






Vibriosis and Cholera Investigation Guideline

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Revision History:

Date	Replaced	Comments
07/2018	05/2018	Updated case definition and laboratory analysis section. Corrected typographical errors.
05/2018	12/2016	Updated Notification sections and Isolation, Work and Daycare Restrictions sections with updated regulations.
12/2016	09/2011	Added table of contents and reporting QI indicators for local investigators. More details added on other Vibrio illnesses. Updated laboratory analysis section.
02/2012	11/2010	Updated to Vibriosis to CDC 2012 case definition. Removed references to KS-EDSS. Added notification section.
11/2010	09/2009	Removal of recommendation for prophylaxis of household contacts. Minor edits to fact sheet. Additional notes on testing at CDC.

Vibriosis and Cholera

Disease Management and Investigation Guidelines

CASE DEFINITION – Cholera (*Vibrio cholerae*, CDC 1996)

Clinical Description for Public Health Surveillance:

- An illness characterized by diarrhea and/or vomiting; severity is variable.

Laboratory Criteria for Case Classification:

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

Case Classification:

- **Confirmed:** A clinically compatible illness that is laboratory confirmed.
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CASE DEFINITION – Vibriosis (Non-Cholera *Vibrio* spp., CDC 2012)

Clinical Description for Public Health Surveillance:

- An infection of variable severity characterized by watery diarrhea, primary septicemia, or wound infection. Asymptomatic infections may occur, and the organism may cause extra-intestinal infection.

Laboratory Criteria for Case Classification:

- Supportive laboratory evidence: Detection of a species of the family *Vibrionaceae* (other than toxigenic *Vibrio cholerae* O1 or O139, which are reportable as cholera) from a clinical specimen using a culture-independent diagnostic test.
- Confirmatory laboratory evidence: Isolation of a species of the family *Vibrionaceae* (other than toxigenic *Vibrio cholerae* O1 or O139, which are reportable as cholera) from a clinical specimen

Criteria to Distinguish a New Case from an Existing Case:

- 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. When two or more different species of the family *Vibrionaceae* are identified in one or more specimens from the same individual, each should be reported as a separate case.

Case Classification:

- **Probable:** A case that meets the supportive laboratory criteria for diagnosis, or a clinically compatible case that is epidemiologically linked to a case that meets the supportive or confirmatory laboratory criteria for diagnosis.
- **Confirmed:** A case that meets the confirmed laboratory criteria for diagnosis.

LABORATORY ANALYSIS:

- 1) Laboratories must [notify](#) the Kansas Department of Health and Environment – Bureau of Epidemiology and Public Health Informatics (KDHE-BEPHI) at 1-877-427-7317 for any lab result indicating vibriosis or cholera.
- 2) *Vibrio sp.* can be detected using culture and by culture independent diagnostic tests (CIDT).
 - *Vibrio sp.* grow well on blood and chocolate agar, but fecal specimens and vomitus specimens should be cultured with thiosulfate citrate bile-salts (TCBS agar) to inhibit growth of background flora.
 - When using culture, physicians must always notify the lab if *Vibrio* is suspected to allow for proper media selection.
 - CIDTs for the direct detection of *Vibrio* in stool is increasing, but the specific performance characteristics such as sensitivity, specificity, and positive predictive value of these assays depend on the manufacturer.
 - For diagnosing cholera, a CIDT is not a substitute for culture – the presumptive indication of cholera should always be confirmed by culture with subsequent serogrouping and cholera toxin gene detection.
 - Isolates of or specimens containing *Vibrio cholera* must be shipped out for confirmation the same day they are presumptively identified.
 - Notify the receiving laboratory prior to shipping.
 - For vibriosis, CIDTs may not provide all the information needed; some *Vibrio* may require additional identification, subtyping and antimicrobial resistance testing that must be performed on culture isolates.
- 3) If clinical laboratories are unable to perform a reflex culture from positive CIDT specimens and the situation is a matter of public health importance and warrants confirmation, positive CIDT specimens can be submitted to Kansas Health and Environmental Laboratories (KHEL).
 - If a fresh stool is received for initial testing via CIDT, a quarter sized amount of stool should be transferred immediately into Cary-Blair transport medium vial and refrigerated until it is decided whether confirmation is needed at KHEL. Specimens in transport media should be stored refrigerated.
 - Preserved specimens requiring culture confirmation should be received by KHEL within 4 days of collection.
 - Ship cold (ideal) or at room temperature in an [Enteric with Cary Blair mailer](#) with a *Biological Substance, Category B, Enteric/Misc. Bacterial* shipping label provided by KHEL.
 - Indicate the type of testing already performed and the results of that testing on the [KHEL Universal Submission Form \(Health\)](#).
 - KHEL will provide CIDT culture confirmation and isolate identification.
- 4) All *Vibrio* isolates should be sent to KHEL to allow for confirmation, serogrouping, and toxin testing.
 - Pure isolated colonies (<48 hours old) should be placed in an appropriate tubed media. (Do not send specimens on agar plates.)
 - Package in a “Bacterial Isolate Mailer” with a *Biological Substance*,

