


# Vibriosis Outbreak Management Toolkit

## KEY INFORMATION

### How to use this toolkit

This toolkit is designed for use as a reference for vibriosis case investigations.

 Checklists and Guides

 Forms and Factsheets

 Web-based Resources

### Who should use this toolkit

This toolkit is designed for use by any public health agency involved in a vibriosis investigations

### The toolkit is organized into the following sections:

#### ● BACKGROUND ON VIBRIOSIS

- [General](#)
- [Symptoms](#)
- [Incubation and Duration](#)
- [Transmission](#)
- [Risk Factors and Prevention](#)
- [Treatment](#)

#### ● GUIDANCE AND TOOLS

- [Case Investigations](#)
  - [Case Definition](#)
  - [Case Interview](#)
  - [Environmental Health Investigation](#)
  - [Cluster and Outbreak Investigation](#)

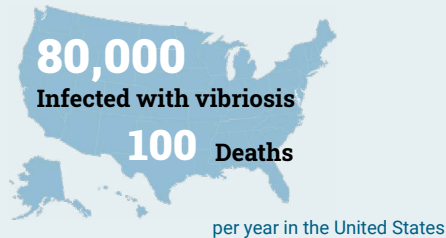


# Vibriosis Outbreak Management Toolkit

## BACKGROUND ON VIBRIOSIS

### Background

#### General



- About 80,000 people develop vibriosis each year in the United States resulting in approximately 100 deaths.
- Vibriosis is caused by infection with certain members of the *Vibrionaceae* family.
- The organisms that cause vibriosis includes at least 14 *Vibrio* species plus two organisms that used to be classified as *Vibrio* spp. *Grimontia hollisae* (formerly *Vibrio hollisae*) and *Photobacterium damsela* serogroup *Damselae* (formerly *Vibrio damsela*) and cause vibriosis-like illness.

#### NOTE

- Infection with toxigenic *Vibrio cholerae* O1 or O139 causes the disease cholera. Cholera and toxigenic *Vibrio cholerae* WILL NOT be discussed in this toolkit
- Infection with non-toxigenic strains of *Vibrio cholerae* cause vibriosis and WILL be covered in this toolkit

- The most common *Vibrio* species causing vibriosis in the US (in declining order) are *Vibrio parahaemolyticus*, *Vibrio alginolyticus*, *Vibrio vulnificus*, non-toxigenic *Vibrio cholerae*, *Vibrio fluvialis* and *Vibrio mimicus* (plus others).
- *Vibrio* species naturally inhabit salt and brackish water (a mixture of fresh and salt water found where rivers meet the sea and in estuaries) and are present in higher concentrations when and where water temperatures are warmer.

- Vibriosis causes three illness syndromes:

- Gastroenteritis
- Skin, wound and outer ear infections
- Septicemia

### Symptoms

- ***Vibrio gastroenteritis*** is characterized by loose, watery stools along with abdominal cramps, nausea, vomiting and sometimes fever which lasts days to weeks.

- *Vibrio parahaemolyticus* is the most common cause of *Vibrio gastroenteritis* in the US
- Other *Vibrio* spp. including *Vibrio vulnificus*, non-toxigenic *Vibrio cholerae*, *Vibrio fluvialis* and others also cause *Vibrio gastroenteritis*.
- *Vibrio gastroenteritis* caused by *Vibrio vulnificus* can develop into septicemia

- ***Vibrio Skin, wound and ear infections*** cause pain, redness and swelling.

- *Vibrio alginolyticus* is the most common cause of *Vibrio* skin, wound and ear infections. Most of these infections are not severe
- *Vibrio* skin and wound infections caused by *Vibrio vulnificus* can develop into necrotizing fasciitis and septicemia

- ***Vibrio septicemia*** is a life-threatening invasive infection characterized by fever, chills, dangerously low blood pressure and blistering lesions called “bullae.”

- *Vibrio vulnificus* is the most common cause of *Vibrio* septicemia in the US
- Approximately 20% of people infected with *Vibrio vulnificus* die in the US

## BACKGROUND ON VIBRIOSIS

### Incubation

- *Vibrio gastroenteritis*, the incubation period is typically within 4 to 96 hours of being exposed
- *Vibrio* skin, wound or ear infections usually develop within 7 days of exposure
- *Vibrio* septicemia usually occurs within 24 hours of exposure but may be longer if it occurs secondary to a wound infection

### Transmission

Vibriosis is not transmitted from person-to-person. Infection routes include:

- **Foodborne transmission:** Consumption of raw or undercooked seafood (especially bivalve shellfish, such as oysters), ready-to-eat foods contaminated with drippings from raw or undercooked seafood or cooked seafood that has been stored in sea water are sources for foodborne transmission of *Vibrio* spp.
- **Skin exposure to salt or brackish water** while swimming, fishing, etc., especially with a pre-existing wound or wound sustained during water activity, or **Skin exposure to drippings from raw seafood** can cause skin, wound or ear infections.

