

Cholera

(Toxigenic *Vibrio cholerae* O1, O139)

Note: Only toxigenic strains of *Vibrio cholerae* serogroups O1 and O139 cause epidemics and are reportable as cholera. This guidance is intended for management of patients with toxigenic strains of *V. cholerae* serogroups O1 and O139, and early management (i.e., before laboratory confirmation is available) of patients with cholera-like illness returning from regions where cholera activity has been reported (e.g., travelers returning from Haiti or the Dominican Republic).

For management of non-toxigenic strains of *V. cholerae* O1 and O139, toxigenic strains of other *V. cholerae* serogroups (e.g. O75 and O141), and other *Vibrio* species, refer to the guidance for vibriosis.

PROTOCOL CHECKLIST

- Enter available information into Merlin within 24 hours of notification
- Review background on disease, case definition, laboratory testing ([page 2](#))
 - Contact provider ([page 6](#))
 - Confirm diagnosis
 - Obtain available demographic and clinical information
 - Determine what information was provided to the patient
- Ensure collection and submission of appropriate specimens ([page 4](#))
- Interview patient(s) ([page 6](#))
 - Review disease facts ([page 2](#))
 - Description of illness
 - Modes of transmission
 - Ask about exposure to relevant risk factors ([page 6](#))
 - Travel to an area affected by cholera
 - Exposure to untreated water sources
 - Exposure to raw shellfish or undercooked seafood
 - Consumption of food imported from an area affected by cholera
 - Pre-existing conditions
 - Identify any similar cases of illness among contacts
 - Determine whether case-patient or symptomatic contact is in a sensitive situation
 - Provide recommendations for case management and management of contacts
 - Infection control ([page 7](#))
 - Management of contacts ([page 8](#))
 - Management of sensitive situations ([page 8](#))
 - Provide education on transmission and prevention ([see page 7](#))
 - Review cholera prevention messages
 - Review proper hand washing
 - Address case-patient's questions or concerns
- If associated with seafood exposure in the United States
 - Determine source
 - Determine if an environmental investigation is warranted
 - Provide education on transmission and prevention ([page 7](#))
 - Avoid consumption of raw oysters and other raw shellfish
 - Avoid cross-contamination of food with raw seafood or juices from raw seafood
 - Appropriate handling of shellfish
- Follow-up on special situations, including outbreaks or case-patients in sensitive situations ([see page 8](#))

- Update Merlin case entry with any additional information
- Complete and submit the Cholera and Other *Vibrio* Illness Surveillance (COVIS) form for confirmed cases.

1. DISEASE REPORTING

A. Purpose of reporting and surveillance

1. To identify exposures and sources of transmission and to take public health action to prevent additional cases.
2. To identify populations at risk and provide health education to reduce risk of exposure.
3. To monitor trends in the epidemiology of toxigenic *V. cholerae* O1 or O139.

B. Legal reporting requirements

Laboratories and physicians are required to report cholera to the local county health department (CHD) immediately upon initial suspicion or laboratory test order.

C. County health department investigation responsibilities

1. Investigate all cases as soon as possible, but no later than one business day, after receiving a report from a provider or laboratory (Section 6).
2. Ensure appropriate control measures are taken to prevent the spread of cholera locally (Section 6). Instruct contacts what actions to take if they suspect they have cholera.
3. Ensure that laboratory specimens are submitted to the Bureau of Laboratories (BOL) for confirmatory testing and additional characterization (Section 4).
4. Report all cases by telephone to the Bureau of Epidemiology (BOE) Laboratory Liaison who will help notify CDC and other DOH staff including food and waterborne disease subject matter experts if indicated.
5. Enter cases in Merlin (VIBRIO CHOLERAЕ TYPE O1 – 00190) within one business day of notification.
6. For confirmed cases, complete the CDC Cholera and Other *Vibrio* Illness Surveillance Report (COVIS) form (http://www.doh.state.fl.us/Disease_ctrl/epi/topics/crforms.htm) and attach an electronic copy to the case in Merlin.

2. THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic agents

Cholera is an acute intestinal infection caused by toxigenic *Vibrio cholera* serogroups O1 and O139. Although other *V. cholerae* serogroups and non-toxigenic strains of *V. cholerae* O1 and O139 cause cholera-like illness, only toxigenic strains of serogroup O1 and O139 cause epidemics and are reportable as “cholera.” *V. cholerae* O1 has two biotypes, Classical and El Tor. Each biotype has two distinct serotypes, Inaba and Ogawa. Cholera is a major cause of epidemic diarrhea in developing countries and causes an estimated 3-5 million cases and 100,000 – 120,000 deaths annually.

