Vibrio Infections including Cholera

rev March 2021

BASIC EPIDEMIOLOGY

Infectious Agent
Vibrio species, a Gram-negative, curve-shaped bacterium.

Transmission
Transmission occurs through the ingestion of food or water contaminated with feces, ingestion of raw/undercooked seafood, or exposure of wounds to contaminated water.

Incubation Period

- *V. cholerae* serogroups O1 and O139:
  - Usually 2 to 3 days (ranges from a few hours to 5 days)
- *V. cholerae* serogroups other than O1 and O139:
  - Usually 12 to 24 hours (range 5.5 to 96 hours)
- *V. parahaemolyticus*:
  - Usually 12 to 24 hours (range 4 to 96 hours)
- *V. vulnificus*:
  - Usually 12 to 72 hours

Communicability
There is no evidence of person-to-person transmission; fecal contamination of food or water is possible.

Clinical Illness
Symptoms and severity of illness may vary. Illness can range from: a mild ear infection (*V. alginolyticus*), gastrointestinal infections of varying severity (*V. parahaemolyticus* and other species), life-threatening invasive disease (*V. vulnificus*), and profuse watery diarrhea (cholera toxin-producing strains of *V. cholerae*).

DEFINITIONS

Note: There are 4 different categories of vibriosis used in NEDSS: Cholera (toxin-producing only), *V. parahaemolyticus*, *V.vulnificus,* and Vibriosis, other or unspecified.

CHOLERA (toxigenic *Vibrio cholerae* O1 or O139)

Clinical Case Definition
An illness characterized by diarrhea and/or vomiting; severity is variable.

Laboratory Confirmation

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

Case Classifications

- **Confirmed:** A clinically compatible illness that is laboratory confirmed

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

VIBRIO PARAHAEMOLYTICUS

Clinical Case Definition
An intestinal disorder characterized by watery diarrhea and abdominal cramps in the majority of cases, and sometimes with nausea, vomiting, fever and headache. Occasionally, a dysentery-like illness is observed with bloody or mucoid stools, high fever and high WBC count. Typically, it is a disease of moderate severity lasting 1-7 days; systemic infection and death rarely occur.

Laboratory Confirmation

- Isolation of *Vibrio parahaemolyticus* from a clinical specimen

Case Classifications

- **Confirmed:** A case that meets the laboratory criteria for diagnosis
- **Probable:**
    - A case with *Vibrio parahaemolyticus* detected, in a clinical specimen, by use of culture independent laboratory methods (non-culture based), **OR**
    - A clinically compatible case that is epidemiologically linked to a case that meets the probable or confirmed laboratory criteria for diagnosis

Note: A case should not be counted as a new case if laboratory results were reported within 30 days of a previously reported infection in the same individual, unless additional information is available indicating a separate infection, e.g., different species

VIBRIO VULNIFICUS

Clinical Case Definition
Infection with *Vibrio vulnificus* produces septicemia in persons with chronic liver disease, chronic alcoholism or hemochromatosis, or those who are immunosuppressed. The disease appears 12 hours to 3 days after eating raw or undercooked seafood, especially oysters. One third of patients are in shock when they present for care or develop hypotension within 12 hours after hospital admission.

Three quarters of patients have distinctive bullous skin lesions; thrombocytopenia is common and there is often evidence of disseminated intravascular coagulation. *V. vulnificus* can also infect wounds sustained in coastal or estuarine waters; wounds range from mild, self-limited lesions to rapidly progressive cellulitis and myositis that can mimic clostridial myonecrosis in the rapidity of spread and destructiveness.

Laboratory Confirmation

- Isolation of *Vibrio vulnificus* from a clinical specimen

Case Classifications

- **Confirmed:** A case that meets the laboratory criteria for diagnosis
- **Probable:**
    - A case with *Vibrio vulnificus* detected, in a clinical specimen, by use of culture independent laboratory methods (non-culture based), **OR**
    - A clinically compatible case that is epidemiologically linked to a case that meets the probable or confirmed laboratory criteria for diagnosis

Note: A case should not be counted as a new case if laboratory results were reported within 30 days of a previously reported infection in the same individual, unless additional information is available indicating a separate infection, e.g., different species

VIBRIOSIS, OTHER OR UNSPECIFIED

Clinical Case Definition

An infection of variable severity characterized by diarrhea and vomiting, primary septicemia, or wound infections. Asymptomatic infections can occur, and the organism can cause extraintestinal infections.