- Skin and wound infections, especially those cause by *V. vulnificus*, can progress to necrotizing fasciitis and septicemia

### Risk Factors and Prevention

In the US, most infections occur during the warmer months (May – October) when *Vibrio* bacteria are more prevalent in salt and brackish water and in the seafood grown in those waters.

People with weakened immune system (including the elderly and pregnant women) and those with liver disease, cancer, diabetes, HIV, or hematologic disease are susceptible to severe vibriosis infections and should avoid activities that put them at risk.

Anyone wanting to reduce their risk of acquiring vibriosis should observe the following practices:

- Always cook oysters and other shellfish before eating
- Always keep shellfish and other seafood cold between purchasing or harvesting and consuming them
- Wash hands and food preparation surfaces with soap and water after preparing raw seafood to prevent cross-contaminating ready-to-eat-foods.
- Stay out of salt or brackish water if you have a wound (including tattoos and piercings)
- If you develop a skin, wound or outer ear infection, tell your health care provider you were exposed to salt or brackish water or raw seafood or seafood juices

### Treatment

Most people recover from vibriosis without treatment, but antibiotics may be needed for severe cases, especially serious wound infections and septicemia.

### More Information

- [Vibrio Species Causing Vibriosis \(CDC\)](#)
- [Vibriosis & Wounds \(CDC\)](#)
- [Washington State Non-cholera vibriosis disease, surveillance and reporting](#)

## GUIDANCE AND TOOLS

### Guidance and Tools

#### Case Investigation

Take the following **steps** to investigate a vibriosis case:

- Interview each reported vibriosis case
- Identify the likely exposure source
- For seafood associated cases
  - Determine which seafood was consumed
  - Which seafood should be investigated
- Request an environmental health (EH) assessment
- Update and submit the CDC COVIS form

#### Case Definitions

**Confirmed case:** isolation of a species of the family Vibrionaceae (other than toxigenic *Vibrio cholerae* O1 or O139) from a clinical specimen

**Probable case:** detection of a species of the family Vibrionaceae (other than toxigenic *Vibrio cholerae* O1 or O139) from a clinical specimen using a culture-independent diagnostic test OR a clinically compatible case that is epidemiologically linked to a confirmed or probable case

The full Council of State and Territorial Epidemiologists (CSTE) vibriosis case definition can be found on the CDC website:

- [CSTE vibriosis case definition](#)

#### Case Interview

Each vibriosis case should be interviewed with a standardized investigation form and/or the CDC Cholera and Other Vibrio Illness Surveillance system form. For restaurant-associated cases, it is helpful to pull the restaurant menu up during the interview to try to pinpoint which item was ordered.

Cases who consumed shellfish during their exposure period may have a difficult time recalling the specific type that was consumed, therefore, use these [shellfish interviewing tips](#) to try to narrow down which shellfish the case-patient likely consumed.

If the case-patient consumed multiple types of seafood during their exposure period, use the [CDC Investigation Prioritization Guidance](#) to determine which seafood (if any) should be investigated by environmental health.

Once you have identified which seafood item (if any) should be investigated, conduct an environmental health assessment (or request one) at the retail establishment where the seafood was purchased.

- [Example standardized Vibriosis interview form \(Washington State\)](#)
- [Example Vibriosis Investigation Guidelines \(Washington State\)](#)

#### Environmental Health Investigations

An EH assessment should be conducted for every vibriosis case involving a restaurant, grocery/market, food truck, or other commercial establishment. [The Environmental Assessment Vibriosis Quick Reference](#) document and the [Environmental Assessment Field Guides](#) can assist EH in field investigation. Determining if contributing factors at the retail establishment may have contributed to the proliferation or survival (in the case of cooked product) of *Vibrio* is an important component of the investigation. In the event that an illness is traced back to a particular shellfish growing area, regulatory action may not be taken unless contributing factors at the facility can be ruled out.

Information regarding improper handling and storage should be completed on page 5 of the CDC COVIS form:

**Was there evidence improper handling or storage?**

Yes     No     Unknown

**If yes (check all that apply):**

Holding temperature violation     Cross-contamination  
 Co-mingling of live and dead shellfish     Improper storage  
 Other: \_\_\_\_\_

## GUIDANCE AND TOOLS

Overall, the environmental assessment should focus on:

- Confirming approved shellfish source (including collecting shellfish tags and invoices)
- Identifying risks associated with receiving, storage, preparation, cooking, and temperature control
- Investigating if cross-contamination potentially took place (if applicable)
- Ensuring the appropriate consumer advisory (if required)
- Instituting control measures (as needed)