B. Description of illness

The clinical picture for cholera ranges from asymptomatic infection to severe diarrheal illness. Approximately 75% of persons infected with *V. cholerae* are asymptomatic. Most persons with symptoms develop a mild to moderate diarrheal illness that is difficult to differentiate from other causes of diarrheal disease. Five to 10 percent of infections cause severe disease. Severe cholera is characterized by acute profuse watery diarrhea, sometimes described as “rice-water stools,” that can lead to rapid fluid loss and

hypovolemic shock. Additional symptoms of severe illness may include vomiting, tachycardia, loss of skin turgor, muscle cramps, dry mucous membranes, hypotension, and thirst. Without treatment, death can occur within hours.

C. Reservoirs

The main reservoir is humans, although environmental reservoirs also exist. Toxigenic *V. cholerae* O1 and O139 are naturally occurring in fresh and brackish waters where reservoirs include shellfish and plankton.

D. Modes of transmission

Cholera transmission occurs by ingestion of contaminated water or food. In the outbreak setting, fecal contamination of water and food supplies by infected individuals contributes to the widespread transmission of cholera. Transmission can also occur through consumption of raw or undercooked shellfish from waters where natural reservoirs of *V. cholerae* exist. Person-to-person transmission is rarely documented.

E. Incubation period

The incubation period for cholera ranges from a few hours to five days (usually 2-3 days).

F. Period of communicability

V. cholerae is communicable for as long as stool cultures are positive. Stools typically remain positive only a few days following resolution of symptoms. A long-term carrier state, as long as several months, is uncommon and not thought to play an important role in the transmission of disease.

G. Treatment

Prompt and adequate rehydration is the cornerstone of treatment. Immediate administration of oral rehydration solution (ORS) or intravenous fluids can dramatically reduce case-fatality rates. Antimicrobial therapy is indicated for patients with severe diarrhea and has been shown to reduce fluid requirements and shorten the duration of diarrhea and vibrio excretion. Antibiotics commonly used to treat cholera include doxycycline, azithromycin, erythromycin, and ciprofloxacin. When possible and in the setting of an outbreak, antibiotic choice should be based on antimicrobial susceptibility testing. Additional details about rehydration and antibiotic treatment are available at: <http://www.cdc.gov/cholera/treatment.html>.

H. Prophylaxis

None indicated

I. *Vibrio cholerae* in Florida

Cholera in Florida is almost exclusively due to travel outside the United States. Florida experienced an increased number of cases of imported cholera during the Latin American cholera epidemic in the early 1990s. No cases of illness due to toxigenic *V. cholerae* were reported from 1997 – 2009. Cases associated with travel to Hispaniola were reported following identification of the outbreak in October 2010.

3. CASE DEFINITIONS**A. Clinical description**

An infection of variable severity characterized by diarrhea and/or vomiting; severity is variable.

B. Laboratory criteria for diagnosis

- Isolation of toxigenic (i.e., cholera toxin-producing) *Vibrio cholerae* O1 or O139 from stool or vomitus

OR

- serologic evidence of recent infection.

C. Case classification

Confirmed: a clinically compatible illness that is laboratory confirmed.

D. Comments

Illnesses caused by strains of *V. cholerae* other than toxigenic *V. cholerae* O1 or O139 should not be reported as cases of cholera

The etiologic agent of a case of cholera should be reported as either *V. cholerae* O1 or *V. cholerae* O139. Toxigenic production for *V. cholerae* O1 or O139 must be performed by CDC.

Infections due to *Vibrio cholerae* non-O1 should be reported as *Vibrio*, infections (code 00198) *Vibrio cholerae*, non-O1.

Any available isolates of the organism must be sent to the Bureau of Laboratories for confirmation and serotyping. Toxigenic production for *V. cholerae* O1 or O139 must be performed by CDC. This condition has been identified as a potential bioterrorism agent by the CDC.

A copy of laboratory test results must accompany the paper case report form.

Due to the outbreak of cholera in Haiti starting in fall 2010 an interim case definition was developed; please refer to “Guidance for Haiti-related Toxigenic *Vibrio cholerae* Type 01 Case Reporting for County Health Departments” as long as a response to the Haiti cholera outbreak is occurring. This document is available at:

http://www.doh.state.fl.us/disease_ctrl/epi/Acute/cholera.htm

4. LABORATORY TESTING**A. Criteria for diagnosis**

Isolation of toxigenic (i.e., cholera toxin-producing) *Vibrio cholerae* O1 or O139 from stool or vomitus OR serologic evidence of recent infection.

