnesses to the CDC or to their respective state health departments, and the number of reported cases greatly underestimates the true number of cases.

Recently, a *V. parahaemolyticus* outbreak was traced to a cruise ship in Alaska and attributed to consumption of locally harvested raw oysters. An extremely large outbreak was also documented in Chile and involved more than 10,000 persons. Thus, travelers should be aware of these risks and avoid potentially contaminated raw seafood. *Vibrio parahaemolyticus* has also begun to appear in areas of the world that were previously unaffected—since 2006, for example, outbreaks were reported in Oregon, New York, Washington, and Massachusetts, as well as several provinces in Canada. It appears that an increase in seawater temperature may be contributing to the global expansion of this pathogen, although increased proficiency in detection and reporting of *V. parahaemolyticus* may also account for the rising number of infections.

How does infection with *V. parahaemolyticus* occur?

Vibrio parahaemolyticus is a naturally occurring estuarine organism that can be taken up and concentrated by mollusks, such as clams and oysters, as they feed. Outbreaks of illness related to *V. parahaemolyticus* typically occur by ingesting raw or undercooked seafood and shellfish (especially oysters), or through cross-contamination of cookware or utensils. The bacteria proliferate rapidly when contact surfaces are not cleaned properly or the seafood is not kept out of the temperature “danger zone” (see specifics below).

Receiving and Storage of Seafood and Shellfish

There are specific recommendations in the FDA’s 2013 Food Code for handling seafood and shellfish in a retail or food service operation (<http://www.fda.gov/downloads/Food/GuidanceRegulation/ucm123970.pdf>). Seafood and shellfish are considered potentially hazardous foods because foodborne pathogens increase in number if temperature abuse (i.e., elevated temperatures) occurs. In other words, most foods in this category should be kept at either above 135°F (after cooking) or below 41°F (storage), with temperatures in the middle considered part of the “danger zone.” As a rule of thumb, foods should spend no more than 4 hours in the danger zone temperature range. Shellfish are an exception and may be transported and received at 45°F.

Once a product is frozen, it is important to maintain a proper freezer temperature to avoid product thawing. Labeling properly stored foods is also helpful to ensure that others handling the food in the future will know exactly how long a food product has been stored.

Seafood in interstate commerce must be produced under the Seafood HACCP regulation. Detailed information can be found on the FDA Web site at <http://www.fda.gov/Food/GuidanceRegulation/HACCP/ucm2006764.htm>. For Florida-specific requirements, please see the Florida Department of Agriculture and Consumer Services Web pages at <http://www.freshfromflorida.com/Divisions-Offices/Aquaculture/Agriculture-Industry/Shellfish>.

How to Prevent Infection by *Vibrio parahaemolyticus* in Individuals Who Are in High-Risk Groups

These suggestions should always be followed to help prevent infection, especially for persons with underlying diseases that place them in high-risk groups:

- When in coastal areas, avoid exposing skin abrasions or wounds to seawater, brackish water, or raw seafood. Clean exposed wounds thoroughly and seek medical attention if there are signs of infection. The old saying the seawater will cure a wound is not correct. If high levels of *Vibrios* are present, it can lead to a serious wound infection.
- Do not eat raw shellfish, especially oysters, if you are immunocompromised or have liver disease, alcoholism, diabetes, or hemochromatosis (iron overload).
- Cook shellfish thoroughly (CDC 2013).

For shellfish still in the shell

- Steam until the shell opens and continue to cook for at least 9 more minutes. Do not eat if shell does not open during steaming.
- Boil until the shell opens and continue to cook for 5 minutes.

For shucked oysters

- Boil for at least 3 minutes.
- Fry in oil at 375°F for at least 10 minutes.
- Avoid cross-contamination of other cooked foods with raw seafood or juices from raw seafood. Disinfect all surfaces and utensils properly.

References

Centers for Disease and Control and Prevention [CDC], Division of Bacterial and Mycotic Diseases. 2013. *Vibrio parahaemolyticus*. Retrieved September 3, 2015 from <http://www.cdc.gov/vibrio/vibriop.html>.

DHS Oregon. Oregon Department of Human Services. Retrieved March 31, 2009 from <http://www.dhs.state.or.us/publichealth/acd/vibrio/facts.cfm>. Now available at <http://www.oregon.gov/DHS/ph/acd/diseases/vibrio/facts.shtml>.

Florida Department of Agriculture and Consumer Services [FDACS] n.d. Shellfish. Retrieved September 3, 2015 from <http://www.freshfromflorida.com/Divisions-Offices/Aquaculture/Agriculture-Industry/Shellfish>

Food and Drug Administration [FDA]. n.d. Food Code 2013. Retrieved September 3, 2015 from <http://www.fda.gov/Food/GuidanceRegulation/RetailFoodProtection/FoodCode/ucm374275.htm>.

Food and Drug Administration [FDA]. n.d. Seafood HACCP. Retrieved September 3, 2015 from <http://www.fda.gov/Food/GuidanceRegulation/HACCP/ucm2006764.htm>.

Mariott, N.G. and Gravani, R.B. 2006. *Principles of Food Sanitation: 5 Edition*. Springer, New York, NY.

Murano, Peter S. 2003. *Understanding Food Science and Technology*, 305–314. Belmont, CA: Thomson Wadsworth.

Minnesota Department of Agriculture. n.d. Employee Personal Hygiene. Retrieved September 3, 2015 from <http://www.mda.state.mn.us/food/safety/minn-food-code-fact-sheets/personal-hygiene.aspx>.

Minnesota Department of Agriculture. n.d. Potentially Hazardous Foods. Retrieved September 3, 2015 from <http://www.mda.state.mn.us/food/safety/minn-food-code-fact-sheets/potentially-hazardous-food.aspx>.

Schneider, K.R., Silverberg, R., Chang, A. and Goodrich-Schneider, R.M. 2014. *Preventing Foodborne Illness: Clostridium botulinum*. FSHN0406. Gainesville: University of Florida Institute of Food and Agricultural Sciences. Retrieved September 3, 2015 from <http://edis.ifas.ufl.edu/FS104>.