Shellstock tagging is required by the FDA through the [National Shellfish Sanitation Program \(NSSP\)](#). These tags are designed to allow traceback of shellfish associated with illness to the growing area and harvest date. Retailers are required to maintain tags onsite for 90 days after sale. Shellfish tags include information related to growing location, date of harvest, and shippers, distributors, etc. If tags are not available or if it is not possible to identify which shellfish tags belong with the shellfish served to the case-patient, EH investigators should collect shellfish invoices.

|   |                                   |
|---|-----------------------------------|
| <b>XYZ Shellfish Company</b><br>1195 Commercial Way, Metropolis, WA 98000<br>Cert. # WA-9999-SS   |                                   |
| ORIGINAL SHIPPER'S CERT. NO. (if other than above): _____   |                                   |
| HARVEST DATE: <b>November 17, 2018</b>  |                                   |
| HARVEST LOCATION: <b>WA-Totten Inlet</b> Harvest Site ID: <b>Bed/BIDN/Parcel#</b>   |                                   |
| TYPE OF SHELLFISH: <b>Manila Clams</b>  |                                   |
| QUANTITY OF SHELLFISH:  | dozen                      pounds |
| THIS TAG IS REQUIRED TO BE ATTACHED UNTIL THE CONTAINER IS EMPTY OR IS RETAGGED AND THEREAFTER KEPT ON FILE, IN CHRONOLOGICAL ORDER, FOR 90 DAYS.<br>RETAILERS: DATE WHEN LAST SHELLFISH FROM THIS CONTAINER SOLD OR SERVED (INSERT DATE) _____ |                                   |

- Once the environmental assessment has been completed, update the seafood investigation section of the CDC [COVIS Report form](#) using information gathered during the environmental health assessment and attach the shellfish tags (this step and the following may be completed by communicable disease epidemiologists).

- Share the redacted COVIS form, the shellfish tags and invoices with the agency that regulates the implicated shellfish, even if out of state or in Canada.

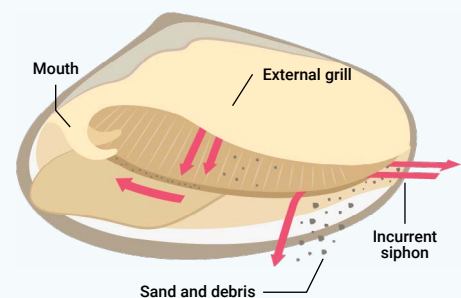
CDC does not forward COVIS forms, tags, or invoices to the states where shellfish are harvested.

## Vibriosis Cluster and Outbreak

### Identifying an Outbreak

Because individual cases of vibriosis potentially spur product traceback, it seems like cluster and outbreak detection for vibriosis cases would be common. Unfortunately, since vibriosis case-patients often report consuming multiple shellfish varieties or don't even recall what kind of shellfish they consumed, vibrio outbreak identification is not common.

## WHY SHELLFISH?



**Bivalve shellfish like oysters** are most often associated with transmitting *Vibrio* infection because they are often eaten raw and because bivalves are filter feeders—they siphon the water they are grown in through their gills and extract phytoplankton and zooplankton for food.

Any organisms that are in the water also get pulled in and become concentrated in the tissues of the oyster (or clam, mussel, or scallop). If the bivalve is eaten raw or is undercooked the *Vibrio* organisms are ingested and can cause infection.

## GUIDANCE AND TOOLS



### Whole Genome Sequencing

Another way to identify vibriosis clusters and outbreaks is through whole genome sequencing (WGS). Case-patient isolates that are highly genetically related may point to a common shellfish as the source of illness. However, WGS data should always be interpreted in tandem with shellfish traceback data.

Traceback data can show that case-patients infected with a highly genetically related strain of *Vibrio* consumed shellfish that were grown and harvested hundreds (or even thousands) of miles apart. There are several reasons this might happen:

- Shellfish are often moved from one growing area to another (for example, from a higher risk area for *Vibrio parahaemolyticus* to a lower risk area) and the *Vibrio* strains in the shellfish also get moved around.
- Certain related strains (“clones”) of *Vibrio* organisms may become either the predominant strain of one species (*Vibrio parahaemolyticus*, for example) in a region, or just the strain most likely to cause illness (the most “pathogenic”) in a region.
- Oysters grown in different regions sometimes share the same wet storage prior to harvest. What the shellfish may have in common is the same wet storage, not the same growing area.
- Infections that are highly related via WGS may also be a result of cross-contamination between shellfish or between raw shellfish and ready-to-eat foods.

### Reporting Vibriosis Outbreaks

If individual vibriosis cases are identified as part of an outbreak, indicate this on the CDC COVIS form. In addition, foodborne vibriosis outbreaks should be reported to both the **National Outbreak Reporting System** (NORS) and the **National Environmental Assessment Reporting System** (NEARS).

Below are links to these national reporting systems:

- [COVIS](#)
- [NORS](#)
- [NEARS](#)