Category B, Enteric/Misc. Bacterial shipping label provided by KHEL.

- Ship at room temperature.
 - Isolates must be received by KHEL within 21 days of collection.
 - Indicate the type of testing already performed and the results of that testing on the [KHEL Universal Submission Form \(Health\)](#).
 - Serogrouping and toxin testing of isolates will be performed by CDC.
- 5) CDC requests that *Vibrio* isolates be forwarded to the Enteric Diseases Laboratory Branch (EDLB) per the isolate submission memo and table found at <https://www.cdc.gov/ncezid/dfwed/edlb/additional.html>. EDLB (specifically the Epidemic Investigations Laboratory) requests that state public health labs immediately forward all suspect *V. cholerae* isolates. KDHE will coordinate the submission of isolates to CDC.
- 6) **Special request from the CDC on forwarding isolates to the CDC Foodborne and Diarrheal Disease Laboratory:**
- *V. cholerae* identification: handle every isolate with a priority of “RUSH”; notify CDC lab for every a rush shipment
 - Foodborne outbreaks of non-cholera *Vibrio*: all isolates and implicated foods can be sent to the CDC lab via routine procedures
 - Tests to detect serum antibodies for *V. cholerae* are available at CDC and are subject to preapproval.
- 7) Call (785) 296-1620 for additional information on specimen transport.

EPIDEMIOLOGY

Vibrio bacteria grow well in salty environments and are commonly found in warm marine and estuarine environments. *Vibrio cholerae* O1 and O139 strains produce a cholera toxin that causes cholera; illness cause by other *Vibrio* strains are referred to as vibriosis.

Vibriosis occurs throughout the year with approximately 80% occurring from May through October. Large U.S. outbreaks have been linked to the consumption of raw oysters. Wound infections may occur when wounds or soft tissues are exposed to brackish or salt water. Persons with liver diseases, cirrhosis, iron storage disorders, immune suppression, malignancies, and alcoholism are at particularly high risk of serious infection. *V. vulnificus* can cause bloodstream infections in people with liver disease.

In the United States, *V. cholerae* infections were prevalent in the 1800s but had been eliminated by modern sewage and water treatment systems. Travel to areas with epidemic cholera, such as parts of Africa, Asia, or Latin America, may result in exposure to and infection with *V. cholerae*. Travelers may also bring contaminated seafood back to the U.S. Since 1995, over 80% of reported cholera cases have occurred in Africa. Non-O1/non-O139 *V. cholerae* is associated with 2-3% of cases of diarrhea illness in tropical developing countries.

DISEASE OVERVIEW

A. Agent:

Cholera: *Vibrio cholerae* serogroup O1 or O139 that produce cholera enterotoxin. Non-cholera vibriosis: *V. cholerae* other than O1 and O139, as well as other *Vibrio* species, such as *V. parahaemolyticus* and *V. vulnificus*.

B. Clinical Description:

Cholera is an acute enteric disease; a severe form is seen with sudden onset of profuse painless watery stools, nausea and vomiting. Untreated cases may experience rapid dehydration, acidosis, circulatory collapse, hypoglycemia and renal failure. With severe dehydration, death may occur within a few hours and the case-fatality rate may exceed 50%. With proper treatment, the case-fatality rate is < 1%. Cases can be asymptomatic or have mild diarrhea; infection can be transmitted by asymptomatic carriers. Non-O1/ non-O139 *Vibrio* species cause milder forms of gastroenteritis, wound infections, and in rare cases primary septicemia. In persons with underlying medical conditions, especially liver disease, *V. vulnificus* can cause bloodstream infections characterized by fever, chills, decreased blood pressure, blistering skin lesions, and often death.

C. Reservoirs:

Brackish, warm marine waters and estuaries are a natural environment for all *Vibrio* species. *V. cholerae* can also be found in fresh water lakes. Humans are the only natural host for *V. cholerae* O1 and O139. All *Vibrio* species can attach to the chitin-containing shells of crabs, shrimps, and shellfish. *Vibrio* species other than *V. cholerae* O1 and O139 can be found in fish and shellfish.

D. Mode(s) of Transmission:

Ingestion of food or water contaminated directly or indirectly with feces or vomitus of infected persons (e.g., sewage). Large epidemics often related to fecal contamination of water supplies or street vended foods. Eating raw or undercooked shellfish that are naturally contaminated can result in transmission. Wound infections from exposure to warm seawater.

E. Incubation Period:

V. cholerae: Range 2 hours to 5 days; most commonly, 2-3 days.

Non-O1/ non-O139 *V. cholerae*: Range 5.5 to 96 hours, usually 12-24 hours.

V. parahaemolyticus: Range 4 to 30 hours, usually 12-24 hours.

V. vulnificus: Usually 12-72 hours after eating raw seafood

F. Period of Communicability:

For *V. cholerae*, as long as it shed in stools. Antibiotics are may shorten the period of communicability. Chronic biliary infection, lasting for years, has been observed in adults and is associated with intermittent shedding in their stool. Other *Vibrio* species are not transmitted person to person.

G. Susceptibility and Resistance:

Variable. Infection with serogroup O1 may confer limited immunity.

H. Treatment:

Oral or parenteral rehydration therapy for dehydration and electrolyte imbalance. Antimicrobial therapy is useful adjunctive therapy for severely ill.

NOTIFICATION TO PUBLIC HEALTH AUTHORITIES

Suspected cases of Vibriosis and cholera shall be reported within 24 hours, except if the reporting period ends on a weekend or state-approved holiday, the report shall be made by 5:00 p.m. on the next business day after the 24-hour period:

1. Health care providers and hospitals: report to the local public health jurisdiction or KDHE-BEPHI (see below)
2. Local public health jurisdiction: report to KDHE-BEPHI (see below)
3. Laboratories: report to KDHE-BEPHI (see below)

**Kansas Department of Health and Environment (KDHE)
Bureau of Epidemiology and Public Health Informatics (BEPHI)**

Phone: 1-877-427-7317

Fax: 1-877-427-7318

Further responsibilities of state and local health departments to the CDC:

As a nationally notifiable condition, vibriosis and cholera cases require ROUTINELY NOTIFIABLE report to the Center of Disease Control and Prevention (CDC).

1. ROUTINE reporting requires KDHE-BEPHI to file an electronic report for cases within the next reporting cycle.
 - KDHE-BEPHI will file electronic reports weekly with CDC.
2. In addition to reporting through the National Notifiable Diseases Surveillance System (NNDSS), CDC requests that states collect and report the information on the standard form for Cholera and Other Vibrio Illness Surveillance (COVIS): www.cdc.gov/nationalsurveillance/cholera_vibrio_surveillance.html.
 - KDHE-BEPHI will file reports with the COVIS after the case has been investigated and closed by the local public health jurisdiction.
3. **Local public health jurisdiction** will report information requested as soon as possible, ensuring that the electronic form is completed within 3 days of receiving a notification of a cholera report and within 5 days of a vibriosis report.

INVESTIGATOR RESPONSIBILITIES

- 1) [Report](#) all confirmed, probable and suspect cases to the KDHE.
- 2) Use current [case definition](#), to confirm diagnosis with the medical provider.
 - If the *Vibrio* species was not isolated from the clinical specimen, have the stool forwarded to KHEL for isolation procedures.
 - Collect all information requested in [Step 1](#) of case investigation.
 - Ensure that case/proxy is aware of the diagnosis.
- 3) Continue the [case investigation](#) to identify potential source of infection.
 - Initiate the case investigation within 1 day of a cholera and within 3 days of vibriosis (not cholera) notification.
 - Complete the investigation within 3 days of a vibriosis (not cholera) notification and within 7 days of a vibriosis (not cholera) notification.
- 4) Conduct [contact investigation](#) to locate additional cases and/or contacts.
 - *V. cholerae* may be transmitted person-to-person.
 - Other *Vibrio* species: contacts are considered those exposed to the same source as the case (i.e., seafood)
- 5) Identify whether the source of infection is major public health concern.
 - Ensure the isolate or clinical specimen is sent to KHEL.
 - Source of infection associated to commercially available seafood.
- 6) Initiate control and prevention measures to prevent spread of disease.
- 7) Complete all information requested in the EpiTrax.
- 8) Use the disease [fact sheets](#), as needed.

STANDARD CASE INVESTIGATION AND CONTROL METHODS

Case Investigation

- 1) Contact the medical provider who ordered testing of the case and obtain the following information. (This includes medical records.)
 - Collect patient's demographics ([address](#), [birth date](#), [gender](#), [race/ethnicity](#), [primary language](#), and [phone number\(s\)](#)). [Demographic]
 - Record patient's occupation [Epidemiologic]
 - Obtain information on any laboratory tests performed.
 - If CIDT was performed, record information on the type of and manufacturer of the test (if available). [Notes]
 - Investigate all cases, even if only a CIDT was performed.
 - Note any other organisms isolated or detected from the clinical specimen that yielded *Vibrio*.
 - Identify if the specimen or isolate was forwarded to the state lab for confirmation. [Laboratory]
 - For *V. cholerae* O1 or O139, note the serotype, biotype and toxin test.
 - Record [onset date](#) and [time](#) of first symptoms associated to this episode [Clinical]
 - Record duration of illness in days [Clinical]

- Record antibiotic treatment [Clinical]
 - Record hospitalizations: location and duration of stay [Clinical]
 - Record outcomes: survived or date of death [Clinical]
 - Record pregnancy status for women. [Clinical]
 - Symptoms: fever (note maximum temperature); nausea, vomiting, diarrhea (note maximum stool number per 24-hours, visible blood in stool, abdominal cramps, headache, muscle pain, shock, and cellulitis or bullae (noting the anatomical site). [Investigation – Symptoms].
 - Complications: Amputation, skin graft, describe [Investigation – Symptoms]
 - Cholera vaccine receipt [Investigation –Medical History]
 - Pre-existing conditions: alcoholism, diabetes, peptic ulcer, gastric surgery, heart disease/failure, hematologic disease, immunodeficiency, liver disease, malignancy, renal disease, other [Investigation – Medical History]
 - Medical treatments: antibiotics, chemotherapy, radiotherapy, systemic steroids, immunosuppressant, antacids, Hx-Blocker or other ulcer medication [Investigation – Medical History]
- 2) If a continued investigation is needed and the patient charts do not provide information on the following risk factors or travel, interview the case to determine risk factors and transmission. [Investigation – Exposure]
- Travel outside of home state in 7 days prior to illness.
 - Consumption of seafood 7 days prior to illness onset
 - Exposure to body of water, drippings from raw or live seafood, or contact with marine or freshwater life; noting type of exposure, date and time of exposure and if there were any wounds present.
 - **For *Vibrio cholerae* O1 or O139**, inquire about exposures 4 days before illness began:
 - Seafood exposure, foreign travel, street-vender food, other persons with cholera-like illness.
 - If yes to foreign travel: inquire on education received to prevent cholera prior to travel, receipt of cholera vaccine, and the reason for the travel.
 - If domestically acquired illness due to any *Vibrio* species is suspected to be related to seafood consumption, a seafood investigation must be completed. The state agency involved in traceback and inspections will depend on the seafood source. The local health department will assist the agency performing the traceback by collecting the following:
 - Type of seafood, date and time consumed and amount consumed.
 - If patient ate multiple seafood types; note why a specific seafood was investigated.
 - How was seafood prepared?
 - Where seafood was obtained; record contact information of source.
- 3) Examining the epidemiological information, record where the infection was most likely imported from. (Indigenous or out-of-county, state, or U.S.) [Epidemiologic].

Contact Investigation

- 1) Review the patient's occupation and activities that were collected and recorded on the [\[Epidemiological\]](#) and [\[Investigation-Exposure\]](#) tab.
- 2) Consider the following types of contacts during the contact investigation:
 - Anyone exposed to the implicated food or body of water.
 - Only when there is a high probability of fecal exposure would the exposed individuals be considered contacts of *V. cholerae*.
 - High risk contacts at risk for developing severe disease are all children, immunocompromised people, and people with chronic liver disease
- 3) Create a line listing of contacts with contact information. [\[Contact\]](#)
- 4) Collect on any information on symptoms.
- 5) Note any high risk contacts.
- 6) Follow-up symptomatic contacts as suspect cases. A contact of non-O1 and non-O139 *Vibrio*, meeting the clinical case definition is a probable case.
- 7) Institute control measures for school or day-care contacts as indicated under [Isolation, Work and Daycare Restrictions](#).
- 8) Follow-up with contacts (especially high risk) with [Contact Management](#).

Isolation, Work and Daycare Restrictions

K.A.R 28-1-6 for *Vibrio cholera* infection (cholera):

Control of Cases

- Each person with a case shall be excluded working as a food employee, health care worker, and attending or working in a child care facility for the duration of the acute illness plus 24 hours following resolution of symptoms.

K.A.R 28-1-6 for Vibriosis (non-cholera *Vibrio* spp.)

Control of Cases

- Each person with a case shall be excluded working as a food employee, health care worker, and attending or working in a child care facility for the duration of the acute illness plus 24 hours following resolution of symptoms.

Case Management

Assure compliance with any [work or school restrictions](#).

Contact Management

- 1) For *V. cholerae*, chemoprophylaxis of contacts is rarely advisable. It should only be considered in very special circumstances in which the probability of fecal exposure is high and delivery of medication can occur rapidly (i.e. within 24 hours of identification of the index case).
- 2) The best measure is to provide education to susceptible contacts on incubation period and symptoms of disease and precautions to take if symptoms develop.
- 3) For implicated seafood or bodies of water, work with cooperating agencies to ensure contacts are notified and protected against further exposure.

Education

- 1) Provide education that includes basic information about the disease and its complications and ways to prevent transmission of illness.
- 2) Instruct cases on the necessary enteric precautions.
- 3) Counsel contacts on the period of time to watch for signs or symptoms and to seek medical care immediately if symptoms develop.
- 4) Instruct cases and contacts to be aware of the risk that infection poses to children, immunocompromised people, and people with chronic liver disease and that those individuals should avoid consuming raw or undercooked seafood.

MANAGING SPECIAL SITUATIONS

A. Outbreak Investigation:

- Outbreak definition: Two or more cases with a common serogroup within a 3-month timeframe occurring in a defined population or community.
- Notify KDHE immediately, 877-427-7317.
- Organize and maintain all data related to outbreak:
- Construct and maintain case listing which includes:
 - Record number, name, DOB (or age) and other demographics,
 - Symptoms; Onset date and time; recovery date and time
 - Source of exposure (i.e., record number, setting),
 - Specimen collection date and lab results,
 - Case status (i.e., confirmed, probable, suspect)
- All epidemiologic data will be reported and managed with the Kansas state electronic disease reporting system (outbreak module).
- Identify population(s) at risk of infection based on the scope and spread of the outbreak; use the information collected in case investigations to define:
 - Person: who is becoming ill (i.e., age, gender, occupations)
 - Place: where are the cases (i.e. classrooms, addresses) and to what settings or activities are they associated
 - Time: when did it start and is it still going on
- Enhance surveillance and perform active case finding:
 - Maintain active surveillance with medical providers serving the affected communities for two incubation periods from last confirmed case.
- Outbreak control:
 - Target efforts on those population(s) identified as at risk.
 - Evaluate the effectiveness of and consider amendments to the restrictions discussed in [Isolation, Work and Daycare Restrictions](#).
 - Establish protocols for control measures necessary to slow or prevent the transmission of disease in affected settings.

B. Bioterrorism / Intentional Contamination Situation:

Vibrio cholerae is considered a Category B bioterrorism agent in that it is a food and water safety threat. If the natural etiology cannot be readily established by a prompt and vigorous investigation, the situation should be considered to be a bioterrorist act until proven otherwise. If suspected:

- Notify local law enforcement and state public health officials.
- Implement “[Chain of Custody](#)” procedures for all samples collected, as they will be considered evidence in a criminal investigation.
- Work to define population at risk which is essential to guide response activities. Public health authorities will play the lead role in this effort, but must consult with law enforcement, emergency response and other professionals in the process. The definition may have to be re-evaluated and redefined at various steps in the investigation and response.
- Once the mechanism and scope of delivery has been defined, identify symptomatic and asymptomatic individuals among the exposed and recommend treatment and/or chemoprophylaxis.
- Establish and maintain a detailed line listing of cases, suspect cases, exposed, and potentially exposed individuals with accurate identifying and locating information as well as appropriate epidemiological information.

Safety Considerations:

- Food and water are the most likely mechanism of delivery.
- No isolation or quarantine measures are indicated beyond standard enteric precautions.

DATA MANAGEMENT AND REPORTING TO THE KDHE

- A. Accept the case assigned to the LHD and record the date the LHD investigation was started on the [\[Administrative\]](#) tab.
- B. Organize and collect data, using appropriate data collection tools including:
- The [CDC Cholera and Vibrio Illness Form](#) can be used to collect information.
 - Alternatively, investigators can collect and enter all required information directly into EpiTrax [\[Investigation\]](#), [\[Clinical\]](#), [\[Demographics\]](#), [\[Epidemiological\]](#) tabs.
 - During outbreak investigations, refer to guidance from a KDHE epidemiologist for appropriate collection tools.
- C. Report data collected during the course of the investigation via EpiTrax.
- Verify that all data requested on the [Report Form](#) has been recorded on an appropriate EpiTrax [\[tab\]](#), or that actions are completed for a case lost to follow-up as outlined below.
 - Some data that cannot be reported on an EpiTrax [\[tab\]](#) may need to be recorded in [\[Notes\]](#) or scanned and attached to the record.
 - Paper report forms do not need to be sent to KDHE after the information is recorded and/or attached in EpiTrax. The forms should be handled as directed by local administrative practices.
- D. If a case is lost to follow-up, after the appropriate attempts to contact the case have been made:
- Indicate 'lost to follow-up' on the [\[Investigation\]](#) tab with the number of attempts to contact the case recorded.
 - Record at least the information that was collected from the initial reporter.
 - Record a reason for 'lost to follow-up' in [\[Notes\]](#).
- E. After the requirements listed under [Case Investigation](#) have been completed, record the "Date LHD investigation completed" field located on the [\[Administrative\]](#) tab.
- Record the date even if the local investigator's [Case](#) or [Contact Management](#) for the contact is not "Complete".
- F. Once the entire investigation is completed, the LHD investigator will click the "Complete" button on the [\[Administrative\]](#) tab. This will trigger an alert to the LHD Administrator so they can review the case before sending to the state.
- The LHD Administrator will then "Approve" or "Reject" the CMR.
 - Once a case is "Approved" by the LHD Administrator, BEPHI staff will review and close the case after ensuring it is complete and that the case is assigned to the correct event, based on the reported symptoms reported.
- (Review the [EpiTrax User Guide, Case Routing](#) for further guidance.)

ADDITIONAL INFORMATION / REFERENCES

- A. Treatment / Differential Diagnosis:** Red Book: 2015 Report of the Committee on Infectious Diseases. 30th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2015.
- B. Epidemiology, Investigation and Control:** Heymann. D., ed., Control of Communicable Diseases Manual (CCDM), 20th Edition. Washington, DC, American Public Health Association, 2015.
- C. Case Definitions:** CDC Division of Public Health Surveillance and Informatics, Available at: www.cdc.gov/nndss/
- D. KDHE Foodborne Illness and Outbreak Manual:**
www.kdheks.gov/epi/download/kansas_foodborne_illness_manual.pdf
- E. Intentional Biological Event:** Kansas Biological Incident Annex at:
www.kdheks.gov/cphp/operating_guides.htm
- F. Chain of Custody:** KDHE Chain of Custody Standard Operating Guide,
www.kdheks.gov/cphp/operating_guides.htm#coc
- G. Additional Information (CDC):**
- www.cdc.gov/cholera/index.html
 - www.cdc.gov/vibrio/index.html