Laboratory Confirmation

- Isolation of a species of the family *Vibrionaceae* (other than *Vibrio parahaemolyticus*, *Vibrio vulnificus*, and toxigenic *Vibrio cholerae*) from a clinical specimen
    - Genera in the family *Vibrionaceae* currently include *Aliivibrio, Allomonas, Catenococcus, Enterovibrio, Grimontia, Listonella, Photobacterium, Salinivibrio*, and *Vibrio*.

Case Classifications

- **Confirmed:** A case that meets the laboratory criteria for diagnosis
- **Probable:**
    - A case with a species of the family *Vibrionaceae* (other than *Vibrio parahaemolyticus*, *Vibrio vulnificus*, and toxigenic *Vibrio cholerae* O1 or O139) detected, in a clinical specimen, by use of culture independent laboratory methods (non-culture based), **OR**
    - A clinically compatible case that is epidemiologically linked to a case that meets the probable or confirmed laboratory criteria for diagnosis

Note: as required by TAC all *Vibrio* species isolates must be submitted to the DSHS laboratory.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should promptly investigate all reports of *Vibrio* infections. Investigations should include an interview of the case or a surrogate to get a detailed exposure history. Please use the **Cholera and Other *Vibrio* Illnesses Surveillance (COVIS) Report** form. The form is available on the DSHS website http://www.dshs.state.tx.us/idcu/investigation/.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition.
- ☐ Verify that the laboratory has forwarded the isolate to the DSHS laboratory, as required. If an isolate has not been sent, please request a specimen be submitted.
    - Note: *Vibrio* bacteria are difficult to speciate, and it is not uncommon for the DSHS laboratory to identify a different species from an isolate than a hospital laboratory. EAIDU consider speciation conducted by the DSHS laboratory to be definitive.
- ☐ Review medical records or speak to an infection preventionist or healthcare provider to verify case definition, identify possible risk factors and describe course of illness.
    - Use information from medical records to complete the Clinical Information section of the COVIS form.
- ☐ Interview the case to identify potential sources of infection and risk factor information.
    - Use the **Cholera and Other *Vibrio* Illnesses Surveillance (COVIS) Report** form to record information from the interview.
    - Provide education on effective hand washing, food safety, and the risk of consuming raw/undercooked shellfish. See Prevention and Control Measures.
- ☐ If the case consumed any raw oysters during his/her incubation period, contact any restaurants or points of service where the case reported consuming this food item.
    - Obtain, or have a sanitarian obtain, oyster tags from all restaurants or points of service for the dates appropriate for the case's consumption dates.
    - If the restaurant is out of your jurisdiction, please contact an EAIDU foodborne epidemiologist and they will request oyster tags from the health department with jurisdiction.
    - Complete Section IV: Seafood Investigation Section of the COVIS form
- ☐ Fax or email securely the COVIS form and if applicable, copies of the oyster tag (both sides) information to the EAIDU foodborne epidemiology team at 512-776-7616 or FOODBORNETEXAS@dshs.texas.gov.
    - A member of the EAIDU foodborne team will fax this information to the DSHS Seafood Safety office and the regional office of the FDA for follow-up.
    - An EAIDU foodborne epidemiologist will fax the form (deidentified) to the CDC.
    - Please note that the CDC measures the proportion of interviews reported to CDC within 7 days of interview date, so please send the form as soon as possible.
    - For lost to follow-up (LTF) cases, please complete as much information obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on investigation form and fax/email securely to DSHS EAIDU noting case is LTF.
- ☐ Hospitalized cases should be followed until discharge and patient's outcome recorded on the COVIS form.
    - Initial reports can be sent to DSHS prior to discharge.
- ☐ In the event of a death, copies of the hospital discharge or death summary should also be faxed to DSHS EAIDU.
- ☐ If case is part of an outbreak or cluster, see Managing Special Situations section.

- All confirmed and probable case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures

- Do not eat raw oysters or other raw shellfish, particularly if you are immunocompromised or have chronic liver disease.
- Cook shellfish (oysters, clams, mussels) thoroughly. Do not eat shellfish that do not open during cooking.
    - For shellfish in the shell either:
        - boil until the shells open and continue boiling for five more minutes, or
        - steam until the shells open and continue cooking for nine minutes;
    - For shucked oysters, boil for at least three minutes or fry them in oil for at least 10 minutes at 350°F degrees.
- Avoid cross-contamination between cooked seafood and other foods with raw seafood and their juices.
- Eat shellfish promptly after cooking and immediately refrigerate leftovers.
    - Eat refrigerated left-over cooked shellfish within 2 days.
- Wear protective clothing (e.g., gloves) when handling raw shellfish.
- Avoid exposure of open wounds or broken skin to warm salt or brackish water, or to raw shellfish harvested from such waters.
- When traveling internationally to areas with poor sanitary conditions:
    - Drink bottled water or water that has been boiled for at least 1 minute.
    - Don't drink fountain drinks or drinks with ice.
    - Don't eat fruits or vegetables that you don't peel yourself.
    - Avoid uncooked foods.
- Routine hand washing with soap and warm water, especially:
    - Before preparing, handling or eating any food.
    - After going to the bathroom.
    - After changing a diaper.
    - After caring for someone with diarrhea.

Exclusions

School/child-care: No exclusions are specified for *Vibrio* infections but the standard exclusion for diarrhea or fever applies:

- Children with diarrhea should be excluded from school/child-care until they are free from diarrhea for 24 hours without the use of diarrhea suppressing medications.
- Children with a fever from any infection should be excluded from school/child-care for at least 24 hours after fever has subsided without the use of fever suppressing medications.

Food Employee: No exclusions are specified for *Vibrio* infections but the standard exclusion for vomiting or diarrhea applies:

- Food employees are to be excluded if symptomatic with vomiting or diarrhea until:
    - Asymptomatic for at least 24 hours without the use of diarrhea suppressing medications OR
    - Medical documentation is provided stating that symptoms are from a noninfectious condition.

Please see Guide to Excluding and Restricting Food Employees in Appendix A.

MANAGING SPECIAL SITUATIONS

Outbreaks

If an outbreak is suspected, notify the appropriate regional DSHS office or DSHS EAIDU at **(512) 776-7676**.

The local/regional health department should:

- Interview all cases suspected as being part of the outbreak or cluster.
- Request medical records for any case in your jurisdiction that died, was too ill to be interviewed, or for whom there are no appropriate surrogates to interview.
- Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and risky foods eaten, foods eaten leading up to illness, or other risky exposures, such as animal contact and travel, reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Food	Animal	Notes
1	NT	34	F	W/N	2/4/16	Bl. D, F	Chicken, eggs	Dog	Dog food
2	PR	2	M	U/U	1/30/16	V,D,F	Chicken, spinach	None	Brother ill

- If the outbreak was reported in association with an apparent common local event (e.g., party, conference, rodeo), a restaurant/caterer/home, or other possible local exposure (e.g., pet store, camp), contact hospitals in your jurisdiction to alert them to the possibility of additional vibriosis cases.
- If isolates have not already been submitted to the DSHS laboratory for confirmation and Whole Genome Sequencing (WGS), request hospital/clinical labs submit isolates for confirmation and WGS analysis. See Laboratory Procedures.
- Work with any implicated facilities to ensure staff, students, residents, and volunteers receive hand hygiene education, and review hygiene and sanitary practices currently in place including:
    - Policies on and adherence to hand hygiene.
    - Storage and preparation of food.
    - Procedures for changing diapers and toilet training.
    - Procedures for environmental cleaning.
- If shellfish is identified as a possible source of infection, determine the source of shellfish and how the shellfish were handled prior to consumption.
    - Obtain, or have a sanitarian obtain, oyster tags from all points of service for the appropriate time frame.
- Recommend that anyone displaying symptoms seeks medical attention from a healthcare provider.
- Restrict individuals from handling food, engaging in child-care, healthcare work, or attending child-care, if they are symptomatic. See Exclusions in Case Investigation section.
- Enter outbreak into NORS at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

Whole Genome Sequencing clusters:

- For clusters of cases with indistinguishable WGS patterns detected by CDC/PulseNet and/or the DSHS laboratory, a member of the DSHS EAIDU foodborne team will notify appropriate DSHS regional epidemiologists, usually by email, who will then notify appropriate local health departments of cases within their jurisdiction.
- Local/regional health departments with cases in their jurisdiction should:
    - Interview the case patient, even if they have already been interviewed as part of a routine disease investigation, using the cluster specific questionnaire attached in the email notification.
        - Fax the completed questionnaire promptly within timeframe designated in cluster notification to DSHS EAIDU at **512-776-7616** or email securely to an EAIDU foodborne epidemiologist.
    - If the health department having jurisdiction of a case is unable to reach a case-patient after 3 attempts during normal working hours, and they are not able to call after hours, please call the DSHS regional office or DSHS EAIDU to discuss further.
    - If an interview is unattainable or the case is lost to follow-up, fax medical records and any case information to DSHS EAIDU.
- Local/regional health department with cases will be notified by the EAIDU foodborne team of any CDC or DSHS conference calls and may participate, if able.

Note:

- If a food item or food establishment is implicated, the lead epidemiologist for foodborne diseases will notify the DSHS Division of Regulatory Services about the outbreak and the possibility of a common contaminated food source for the cases.
- Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist and the DSHS Laboratory. The general policy is to test only food samples implicated in suspected outbreaks, not in single cases.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements
Confirmed, probable and clinically suspected cases are required to be reported **within 1 work day** to the local or regional health department or DSHS EAIDU at **(512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed and probable** cases to DSHS.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
    - A case should not be counted as a new case if laboratory results were reported within 30 days of a previously reported infection in the same individual, unless additional information is available indicating a separate infection, e.g., different species. A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Fax completed COVIS forms to DSHS EAIDU at **512-776-7616** or email securely to an EAIDU foodborne epidemiologist at FOODBORNETEXAS@dshs.texas.gov.
    - An EAIDU foodborne epidemiologist will fax the form (de-identified) to the CDC.
    - Please note that the CDC measures the proportion of interviews reported to CDC within 7 days of interview date, so please send the form as soon as possible.
    - For lost to follow-up (LTF) cases, please complete as much information obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on investigation form and fax/email securely to DSHS EAIDU noting case is LTF.

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512-776-7676**
- Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.
    - For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
    - The following should be reported to NORS:
        - Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
        - Outbreaks as indicated above with patients in the same household.
    - Enter outbreaks into NORS online reporting system at https://wwwn.cdc.gov/nors/login.aspx
    - Forms, training materials, and other resources are available at http://www.cdc.gov/nors/
- To request a NORS account, please email FoodborneTexas@dshs.state.tx.us
    - Please put in Subject Line: NORS User Account Request
    - Information needed from requestor: name, email address, and agency name
    - After an account has been created a reply email will be sent with a username, password, and instructions for logging in

LABORATORY PROCEDURES

CLINICAL SPECIMENS:

All *Vibrio* species isolates must be submitted to the DSHS laboratory.

In an outbreak or other special situation, the DSHS Laboratory can culture raw stool or stool in transport medium (e.g., Cary-Blair media) for *Vibrio* species. Contact an EAIDU foodborne epidemiologist prior to submitting raw stool or stool in transport medium for culture.

Specimen Collection

- Submit pure cultures on an agar slant at ambient temperature or 2-8ºC *(ice pack)* as soon as possible to ensure viability.
- For raw stool or stool in transport medium, please refer to table below:

Specimen type	Transport time to lab from time of collection	Transport temperature
Raw stool	≤24 hours	4ºC (ice pack)
Raw stool	>24 hours	Freeze immediately at ≤-70ºC. Ship on dry ice.
Stool in transport solution/medium	Time of collection to ≤3 days	Room temp or 4ºC (ice pack)
Stool in transport solution/medium	>3 days	Freeze immediately at ≤-70ºC. Ship on dry ice.
All	*The above transport times are optimal for recovery of pathogenic organisms. In the interest of public health, specimens will be accepted up to 30 days from date of collection.	*The above transport temperatures are optimal for the recovery of pathogenic organisms. In the interest of public health, specimens will be accepted at non-optimal temperature transport.

* Note: Pathogen recovery rates decrease over time. For best results, submit ASAP.
** For suspected *Vibrio* species submit at room temperature.

Submission Form

- Use DSHS Laboratory G-2B form for specimen submission.
- Make sure the patient's name, date of birth and/or other identifier match exactly what is written on the transport tubes and on the G-2B form.
- Fill in the date of collection and select the appropriate test.
- If submitting as part of an outbreak investigation, check "Outbreak association" and write in name of outbreak.
- Payor source:
    - Check "IDEAS" to avoid bill for submitter

Specimen Shipping

- Ship specimens via overnight delivery.
- DO NOT mail on Friday, or state holidays unless special arrangements have been pre-arranged with DSHS Laboratory.
- Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health Services
Attn. Walter Douglass (512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection:

- Missing or discrepant information on form/specimen.
- Specimen not in correct transport medium
- Transport media was expired

FOOD SAMPLES AND ENVIRONMENTAL SWABS:
Testing of food and environmental swabs for *Vibrio cholera, Vibrio parahaemolyticus* and *Vibrio vulnificus* is available at the DSHS laboratory. Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist and the DSHS Laboratory.

General policy

- The DSHS lab will only test food samples or environmental swabs from facilities implicated in a suspected outbreak (not associated with single cases).
- In outbreaks, the DSHS lab will not test food samples or environmental swabs unless a pathogen has been identified in a clinical specimen.
- Food samples or environmental swabs must be **collected by a registered sanitarian.**

For further questions, please contact an EAIDU foodborne epidemiologist to discuss further.

UPDATES

March 2021

- Minor edits.