

Cholera



Section 1:

ABOUT THE DISEASE

A. Etiologic Agent

Cholera is an acute diarrheal disease caused by enterotoxins produced by *Vibrio cholerae* of the O1 and O139 serogroups. Non-toxigenic *V. cholerae*, or non-O1 and non-O139 *V. cholerae*, can cause sporadic illness but are not associated with the epidemiological characteristics and clinical picture of cholera and do not cause epidemics.

Note: This chapter only pertains to V. cholera serogroups O1 and O139. Other species of Vibrio (e.g., V. parahaemolyticus, V. vulnificus) are not reportable, except in outbreak situations.

B. Clinical Description

Infection with O1 or O139 serogroups of *V. cholerae* often results in asymptomatic or mild illness involving only diarrhea. However, approximately 1 out of 20 infected people will develop more severe illness characterized by profuse watery stools, nausea, some vomiting, and leg cramps. Because of rapid loss of body fluids, dehydration and shock can occur in the most severe cases. Without rehydration therapy, death can result within hours. The case-fatality rate in severe, untreated cases may exceed 50%; with proper treatment, the rate is <1%.

C. Vectors and Reservoirs

Humans are the primary reservoir, although environmental reservoirs may exist in brackish water and estuaries.

D. Modes of Transmission

V. cholerae is usually transmitted via the ingestion of food or water contaminated (directly or indirectly) with feces or vomitus of infected persons (e.g., via sewage).

E. Incubation Period

The incubation period for cholera ranges from a few hours to 5 days; it is typically 2–3 days.

F. Period of Communicability or Infectious Period

Although direct person-to-person spread has not been demonstrated, cholera may presumably be transmitted as long as stools test positive for the bacterium, most likely until a few days after recovery from symptoms. Shedding of bacteria may occasionally persist for several months. Antibiotics effective against the infecting strain shorten the period of communicability.

G. Epidemiology

Since the early 19th century, pandemic cholera has appeared periodically in most parts of the world. In 1991, an epidemic began in Peru that quickly spread to other countries in South America. By 1994, more than 950,000 cases

of cholera in the Western Hemisphere had been reported to the World Health Organization (WHO). In the U.S., most cases occur among travelers returning from areas experiencing epidemic cholera. Sporadic cases have also occurred among persons ingesting inadequately cooked shellfish harvested from coastal waters of Texas and Louisiana. People at increased risk for cholera include those with low gastric acidity. Studies show that some protection against biotypes (strains) within a serogroup is conferred from previous infection.

H. Bioterrorist Potential

V. cholerae O1 and O139 are listed by the Centers for Disease Control and Prevention (CDC) as Category B bioterrorist agents. If acquired and properly disseminated, *V. cholerae* O1 and O139 could cause a serious public health challenge.



Section 2:

REPORTING CRITERIA AND LABORATORY TESTING

A. What to Report to the Massachusetts Department of Public Health (MDPH)

Report either of the following:

- ◆ Isolation of *V. cholerae* O1 or O139 from stool or vomitus; or
- ◆ Serologic evidence of recent infection.

Also report any suspected exposure to *V. cholerae* O1 or O139 that may be the result of bioterrorism.

Note: Other species of Vibrio (e.g., V. parahaemolyticus, V. vulnificus) are not currently reportable in Massachusetts except in outbreak situations. See Section 3C for information on how to report a case.

B. Laboratory Testing Services Available

The MDPH State Laboratory Institute (SLI), Enteric Laboratory will test stool specimens for the presence of *V. cholerae*. It can further identify isolates of *V. cholerae* as serogroup O1. Non-O1 *V. cholerae* are sent to the CDC for serogroup O139 testing. The SLI Enteric Laboratory will also perform confirmatory testing and/or further identification on isolates of other *Vibrio* species obtained from stool specimens. Additionally, the SLI Enteric Laboratory requests submission of all isolates of *V. cholerae*, *V. vulnificus*, and *V. parahaemolyticus* for further testing for surveillance purposes.

For more information on stool specimen and isolate submission, contact the SLI Enteric Laboratory at (617) 983-6609.

Blood specimens submitted for serologic testing for evidence of recent infection are forwarded to the CDC. Contact the SLI Enteric Laboratory at (617) 983-6609 for submission of blood samples to the CDC.

The SLI Reference Laboratory performs confirmatory testing and/or identification of *Vibrio* species from sources others than stool (e.g., wound). For more information on submission of non-stool specimens, contact the SLI Reference Laboratory at (617) 983-6607.