Isolation of *Vibrio cholerae* from stool is widely available at most hospital and commercial laboratories. The test request must be specific for *Vibrio cholerae* because identification of the organism by culture requires special techniques that are not routinely performed.

Any available isolates of the organism must be sent to the FDOH Bureau of Laboratories (BOL) for confirmation and serotyping. The BOL can also perform testing on clinical specimens if this type of testing is not available locally. The BOL should be notified by phone prior to specimen or isolate submission.

Confirmation of toxin production must be performed by the Centers for Disease Control and Prevention (CDC). Serologic testing is only available at CDC.

B. Specimens for laboratory testing

1. Stool: Isolation of *Vibrio cholerae* from stool is the preferred method of diagnosis for cholera.

2. Serum: Please consult with your BOE Regional Epidemiologist/Laboratory Liaison prior to the collection and submission of sera for testing. Serology may be performed by CDC under select circumstances, such as the outbreak in Hispaniola. For details, refer to the interim "Guidance for Haiti-related Toxicogenic *Vibrio cholerae* Type O1 Case Reporting for County Health Departments" at: http://www.doh.state.fl.us/disease_ctrl/epi/Acute/cholera.htm. For optimal results, three serum samples (S1-S3) should be collected for each case according to the following time schedule:
 - a. Serum 1 (S1): Collect as soon as possible following onset of symptoms: ideally within the first three days.
 - b. Serum 2 (S2): Collect 10-14 days after illness onset, but no later than three weeks after illness onset
 - c. Serum 3 (S3): Collect about two weeks after S2, but no later than six weeks after illness onset.

If the optimal time for collection of S1 has passed, collect S2 and S3 specimens. If more than three weeks has elapsed from illness onset then collect S3 only.

C. Testing requests

1. Submitting specimens/isolates to BOL
 - a. All submissions should be accompanied by Clinical Lab Submission Form 1847 (http://www.doh.state.fl.us/lab/addpages/BOL_Forms.html).
 - b. Electronic Laboratory Ordering (ELO) may also be used by entering request into the HMS State Laboratory System, placing bar coded label on the Cary- Blair vial, and writing the date collected on the vial.
2. Specimen collection and storage
 - a. Stool or rectal swabs should be transported in Cary Blair medium at room temperatures (not refrigerated or frozen). Cary Blair medium should be at room temperature before stool is placed in the media.
 - b. Isolates should be submitted in a screw-top agar slant that will support growth (e.g. blood agar).
 - c. Storage of stool specimens and isolates prior to shipping should be at ambient temperatures. Prolonged storage in the refrigerator may adversely affect the laboratory's ability to culture the organism.
 - d. Serum should be separated from the clot or packed cells in a serum separator tube within one hour of collection and transferred to a separate sterile tube for storage and shipment. Storage should be at 4 degrees Celsius or frozen if stored for greater than two weeks
3. Packaging and shipping
 - a. Contact the DOH BOL prior to shipment.
 - b. Stool specimens and isolates should be shipped in a cooler without cool-packs.
 - c. Serum: If refrigerated, specimens should be shipped in a cooler with cool-packs. If frozen, specimens should be shipped using dry ice. Specimens should be shipped to the state laboratory in Jacksonville, Florida for transfer to CDC for testing. Specify the type of testing requested and that the specimen should be forwarded to CDC for testing on the submission form.
 - d. Guidelines for packaging and shipping can be found at: http://www.doh.state.fl.us/lab/PDF_Files/Packaging_Flowchart_0422051.pdf and http://www.doh.state.fl.us/lab/PDF_Files/Packaging_Flowchart_notes_0422051.pdf
4. Contact the regional laboratory with questions:
http://www.doh.state.fl.us/lab/addpages/BOL_Contacts.html.

5. CASE INVESTIGATION

A. Contact the physician or hospital

1. Confirm diagnosis of a *Vibrio cholerae* infection.
2. Obtain and review available medical records and note the following:
 - a. Date of onset
 - b. Signs and symptoms
 - c. Predisposing conditions (e.g., immunosuppression)
 - d. Request available test results
 - e. Treatment (especially antimicrobials)
 - f. Current clinical status
3. Ensure collection and submission of required clinical specimens for the diagnosis of cholera.
4. Determine that the patient is aware of the diagnosis and ascertain what information has been provided.
5. Obtain demographic information, including contact information (home, cellular, pager and/or work numbers). Determine current location of the patient (i.e., hospital or home) and the preferred method of contact.
6. Notify the physician that you will be contacting the patient as DOH follows up on all cases of cholera to assess risk factors, to better characterize the occurrence of cholera infections in Florida, and to identify potential means for preventing further illness. It may also be appropriate at this point to determine if the physician has any concerns about the health department contacting the patient.

B. Interview the patient

1. Contact the patient by telephone, home visit, or visit to the hospital. Interviews should be completed as soon as possible after being reported to optimize recall.
2. The CDC Cholera and Other *Vibrio* Illness Surveillance Report (COVIS) form is required for all confirmed cholera cases. This form can be found at http://www.doh.state.fl.us/Disease_ctrl/epi/topics/crforms.htm. Ensure that the relevant data for this form is collected during the interview.
3. For cases associated with the outbreak of cholera in Haiti, follow the guidelines provided in the document "Guidance for Haiti-related Toxicogenic *Vibrio cholerae* Type 01 Case Reporting for County Health Departments." The document above can be found at http://www.doh.state.fl.us/disease_ctrl/epi/Acute/cholera.htm.
4. Items to cover during interview include:
 - a. Briefly review general information for this disease.
 - b. Exposures during exposure period (seven days prior to onset):
 - i. Travel outside Florida or the United States. Determine dates of travel.
 - ii. Exposure to untreated sources of water.
 - iii. Handling of raw shellfish.
 - iv. Consumption of seafood, particularly raw or undercooked seafood. If a shellfish vehicle is identified, interview others who ate the same item.
 - v. Consumption of food items imported from areas affected by cholera; interview others who ate the same item and provide information on actions to take if they become ill.
 - vi. Restaurant meals. Obtain the name of the restaurant(s), date(s), and location(s) of the meal(s).

- c. Determine if others (e.g., family, friends, travel companions, coworkers, etc.) are known or thought to be ill with similar symptoms. If so, inquire about possible common source exposures. Obtain the name, phone number or address and clinical information of the ill person and follow-up if appropriate.
- d. Determine if the patient or any of their symptomatic household or other close contacts are associated with sensitive situations (i.e. an attendee or employee of a daycare/childcare setting, a food handler, or an employee in a healthcare setting with direct patient care). Determine the dates and times he/she worked to assess the risk of transmission to others. See Section 7 for recommended exclusions for symptomatic patients or contacts in sensitive situations.
- e. Provide basic instruction to patients and contacts regarding control measures for preventing further spread of the disease (Section 6).

C. Environmental evaluation

A sanitary inspection is indicated if a commercial food service facility, child care center, or public drinking water supply is suspected as the source of infection. If illness was associated with shellfish, determine what shellfish was consumed, and information on preparation and handling. Obtain the shellfish labeling tags and collect information on the supplier and harvest site.

D. Merlin data entry

Create a case in Merlin under disease code **VIBRIO CHOLERAЕ TYPE O1 – 00190** within one business day of notification. Enter the data collected into Merlin, being sure to include all required fields on the Basic Data screen, complete the Case Symptoms screen, travel screen, and attach all relevant labs. Please attach all labs received via electronic laboratory reporting (ELR) to the case and include serogroup, biotype, and toxigenicity information as available.

6. CONTROLLING FURTHER SPREAD

A. Infection Control Recommendations

Standard precautions are recommended for hospitalized patients. Contact precautions should be used for diapered or incontinent persons for the duration of the illness.

B. Patient/ household education on prevention recommendations

Education for the patient and care-givers should include the importance of effective hand washing, particularly after using the toilet or changing diapers and before preparing or eating food. Persons with diarrhea should not be involved in food preparation.

Importation of food items by travelers from cholera-affected areas is not recommended.

Avoid consumption of raw oysters or other raw shellfish, particularly if a predisposing factor for infection exists. Persons at increased risk for infection and more severe disease include persons with immunocompromising conditions, persons with chronic liver disease, and persons using antacids, histamine receptor blockers, and proton pump inhibitors.

Shellfish should be obtained from approved sources and should be adequately boiled or steamed (at least 10 minutes) prior to consumption.

Avoid cross-contamination of food with raw seafood or juices from raw seafood.

Ensure proper temperature control of shellfish prior to preparation and consumption.

Eat shellfish promptly after cooking and immediately refrigerate leftovers.

C. Isolation of patients

Patients in non-sensitive situations should be counseled regarding disease transmission, food preparation, and hand washing practices. Follow-up or release from isolation based on stool culture results is not required. See Section 7 for recommended exclusions for symptomatic patients in sensitive situations (i.e., an attendee or employee of a daycare/childcare setting, a food handler, or an employee in a healthcare setting with direct patient care).

D. Management of contacts

Although person-to-person transmission is not likely, CHD epidemiology staff should identify persons at risk of acquiring cholera infection from identified patients and those persons with similar exposures. Household and other close contacts should be educated about the importance of hand washing after caring for ill persons, changing diapers, defecating, and before preparing food. These contacts should be advised to seek immediate medical attention and to alert their healthcare provider of their exposure to a cholera case if they should become ill. If contacts with acute watery diarrhea are identified, CHD staff should ensure that these persons receive appropriate medical care and diagnostic testing for cholera. These persons should be managed as probable cases until proven otherwise. This is especially important when secondary transmission to persons in sensitive situations is suspected. Stool culture or serology can be used to investigate possible infection among persons exposed to a common source.

E. Food or water is implicated as the source of an outbreak

Contact your Regional Environmental Epidemiologist for investigation guidance (http://www.doh.state.fl.us/environment/medicine/foods-surveillance/about_us.htm).

F. Immunization recommendations

There are two oral cholera vaccines currently available on the market, but neither vaccine is available in the United States. CDC does not recommend cholera vaccines for most travelers because protection is incomplete and of short duration (3-6 months).

7. MANAGING SENSITIVE SITUATIONS

Guidance for management of cholera cases in sensitive situations is not specifically addressed in Chapter 64D-3 of the Florida Administrative Code. Current DOH recommendations for sensitive situations are addressed below.

A. Patient is a food handler

The patient should be instructed not to work as a food handler until symptoms resolve completely. Consult with the Regional Environmental Epidemiologist to determine if further follow-up is warranted.

B. Patient works at a health care or residential care facility

The patient should be instructed not to work until complete resolution of symptoms. Investigate if the patient had contact with any persons with a similar illness and determine if there has been an unusual incidence of diarrheal illness at the facility within the past week. Consult with the BOE Laboratory Liaison to determine if further investigation is necessary.

C. Patient attends or works at a child care facility

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The patient should be instructed not to return to the day care facility until complete resolution of symptoms. Determine if there has been an unusual incidence of diarrheal illnesses at the facility within the past week. Consult with the BOE Regional Epidemiologist/ Laboratory Liaison to determine if further investigation is warranted.

8. IMPORTANT LINKS

A. Cholera Case Report Form

http://www.doh.state.fl.us/Disease_ctrl/epi/topics/crforms.html

B. Cholera FAQs

<http://www.cdc.gov/cholera/general/>

C. Contact the Bureau of Epidemiology website:

http://www.doh.state.fl.us/disease_ctrl/epi/topics/contact.htm

D. Surveillance Case Definitions:

http://www.doh.state.fl.us/Disease_ctrl/epi/surv/CaseDefinitions.html

E. Food and Waterborne Disease Program – Contact List

http://www.foodandwaterdisease.com/contact_docs/RegionalEpidemiologist_ContactsList.pdf

F. Reporting guidelines

http://www.doh.state.fl.us/Disease_ctrl/epi/Acute/reporting_HP.html. Contact information for

G. County Health Department contact information

http://www.doh.state.fl.us/disease_ctrl/epi/topics/contact.htm.

H. FDOH Bureau of Laboratory contact information and forms

http://www.doh.state.fl.us/lab/addpages/BOL_Contacts.html.

9. REFERENCES

A. David L. Heymann (ed.), *Control of Communicable Diseases Manual*, 18th ed., American Public Health Association Press, Washington, District of Columbia, 2004.

B. WHO cholera: <http://www.who.int/topics/cholera/en/>.

C. CDC cholera: <http://www.cdc.gov/cholera/index.html>;

<http://www.cdc.gov/cholera/treatment.html>;

<http://www.cdc.gov/cholera/prevention.html>.

D. Annual Summaries of *Vibrio* Illnesses:

http://www.cdc.gov/nationalsurveillance/cholera_vibrio_surveillance.html.

E. “Guidance for Haiti-related Toxigenic *Vibrio cholerae* Type O1 Case Reporting for County Health Departments” at: http://www.doh.state.fl.us/disease_ctrl/epi/Acute/cholera.htm.