The SLI Food Microbiology Laboratory, at (617) 983-6610, will test implicated food items from case clusters or outbreaks for *Vibrio* species. See Section 4D for more information.



Section 3:

REPORTING RESPONSIBILITIES AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- ◆ To identify sources of major public health concern (e.g., contaminated water, shellfish, or other food), and to stop transmission from such a source.
- ◆ To identify cases of cholera to prevent transmission.
- ◆ To identify cases and clusters of human illness that may be associated with bioterrorism.

B. Laboratory and Health Care Provider Reporting Requirements

Cholera is reportable to the local board of health (LBOH). The MDPH requests that health care providers immediately report to the LBOH in the community where the case is diagnosed, all confirmed or suspect cases of cholera, as defined by the reporting criteria in Section 2A.

Laboratories performing examinations on any specimens derived from Massachusetts residents that yield evidence of cholera shall report such evidence of infection directly to the MDPH within 24 hours.

C. Local Board of Health (LBOH) Reporting and Follow-Up Responsibilities

Reporting Requirements

MDPH regulations (*105 CMR 300.000*) stipulate that cholera is reportable to the LBOH and that each LBOH must report any confirmed case of cholera or suspect case of cholera, as defined by the reporting criteria in Section 2A. Cases should be reported to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS) using an official MDPH *Cholera and Other Vibrio Illness Case Report Form* (found at the end of this chapter). Refer to the *Local Board of Health Timeline* at the end of this manual's *Introduction* section for information on prioritization and timeliness requirements of reporting and case investigation.

Case Investigation

Due to the rarity of cholera, the imported nature of most infections, and the potential severity of the disease, case investigation of cholera in Massachusetts residents will be directed by the MDPH Division of Epidemiology and Immunization.

1. Following notification of the MDPH, the LBOH may be asked to assist in completing a MDPH *Cholera and Other Vibrio Illness Case Report Form* (found at the end of this chapter) by interviewing the case and others who may be able to provide pertinent information. Much of the information required on the form can be obtained from the health care provider or from the medical record. Use the following guidelines to assist in completing the form:

- a. Accurately record the “Demographic and Isolate Information,” type of *V. cholerae* isolated (O1 or O139), the source of transmission, and the date of the specimen. Be sure to include the patient’s complete name and address at the top of the form. Please note that other species of *Vibrio* (e.g., *V. parahaemolyticus*) are not currently reportable, except in outbreak situations.
- b. In the “Clinical Information” section, indicate the date of symptom onset, symptoms, and other medical information.

Note: In the interest of confidentiality under Question 8 (Pre-Existing Conditions), where immunodeficiency is present, indicate the presence of it without indicating the cause (e.g., HIV, chemotherapy, etc.)

- c. Complete the “Epidemiologic Information” section. When asking about exposures, follow the incubation period guidelines provided on the form (for example, “Did the patient travel in the seven days before illness began?”)
 - d. Complete the “Seafood Investigation” section if illness is suspected to be related to seafood consumption. Record any restaurants, oyster bars, or food stores at which seafood was obtained by the case. If you suspect that the case became infected through food, use the MDPH *Foodborne Illness Complaint Worksheet* (found at the end of this chapter) to facilitate recording additional information. It is requested that the LBOH fax or mail this worksheet to the MDPH Center for Environment Health, Food Protection Program (FPP); see the top of the worksheet for fax number and address. This information is entered into a database and will help link other complaints from neighboring towns, thus helping to identify foodborne illness outbreaks. *Note: This worksheet does not replace the MDPH Cholera and Other Vibrio Illness Case Report Form.*
 - e. If you have made several attempts to obtain case information but have been unsuccessful (e.g., the case or health care provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason(s) why it could not be filled out completely.
2. After completing the form, attach laboratory report(s) and fax or mail (in an envelope marked “Confidential”) to ISIS. The confidential fax number is (617) 983-6813. Call ISIS at (617) 983-6801 to confirm receipt of your fax. The mailing address is:

MDPH, Office of Integrated Surveillance and Informatics Services (ISIS)
305 South Street, 5th Floor
Jamaica Plain, MA 02130
Fax: (617) 983-6813

3. Institution of disease control measures is an integral part of case investigation. It is the responsibility of the LBOH to understand, and if necessary, institute the control guidelines listed in Section 4.



Section 4:

CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (105 CMR 300.200)

Food handlers with cholera must be excluded from work.

Note: A case of cholera is defined by the reporting criteria in Section 2A of this chapter.

Minimum Period of Isolation of Patient

After diarrhea has resolved, food handling facility employees may return to work only after producing one negative stool specimen. If the case is treated with an antimicrobial, the stool specimen shall not be collected until at least 48 hours after cessation of therapy. In outbreak circumstances, a second consecutive negative stool specimen will be required prior to returning to work.

Minimum Period of Quarantine of Contacts

Contacts with diarrhea who are food handling facility employees shall be considered the same as a case and shall be handled in the same fashion. No restrictions otherwise.

B. Protection of Contacts of a Case

Persons who shared food or water with a case during their infectious period should be observed for five days from last exposure for signs of illness. Preventive antibiotic therapy is usually not recommended for household contacts in the U.S. since secondary spread is rare. Immunization of contacts is not indicated.

C. Managing Special Situations

Locally Acquired Case

A locally acquired case of cholera is an unusual occurrence as most cases occur among travelers returning from areas experiencing epidemic cholera. If it is determined, during the course of an investigation, that a case or suspect case does not have a recent travel history to an endemic country, a more intensive investigation will need to be instituted as soon as possible to determine the source of infection and the mode of transmission. This investigation will be conducted jointly with the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850.

Reported Incidence Is Higher Than Usual/Outbreak Suspected

If the number of cases reported in your city/town is higher than usual, if you suspect an outbreak, or if multiple cases are reported among people who have not traveled out of the U.S., investigate to determine the source of infection and the mode of transmission. A contaminated vehicle (e.g., water or food) should be sought, and applicable preventive or control measures should be instituted. Since person-to-person transmission is theoretically possible, special emphasis should be placed on personal cleanliness and sanitary disposal of feces. The MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 will work with you to determine a course of action to prevent further cases and can perform surveillance for cases across town lines, which would otherwise be difficult to identify at the local level.

If bioterrorism is suspected, the MDPH and other response agencies will work closely with LBOH and will provide instructions/information on how to proceed.

D. Preventive Measures

Environmental Measures

Implicated food items from Massachusetts or elsewhere in the U.S. must be removed from consumption. A decision about testing implicated food items can be made in consultation with the FPP or the MDPH Division of Epidemiology and Immunization. The FPP can help coordinate pickup and testing of food samples. If a commercial product is suspected, the FPP will coordinate follow-up with relevant outside agencies.

Note: The role of the FPP is to establish policy and to provide technical assistance with the environmental investigation, such as interpreting the Massachusetts Food Code, conducting a Hazard Analysis and Critical Control Point (HACCP) risk assessment, initiating enforcement actions, and collecting food samples.

The general policy of the SLI is to test only food samples implicated in suspected outbreaks, not single cases (except when botulism is suspected). However, leftover food consumed within the incubation period by a single, confirmed case of domestically acquired cholera will most likely be prioritized for testing.

Note: Refer to the MDPH's Foodborne Illness Investigation and Control Reference Manual for comprehensive information on investigating foodborne illness complaints and outbreaks. Copies of this manual have been made available to LBOH. It can also be located on the MDPH website in PDF format at www.mass.gov/dph/fpp/refman.htm. For the most recent changes to the Massachusetts Food Code, contact the FPP at (617) 983-6712 or on the MDPH website at www.mass.gov/dph/fpp.

Personal Preventive Measures/Education

To avoid exposure, recommend that individuals:

- ◆ Not eat raw or undercooked fish or shellfish. Despite good sanitation, even shellfish harvested from coastal U.S. waters have periodically been contaminated with *V. cholerae*.
- ◆ Always wash hands thoroughly with soap and water before eating or preparing food and after using the toilet.
- ◆ Wash the child's hands as well as own hands after changing a child's diapers, and dispose of feces in a sanitary manner.
- ◆ Wash hands thoroughly and frequently when ill with diarrhea or when caring for someone with diarrhea. Hands should be scrubbed for at least 15–20 seconds after cleaning the bathroom; after using the toilet or helping someone use the toilet; after changing diapers; before handling food; and before eating.

International Travel

Travelers going to cholera endemic areas should pay attention to what they eat and drink. They should also consider getting vaccinated against cholera, but they should be warned that vaccines* are not 100% effective. Avoiding risky foods and potentially contaminated beverages will also help protect against other illnesses, including traveler's diarrhea, typhoid fever, dysentery, and hepatitis A.

Travelers should:

- ◆ “Boil it, cook it, peel it, or forget it.”
- ◆ Drink only bottled or boiled water, keeping in mind that bottled carbonated water is safer than bottled non-carbonated water.
- ◆ Ask for drinks without ice, unless the ice is made from bottled or boiled water.
- ◆ Avoid popsicles and flavored ices that may have been made with contaminated water.
- ◆ Eat foods that have been thoroughly cooked and that are still hot and steaming.
- ◆ Avoid raw vegetables and fruits that cannot be peeled. Vegetables like lettuce are easily contaminated and are very hard to wash well.
- ◆ Peel raw fruits or vegetables and not eat the peelings.
- ◆ Avoid foods and beverages from street vendors.
- ◆ Avoid undercooked or raw fish or shellfish, including ceviche.
- ◆ Not bring any perishable food back to the U.S.

For more information regarding international travel and the cholera vaccines, contact the CDC’s Traveler’s Health Office at (877) 394-8747 or on the CDC website at www.cdc.gov/travel.

A Cholera Public Health Fact Sheet is available from the MDPH Division of Epidemiology and Immunization or on the MDPH website at www.mass.gov/dph. Click on the “Publications and Statistics” link, and select the “Public Health Fact Sheets” section under “Communicable Disease Control.”



ADDITIONAL INFORMATION

The formal CDC surveillance case definition for cholera is the same as the criteria outlined in Section 2A of this chapter. (CDC case definitions are used by the MDPH and the CDC to maintain uniform standards for national reporting.) When reporting to the MDPH, always use the criteria outlined in Section 2A.

Note: The most up-to-date CDC case definitions are available on the CDC website at www.cdc.gov/epo/dphsi/casedef/case_definitions.htm.

* Several vaccines are available that provide varying levels of protection against *V. cholerae*. The oral vaccines provide a high level of short-term protection against O1 strains (approximately several months). The killed whole-cell vaccine provides approximately 50% protection for up to 6 months, but does not prevent asymptomatic infection.



REFERENCES

- American Academy of Pediatrics. [*Vibrio* Infections: Cholera.] In: Pickering L.K., ed. *Red Book: 2003 Report of the Committee on Infectious Diseases, 26th Edition*. Elk Grove Village, IL, American Academy of Pediatrics; 2003: 686–688.
- CDC. Case Definitions for Infectious Conditions Under Public Health Surveillance. *MMWR*. 1997; 46(RR-10).
- “Cholera: Frequently asked Questions.” Centers for Disease Control and Prevention. October 6, 2005.
<www.cdc.gov/ncidod/dbmd/diseaseinfo/cholera_g.htm>.
- Heymann, D., ed. *Control of Communicable Diseases Manual, 18th Edition*. Washington, DC, American Public Health Association, 2004.
- MDPH. *Control Guidelines for Long-Term Care Facilities*. Massachusetts Department of Public Health. 2002.
<www.mass.gov/dph/cdc/epii/lcfc/lcfc.htm>.
- MDPH. *Foodborne Illness Investigation and Control Reference Manual*. Massachusetts Department of Public Health. 1997.
<www.mass.gov/dph/fpp/refman.htm>.
- MDPH. *Regulation 105 CMR 300.000: Reportable Diseases, Surveillance, and Isolation and Quarantine Requirements*. MDPH, Promulgated November 4, 2005.
- Tauxe, R., Mintz, E., Quick, R. Epidemic Cholera in the New World: Translating Field Epidemiology into New Prevention Strategies. *Emerging Infectious Diseases*. 1995; 1(4): 141–146.



FORMS & WORKSHEETS

Cholera

Cholera



LBOH Action Steps

This form does not need to be submitted to the MDPH with the case report form. It is for LBOH use and is meant as a quick-reference guide to cholera case investigation activities.

LBOH staff should follow these steps when cholera is suspected or confirmed in the community. For more detailed information, including disease epidemiology, reporting, case investigation, and follow-up, refer to the preceding chapter.

- Notify the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 to report any confirmed case(s) of cholera.
- Obtain laboratory confirmation.
- For cholera suspected to be the result of food consumption, complete a MDPH *Foodborne Illness Complaint Worksheet* and forward to the MDPH Center for Environmental Health, Food Protection Program (FPP).
- For suspect case(s) due to contaminated seafood, identify and remove any suspect food item(s).
- Consult with the MDPH Division of Epidemiology and Immunization regarding the submission of suspect food items for testing.
- Identify other potential exposure sources, such as a water source.
- Determine whether the case attends or works at a daycare facility and/or is a food handler.
- Identify other potentially exposed persons.
- Fill out the case report form (attach laboratory results).
- Send the completed case report form (with laboratory results) to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS).