



Shiga Toxin-Producing *Escherichia coli* (STEC), including *E. coli* O157:H7 Investigation Guideline

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Attachments can be accessed through the Adobe Reader’s navigation panel for attachments. Throughout this document attachment links are indicated by this symbol ; when the link is activated in Adobe Reader it will open the attachments navigation panel. The link may not work when using PDF readers other than Adobe.

Revision History:

| Date | Replaced | Comments |
|-------------|-----------------|--|
| 10/2019 | 05/2018 | Updated laboratory analysis and case management to provide clarification on exclusion testing. Minor edits and formatting throughout. |
| 05/2018 | 10/2017 | Notification Section, Case Management, Restriction, and Managing Special Situations section modified with requirements of new reporting regulations. Updated case definition. |
| 10/2017 | 09/2016 | Restriction section modified to bring in agreement with Kansas Food Code 2012. Daycare section modified. Laboratory Analysis section modified with new Universal Form and instructions. |
| 09/2016 | 02/2012 | Revised guidelines for work and daycare exclusions and restrictions. Added sample letters for food workers and their managers. |
| 02/2012 | 05/2011 | Updated investigation sections to agree with new surveillance system and added reporting form. |
| 05/2011 | 03/2009 | Minor formatting of investigation guideline. Incorporated disease-specific agent recommendations from Enteric Outbreak in Daycares Manual into guideline. Updated Laboratory Analysis and Management of Special Situations. BEPHI replaced BSE throughout. Included revised Fact Sheet. (02/2012) Removed references to KS-EDSS. |

Shiga Toxin-Producing *Escherichia coli* (STEC), including *E. coli* O157:H7 Disease Management and Investigation Guidelines

CASE DEFINITION (CDC 2014)

Clinical Description for Public Health Surveillance:

- An infection of variable severity characterized by diarrhea (often bloody) and/or abdominal cramps. Illness may be complicated by HUS (note that some clinicians still use the term thrombotic thrombocytopenic purpura [TTP] for adults with post-diarrheal HUS).

Laboratory Criteria for Case Classification:

Confirmatory laboratory evidence:

- Isolation of *E. coli* O157:H7 from a clinical specimen OR
- Isolation of *E. coli* from a clinical specimen with detection of Shiga toxin or Shiga toxin genes.

Supportive laboratory evidence:

- Isolation of *E. coli* O157 from a clinical specimen without confirmation of H antigen, detection of Shiga toxin, or detection of Shiga toxin genes, OR
- Identification of an elevated antibody titer against a known Shiga toxin-producing serogroup of *E. coli*, OR
- Detection of Shiga toxin or Shiga toxin genes in a clinical specimen using a culture-independent diagnostic test (CIDT) and no known isolation of *Shigella* from a clinical specimen, OR
- Detection of *E. coli* O157 or STEC/ Enterohemorrhagic *E. coli* (EHEC) in a clinical specimen using a CIDT.

Epidemiologic Linkage

A clinically compatible illness in a person that is epidemiologically linked to a confirmed or probable case with laboratory evidence **OR**

A clinically compatible illness in a person that is a member of a risk group as defined by public health authorities during an outbreak

Criteria to Distinguish a New Case from Existing Case

A new case should be created when a positive laboratory result is received more than 180 days after the most recent positive laboratory result associated with a previously reported case in the same individual. (See formula referenced in Appendix B of the 2017 CSTE Position Statement [17-ID-10] for details on time-period calculation, hierarchy of dates and interpretation) **OR**

When two or more different serogroups/serotypes are identified in one or more specimens from the same individual, each serogroup/serotype should be reported as a separate case

Case Classification:

Suspected

- Identification of an elevated antibody titer against a known Shiga toxin-producing serogroup of *E. coli* in a person with no known clinical compatibility, OR
- Detection of Shiga toxin or Shiga toxin genes in a clinical specimen using a CIDT and no known isolation of *Shigella* from a clinical specimen in a person with no known clinical compatibility, OR
- Detection of *E. coli* O157 or STEC/EHEC in a clinical specimen using a CIDT in a person with no known clinical compatibility, OR
- A person with a diagnosis of post-diarrheal HUS/TTP (see HUS case definition).

Probable

- A person with isolation of *E. coli* O157 from a clinical specimen without confirmation of H antigen, detection of Shiga toxin or detection of Shiga toxin genes, OR
- A clinically compatible illness in a person with identification of an elevated antibody titer against a known Shiga toxin-producing serogroup of *E. coli*, OR
- A clinically compatible illness in a person with detection of Shiga toxin or Shiga toxin genes in a clinical specimen using a CIDT and no known isolation of *Shigella* from a clinical specimen, OR
- A clinically compatible illness in a person with detection of *E. coli* O157 or STEC/EHEC from a clinical specimen using a CIDT, OR
- A clinically compatible illness in a person that is epidemiologically linked to a confirmed or probable case with laboratory evidence, OR
- A clinically compatible illness in a person that is a member of a risk group as defined by public health authorities during an outbreak.

Confirmed

- A person that meets the confirmatory laboratory criteria for diagnosis.

Comments:

- Asymptomatic infections and infections at sites other than the gastrointestinal tract in people (1) meeting the confirmatory laboratory criteria for diagnosis or (2) with isolation of *E. coli* O157 from a clinical specimen without confirmation of H antigen, detection of Shiga toxin, or detection of Shiga toxin genes, are considered STEC cases and should be reported.
- Persons with (1) detection of Shiga toxin or Shiga toxin genes using a CIDT and (2) isolation of *Shigella* spp. from a clinical specimen should not be reported as an STEC case.
- Persons with (1) detection of Shiga toxin or Shiga toxin genes using a CIDT and (2) the absence of isolation of *Shigella* from a clinical specimen, should be classified as a suspect or probable case, regardless of whether detection of Shiga toxin or Shiga toxin genes is confirmed by a public health laboratory.

LABORATORY ANALYSIS

Services available from the Kansas Health and Environmental Laboratories (KHEL):

- 1) Laboratory isolate submission: STEC isolate submission to KHEL is required by law. KHEL stores and analyzes these isolates for public health. Ship isolates using the KHEL [infectious disease mailers](#).
- 2) Outbreak investigations: Testing of stool specimens from suspected cases using molecular GI Screens. **Preapproval** is required through KDHE Epidemiology at 877-427-7317.
- 3) Removal of work / daycare restrictions with culture of stool specimens.
 - o The health department with jurisdiction over the case is responsible for the collection and shipment of stool specimens needed for the removal of exclusions.
 - o Specimen type: Feces; marble size amount in Cary-Blair
 - o Collection materials: [Enteric kit](#) (bottle with Cary-Blair medium (0.16%))
 - o Timing of specimen collection, [to remove work/daycare restrictions](#):
 - Collect the first specimen >48 hours after the discontinuation of antibiotics and at least 24 hours after diarrhea has stopped.
 - Collect the second specimen \geq 24 hours later.
 - Continue to collect stool >24 hours apart until obtaining two consecutive negatives.
 - o Each clinical specimen should be:
 - Packaged with a unique KDHE Universal Laboratory Submission Form that requests "Epidemiology Exclusion Testing", **and**
 - Labeled with a unique barcode from the KDHE Universal Form, patient full name (last, first), and date of birth (MM/DD/YYYY).
 - o Refrigerate clinical specimens until shipment.
 - o Ship specimens in the enteric mailer as soon as possible after collection using a courier or rapid shipping method, such as UPS or FedEx.
 - o Exclusion specimens must be received within 72 hours of collection day; specimens for molecular GI screens (outbreaks) must be received with 4 days of collection.
 - o Notify KDHE Epidemiology (877-427-7317) when a specimen is shipped.
- 4) Local Health Departments should keep at least five universal forms and unexpired enteric kits in stock for immediate use.
 - o Order supplies using following order form: www.kdheks.gov/labs/cust_serv/download/specimen_kit_request_form.pdf
 - Under "Health Specimen Submission Forms, select "Universal Laboratory Specimen Submission";
 - Under "Health Specimen Kits", select "Enteric with Cary Blair (Category B) ambient".

KDHE Universal Laboratory Specimen Submission Form (Health)
 6810 SE Dwight Street, Topeka, KS 66620 | Fax: (785) 296-1641 | Phone: (785) 296-1620 | CLIA 17DC

Health Dept. ID# supplied by KHEL
 Health Dept. Name
 Health Dept. Address

PATIENT INFORMATION (Required)
 Last Name, First Name: Patient Last, First Name
 DOB: mm/dd/yyyy Sex: Male Female Unknown
 Race: White Asian AI, AN Black HN, PI
 Ethnicity: Hispanic or Latino Non-Hispanic or Non-Latino
 Address: Patient Address
 City: Patient City State: Patient State Zip: Patient Zip

MRN: _____ Medical # _____
 Collection (Date/Time): mm/dd/yy hh:mm Collector _____
 Physician's Full Name: Health Dept. Medical Consultant
 ICD10 CODE _____

MICROBIOLOGY
 Tuberculosis
 Clinical Isolate
 QuantIFERON: Incubation (Date/Time Required)
 IN: ____ / ____ / ____ OUT: ____ / ____ / ____ Not Incubated
 QuantIFERON Test Program:
 College Contract Contact Investigation
 Correctional Facility Screening Contract
 Other _____

Parasitology
 Fecal Ova/Parasite (Add) Crypto. Cyclospora
 Worm Arthropod

Enteric Bacteriology
 Confirmation*
 Epidemiology Exclusion Testing*
 Isolate*
 E. coli O157 STEC Salmo Shigella Other _____
 Bioterrorism Bacteriology: Rule Out Select Agent

SPECIMEN SOURCE/MATRIX
 Blood Serum
 Bronchial Wash Sputum
 CSF **Stool**
 Endocervical Urethral
 Genital Urine
 Nasopharyngeal Vaginal
 Plasma Wound
 Other _____

TOXICOLOGY
 Blood Metals: Lead, Mercury, Cadmium
 Capillary Venous

SEROLOGY/VIROLOGY
 Chlamydia/Gonorrhea Hepatitis A (IgM)
 HIV Hepatitis B
 Syphilis Rubella
 Herpes (PCR) Influenza
 Special Notes: _____

EPIDEMIOLOGY APPROVAL (877) 427-7317
 Epidemiologist
 Hepatitis A (IgM) Norovirus
 Perinatal-PVST Pertussis
 Arboviral Encephalitis Varicella
 Molecular GI Screen CRE/CR
 Measles: PCR IgG IgM
 Mumps: PCR IgG IgM
 Date of Onset: _____
 Other (Specify): _____

POST EXPOSURE BIOLOGICAL TESTS
 Food Source Environmental Source
 Test for (Specify): _____

EPIDEMIOLOGY

More than 100 serotypes of *E. coli* produce Shiga or Shiga-like toxins. The most commonly identified Shiga toxin-producing *E. coli* (STEC) in North America is *E. coli* O157:H7 (i.e., “*E. coli* O157” or “O157”) which was first identified in 1982. In the U.S., it is estimated that 70,000 infections per year are caused by *E. coli* O157. Persons of all ages are susceptible. Very young children and the elderly are more likely to develop severe illness and hemolytic uremic syndrome (HUS). Sporadic cases occur throughout the year and peak in the summer. Ground beef, apple cider, unpasteurized milk and other foods have been associated with outbreaks.

DISEASE OVERVIEW

A. Agent:

Gram-negative bacilli, *Escherichia coli*, that produce Shiga and Shiga-like toxins. In addition to *E. coli* O157, the most common serogroups in the United States are O26, O111, O103, O45, and O121.

Other types of *E. coli*, such as Enteroaggregative *E. coli* (EAEC), Enteropathogenic *E. coli* (EPEC), Enterotoxigenic *E. coli* (ETEC), and Enteroinvasive *E. coli* (EIEC) are not Shiga toxin-producing and are not reportable diseases in Kansas.

B. Clinical Description:

Majority of cases present with an acute onset of diarrhea 3 to 4 days after exposure. Other symptoms include abdominal cramping and grossly bloody diarrhea. Fever may or may not be present. Severe cases can develop HUS that results in renal failure and death.

C. Reservoirs:

Cattle are of significant public health importance; however, humans and other animals, such as goats, sheep, and deer, serve as reservoirs and carriers.

D. Mode(s) of Transmission:

Fecal-oral, including: person-to-person, animal-to-person, waterborne and foodborne. Transmission occurs from consuming food or liquids, including water, contaminated with human or animal feces. Transmission may occur via types of sexual contact (e.g., oral-anal contact).

E. Incubation Period:

Range 2-10 days; median 3-4 days.

F. Period of Communicability:

Variable, for as long as the organism is excreted; typically, 1 week in adults and up to 3 weeks in some children.

G. Susceptibility and Resistance:

The infectious dose is very low, and little is known about differences in susceptibility between serotypes.

H. Treatment:

Fluid and electrolyte replacement therapy may be indicated. There is evidence that antibiotic treatment may precipitate HUS and its use is controversial. Anti-diarrheal medication should be avoided.

NOTIFICATION TO PUBLIC HEALTH AUTHORITIES

Suspected cases of *Escherichia coli* enteric infection from *E. coli* O157:H7 and other shiga toxin-producing *E. coli*, also known as STEC, 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
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, STEC cases require a 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. The **Local public health jurisdiction** will:
 - Start the investigation **within 3 days** of receiving a notification, and
 - Will report the information requested in the Kansas EpiTrax system, as soon as possible, ensuring that the electronic form is completed **within 5 days** of receiving a notification of a report.

Additional notification that occur for work or daycare restrictions:

1. KDHE will notify the health department with jurisdiction over a case-patient, as soon as it is identified that the patient must be excluded from work or daycare.
2. The health department with jurisdiction over the case will immediately notify the case-patient of the need to collect stool samples, make arrangements for specimen collection, and will notify the employer or daycare of the case-patient, if necessary, using the provided [templates](#).
3. The health department will notify KDHE Epidemiology as soon as a specimen is shipped for testing at KHEL.
4. KDHE will notify KHEL that the specimen is being shipped and will notify the health department by phone as soon as preliminary or final results are available.
5. Additional guidance can be found in the [KDHE Exclusion Guidance for LHD's](#).

INVESTIGATOR RESPONSIBILITIES

- 1) [Report](#) all confirmed, probable and suspect cases to the KDHE-BEPHI.
 - Initiate the case investigation within 3 days of notification of a report.
 - Complete the investigation within 5 days of the notification.
- 2) Contact medical provider to confirm diagnosis using current [case definition](#) and to collect initial information requested under the [case investigation](#).
 - If STEC was not isolated from the clinical specimen, have the stool specimen forwarded to state lab for isolation procedures.
 - If STEC was isolated, ensure a bacterial isolate is sent to KHEL.
 - Collect all information requested in [Step 1](#)) of case investigation.
 - Ensure that case-patient is aware of the diagnosis.
- 3) Continue the [case investigation](#) starting within 3 days of receiving a report.
 - Complete an interview with the case to collect information requested on the [STEC Investigation Form](#).
 - Complete this case investigation within 5 days of receiving the report.
- 4) Conduct [contact investigation](#) to locate additional cases and/or contacts.
 - Only contacts at high risk of acquiring infection require follow-up.
- 5) Identify whether the source of infection is major public health concern,
 - Submission to KHEL of STEC isolates or presumptive STEC (including *E. coli* O157) in clinical specimens is required; ensure isolate or clinical specimen is sent to KHEL.
 - Involvement of foodhandler, daycare, or a direct patient care provider.
 - Commercial raw milk or water supply involved.
- 6) Initiate [control and prevention](#) measures to prevent spread of disease.
 - Initiate needed measures to prevent case-patient from returning to work or school as required by [K.A.R 28-1-6](#).
 - Arrange the [collection and shipment](#) of stool specimens to the KHEL to allow the removal of restrictions or exclusions from work or daycare.
- 7) [Record data](#), collected during the investigation, in the KS EpiTrax system under the data's associated [tab] in the case morbidity report (CMR).
- 8) As appropriate, use the [notification letter\(s\)](#)  and the disease [fact sheet](#)  to notify the case, contacts and other individuals or groups.

STANDARD CASE INVESTIGATION AND CONTROL METHODS

Case Investigation

- 1) Contact the medical provider who ordered testing of the case-patient or is attending to the case-patient and obtain the following information. (This includes medical records for hospitalized patients.).
 - Obtain data on symptoms [Investigation], onset date and time and recovery date and time [Clinical].
 - Determine if further laboratory testing is needed. [Laboratory]
 - If STEC or presumptive STEC (including *E. coli* O157) was isolated from clinical specimen, ensure bacterial isolate was or is sent to KHEL.
 - If STEC was identified by a culture independent gastrointestinal panel, ensure the specimen is sent to KHEL.
 - Collect case's demographic data and contacting information (birth date, county, sex, race/ethnicity, address, phone number(s)) [Demographic]
 - Record hospitalizations: location and duration of stay [Clinical]
 - Record outcomes: survived or date of death [Clinical]
- 2) Interview the case to determine source, risk factors and transmission settings:
 - At least 3 phone attempts at different times of day should be made before the [Enteric Letter to Case](#) is used or the case is closed as lost to follow-up.
 - Collect epidemiological information that helps to establish risks of acquiring and transmitting infection [Investigation]:
 - Patient's occupation, especially associations to food handling, healthcare, group living, daycare attendee or worker, or school attendee or employee (including volunteer work)
 - If a case-patient worked or attended school while ill, record the facility location.
 - Even if the case-patient did not work while ill, record places of potential exposure (where case could have acquired or transmitted illness); including daycare, school, restaurants, recreational source, and group living
 - For the **7 days** prior to symptom onset, unless otherwise noted, examine: [Investigation – Exposure tabs]
 - Exposure to others with diarrhea in or outside the household.
 - Obtain date(s) of exposure, relationship to case and occupation of possible source
 - Note transmission setting, if applicable (i.e., household, daycare)
 - Food history (including place of purchase)
 - Examine risks such as poorly cooked beef products, unpasteurized dairy or juice, melons, lettuce and sprouts.
 - Consider food-handling practices and opportunities for cross-contamination.

- Restaurant or group gathering history.
 - Obtain name, location of restaurant/gathering, food eaten and date(s).
 - Animal Exposure.
 - Specify type and location (e.g. farm, petting zoo, school).
 - In-state and out-of-state travel up to 2 weeks prior to onset.
 - Obtain dates and location(s).
 - Include hiking, camping or hunting trips.
 - Drinking water sources.
 - Specify type (e.g. private, treated, or bottled)
 - Recreational water exposure.
 - Obtain dates, locations and participation type.
 - Association with childcare, residential facility or any institutions.
 - Obtain dates and locations.
 - Underlying medical conditions, special diets or allergies, GI procedures, medicines (include over-the-counter, “organic/holistic” or vitamins/herbs.)
 - For infants ≤ 3 months of age, if a source is not identified, consider:
 - Collecting detailed epidemiologic data and performing stool cultures on caretaker(s), even if asymptomatic.
 - Carefully review food-handling practices to determine whether cross-contamination of infant formula or food may be involved.
 - Collect information from case for the [Contact Investigation](#). (See below).
- 3) Examining the epidemiological information, record where the infection was most likely imported from. (Indigenous or out-of-county, state, or U.S.) [[Investigation](#)].
- 4) Investigate epi-links among cases (clusters, household, co-workers, etc).
- If the case had contact with person(s) who have/had the disease or if there was a possible point source of infection, determine if the other “cases” have been reported to the state:
 - Use names and birthdates of possible cases to search the electronic surveillance system.
 - If found, record the previously reported case’s record number in the notes of the case you are investigating. [[Notes](#)]
 - Highly suspected cases, that have not previously been reported should be investigated as a suspect case and reported in Kansas EpiTrax.
 - For suspected [Outbreaks](#) refer to Managing Special Situations section.

Contact Investigation

- 1) Review the patient's occupation and activities that were collected during the case investigation and recorded on the [\[Investigation\]](#) tabs, especially those food handling and/or child or direct patient care activities performed during the period the case-patient was symptomatic.
 - Obtain dates, activities and locations during the period from illness onset till the resolution of symptoms.
- 2) Consider the following types of contacts during a contact investigation:
 - General contacts: Household and intimate/sexual contacts of case or those who ate food prepared by the case.
 - Daycare contacts: (Risk of transmission increases with younger children who exhibit lack of fecal continence and frequent hand-to-mouth activity.)
 - All direct caregivers and room/classmates of the case in a daycare with only children who are toilet trained or who are all over 2 years of age.
 - All employees and attendees of a daycare with non-toilet trained attendees, if one or more employee or child is infected or if household contacts of two or more separate attendees are infected.
 - All employees, attendees and household contacts of diapered attendees of a daycare in which outbreak recognition is delayed by ≥ 3 weeks.
 - Individuals who work the same shift in a daycare kitchen with an infectious food handler are also considered contacts.
 - Daycare attendees and employees who eat food prepared by an infected food handler, especially if the food handler handled ready-to-eat foods with bare hands or worked while experiencing diarrhea.
 - School Contacts: **Only** with epidemiologic evidence of transmission in a school setting consider those who share similar exposure activities with the cases (e.g. common food/drink, animal or recreational water sources).
 - Food Service Contacts: Patrons of the establishment of an infected food handler if (1) the food handler worked while infectious, (2) had poor personal hygiene, and (3) had the opportunity to have bare-hand contact with ready-to-eat food.
 - Direct patient care provider contact: Patients of an infected care provider if there is evidence that the provider was (1) symptomatic with poor personal hygiene and (2) had an opportunity for bare-hand contact with the patient's ready-to-eat foods, oral medications, or oral treatments.
 - High risk contacts: those at risk for developing severe disease or those who may expose persons at high risk for severe disease.
- 3) ONLY if a risk of transmission exists, create a line listing of contacts at-risk of developing disease. Note possible high-risk contacts
- 4) Follow-up with household and close contacts (especially high-risk contacts) as recommended under [Contact Management](#).
- 5) Institute control measures; see [Isolation, Work and Daycare Restrictions](#).

Isolation, Work and Daycare Restrictions

K.A.R 28-1-6 for Shiga toxin-producing *Escherichia coli* 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:
 - Until two negative stool cultures or other laboratory test acceptable to the secretary is obtained at least 48 hours following completion of antimicrobial therapy

In addition to the K.A.R. 28-1-6 requirements, food handlers are subject to the [2012 Kansas Food Code](#), which restricts or excludes those diagnosed with STEC, depending on the type of population the person serves:

Kansas Food Code 2012:

- Food handlers diagnosed with STEC must be **excluded** from food establishments until symptoms have resolved for at least 24 hours. After symptoms have resolved for at least 24 hours, the worker is **restricted**. Food handlers must be **excluded** from work if they serve a **highly susceptible population**, even after symptoms have resolved.
 - **Restriction** means to limit the activities of a food employee so that there is no risk of transmitting a disease that is transmissible through food and the food employee does not work with exposed food, clean equipment, utensils [including tableware such as dishes and glasses], linens, or unwrapped single-service or single-use articles
 - **Exclusion** means to prevent a person from working as an employee in a food establishment or entering a food establishment as an employee.
 - **Highly susceptible population** means persons who are more likely than other people in the general population to experience foodborne disease because they are:
 - (1) Immunocompromised; preschool age children, or older adults; and
 - (2) Obtaining food at a facility that provides services such as custodial care, health care, or assisted living, such as a child or adult day care center, kidney dialysis center, hospital or nursing home, or nutritional or socialization services such as a senior center.

The KAR and Food Code guidelines for management of a food handler with STEC are summarized in [Figure 1](#).

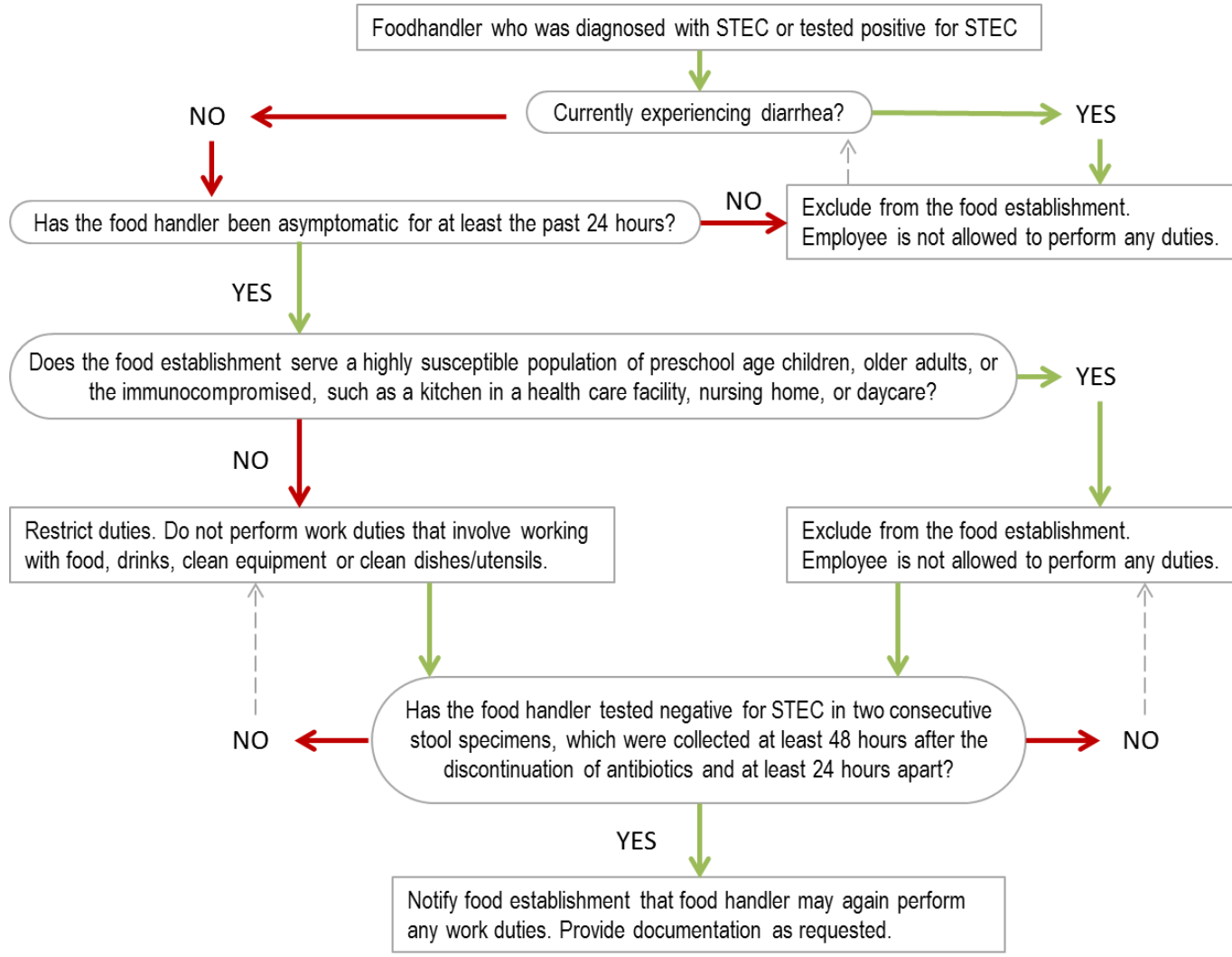
Kansas Food Code 2012, continued
(for food handlers exposed to STEC)

- Food handlers exposed (1) by consuming or preparing food that is suspected source of a confirmed *Shigella* outbreak, (2) by working or attending a setting of a confirmed *Shigella* outbreak, or (3) by living with someone diagnosed with *Shigella* or who worked in a setting of a confirmed *Shigella* outbreak shall be **restricted** when working in a food establishment serving a **highly susceptible population** until:
 - More than 3 calendar days have passed since last day of potential exposure, or
 - More than 3 calendar days have passed since the last the employee's household contact became asymptomatic.

School-aged children: With an understanding of and ability to practice good hygiene, children usually do not represent a risk of spreading this pathogen via the fecal-oral route. Children are a risk only if the infected child is unable to or fails to maintain good hygiene, including hand hygiene after toilet use. Children in diapers at any age constitute a far greater risk of spreading this enteric pathogen. In school settings:

1. Exclude children with diarrhea or fever until symptoms resolve.
2. Recommend the exclusion of infected school-aged students who are diapered until two negative stool cultures are obtained at least 24 hours apart and no sooner than 48 hours following discontinuation of antibiotics.
3. During a school-based, person-to-person outbreak of *E. coli* O157:H7, it is recommended an ill child not be allowed to reenter their room until diarrhea has stopped, and stool cultures are negative for *E. coli* O157:H7.

Figure 1: Management of a food handler with suspected STEC



Case Management

- 1) [Educate](#) case on measures to avoid future illness and to prevent transmission.
- 2) Follow-up is needed to assure compliance with [restrictions or exclusions](#) if:
 - Person with case cares for young children, the elderly or patients;
 - Person with case or an exposed contact handles food; or
 - Person with case attends a daycare or family daycare home.
- 3) When the health department is carrying out restrictions or exclusions:
 - The patient's county of residence is responsible for providing stool enteric kits and instructions for specimen collection to the excluded patient.
 - Plan on having at least five kits and universal forms on hand.
 - Order supplies through KHEL (refer to [Laboratory Analysis](#)).
 - Inform the patient or guardian of the exclusion and arrange for the pick-up and return of enteric kits from and to the health department.
 - Prolonged shedding may occur; the patient should be prepared to submit multiple specimens that are collected 24 hours apart.
 - Specimens should be collected at least 48 hours after discontinuation of antibiotics and at least 24 hours after diarrhea has stopped.
 - A doctor's note releasing a patient from restrictions or exclusions does not supersede the state regulation requiring negative stool cultures.
 - Additional guidance on specimen management can be found in [Laboratory Analysis](#) and [KDHE Exclusion Guidance for LHD's](#).
 - Inform the patient's supervisor or daycare of the needed exclusion.
 - [Sample letters](#) are available that can be adapted for use.
 - After shipping the specimen to KHEL, contact KDHE-BEPHI that a specimen was collected and is being shipped.
 - Continue collecting specimens until restrictions or exclusion can be lifted.
- 4) Document negatives in EpiTrax and the date the exclusion was lifted. [Investigation]
- 5) Report any changes any changes in patient status, especially complications.

Contact Management

- 1) If a contact listing was created because of the high possibility of disease transmission, follow-up with contacts to determine if transmission occurred.
 - Collect information on each contact's health status, noting any symptoms.
 - Collect information on each contact's occupation.
 - Note any school or daycare attendance. (Include facility name and location.)
 - Note any high-risk situations and handle appropriately.
 - A contact that is a food-handler should be restricted from facilities that serve highly susceptible populations. Consult [Figure 1](#).
- 2) As needed, provide [education](#) on avoiding further exposures and to ensure proper medical care is obtained and precautions taken if symptoms develop.
- 3) Symptomatic contact:
 - Considered a probable case; [report](#) to KDHE-BEPHI
 - Initiate any [restrictions](#) and encourage the ill to seek medical evaluation.

- 4) In outbreak situations:
- Cultures to confirm epi-linked cases may be warranted.

Environmental

Environmental Investigation: If a commercial food service, daycare center, public water supply or commercial raw milk dairy is implicated in transmission, coordinate with the proper regulatory agency to accomplish the following:

- 1) Inspecting the facility.
- 2) Collecting food, drink or water samples.

Environmental control measures:

- 1) Proper chlorination or boiling of water prevents illness transmission.
- 2) Clean/sanitize contaminated surfaces with 1% bleach or proper germicides.

Education

- 1) Instruct cases on necessary work, school, or daycare [restrictions](#) or exclusions.
- 2) Counsel contacts to watch for signs or symptoms occurring within 10 days of exposure, and to seek medical attention if needed.
- 3) Provide education about preventing the spread of disease:
 - Stress that case should wash hands thoroughly with soap and water before eating/handling food or after using the toilet.
 - Education should emphasize cleaning fingernails and personal hygiene.
 - Remind contacts when taking care of someone with diarrhea to scrub hands with plenty of soap and water after cleaning the bathroom, helping the person use the toilet, or changing diapers, soiled clothes or sheets.
- 4) Provide education on preventing future illness:
 - Hand washing: washing hands thoroughly with soap and water before eating/handling food or after handling raw food, using the toilet, changing diapers and handling pets, fowl, or other animals and/or feces.
 - Refer to the [KDA Handwashing Fact Sheet](#) for food handlers.
 - Avoid eating raw or undercooked meat or poultry, especially hamburger. Cook hamburger to an internal temperature of at least 160°F (70°C).
 - Do not drink unpasteurized milk or eat anything made from it.
 - Use only clean utensils, dishes and cutting boards to prepare food that is already cooked or will be eaten raw or lightly cooked. Anything used to prepare raw meat, seafood, or poultry, including hands and table or counter top, should be washed thoroughly before touching other food.
 - Wash fresh produce before cutting or consuming.
 - Properly refrigerate and store perishable foods. Store in small containers and do not leave at room temperature for more than 2 hours.
 - Avoid drinking or swallowing untreated surface water. Surface water should be boiled or otherwise disinfected before consumption.

MANAGING SPECIAL SITUATIONS

A. Outbreak Investigation:

Outbreak definition: (1) An unexpected, unexplained increase in cases clustered by time, place, or person; or (2) two or more cases in different households with the same strain or pulsed-field gel electrophoresis (PFGE) pattern clustered by person, place or time (within the incubation period).

- 1) Notify KDHE immediately, 1-877-427-7317.
- 2) 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., case ID, setting, classroom),
 - Specimen collection date and lab results,
 - Case status (i.e., confirmed, probable, suspect)
 - All epidemiologic data will be reported and managed with the Kansas electronic surveillance system's outbreak module.
- 3) 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, address) and to what settings or activities are they associated
 - Time: when did it start and is it still going on
- 4) 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.
- 5) 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. Public Gathering Implicated:

- 1) Food sources may include undercooked meat, cross-contaminated food, or possibly food contaminated by food handler.
- 2) Conduct active case finding; ask about recent illness among food handlers.
- 3) If a food establishment or distributor is implicated as the source of infection refer to "[Case Is a Food Handler or Food Establishment Is Implicated](#)."
- 4) If animal sources are implicated:
 - Hygienic and control measures may need to be initiated on farms, petting zoos or fairs. (Refer to [Animals in Public Places Compendium](#).)
 - Proper hand washing after handling animals should always be stressed.

C. Food handler or Food Establishment Implicated:

- 1) Instruct cases on the necessary [work or daycare restrictions or exclusions](#), and that you will be contacting their manager.
 - Obtain manager name and contact information from the case.
- 2) Coordinate stool specimen collection, shipping, and testing through the KDHE Laboratory. Stool specimens should be collected 48 hours after discontinuance of antibiotics or 24 hours after diarrhea has stopped. All stool specimens should be collected at least 24 hours apart.
- 3) Contact the case's manager at the food service establishment.
 - Explain the case is restricted or excluded until two consecutive stool specimens are negative. Because the Kansas Food Code requires food employees to report an STEC diagnosis to their manager, you can share both the name the case and the STEC diagnosis with the manager.
 - If requested, send letter explaining restriction or exclusion (see attachments, "[STEC food handler template letter](#)" and "[STEC food handler manager template letter](#)")
 - If the manager has questions about work duties a restricted case can perform, provide the Kansas Department of Agriculture (KDA) Division of Food Safety and Lodging phone number: (785) 296-5600.
 - Ask about diarrheal illness among staff or patrons within past 2 weeks.
 - Staff that were symptomatic should be considered as probable cases of STEC, and restricted or excluded from food handling.
 - Collect stool specimens from any staff or patron with history of diarrheal illness within the past 2 weeks.
 - Ship specimens to the KDHE Laboratory (KHEL) for STEC testing.
 - A negative stool specimen, collected >48 hours after antibiotics were last used, allows the staff person to return food handling.
 - Instruct the facility operator to call the health department if new cases of diarrhea occur in staff members within the next 2 weeks.
 - Newly symptomatic staff should be considered as probable cases of STEC, and restricted or excluded from food handling.
 - Coordinate stool specimen collection and shipping to KHEL for symptomatic staff.
- 4) Notify KDHE. KDHE will contact the Kansas Department of Agriculture (KDA) Division of Food Safety and Lodging at (785) 296-5600 so they are aware of the food handler restriction or exclusion.
- 5) Document the restriction or exclusion in EpiTrax in the Epidemiological tab of the case record. [Epidemiological]
- 6) After two consecutive stool specimens test negative, contact case and manager to remove restriction or exclusion.

If >1 case from separate households are associated to the facility:

- 1) The local health department will initiate an [outbreak investigation](#).
- 2) KDHE will notify KDA, and a KDA inspector will also perform the following:
 - A thorough inspection of the establishment.
 - Sample collection of any suspected foods.

D. Daycare Worker or Attendee:

For one case, proceed with the following activities:

- 1) Interview the operator and request a review of attendance records to identify other possible cases among staff or attendees in the past 2 weeks.
- 2) Coordinate the collection stool specimens or rectal swabs from any attendees or staff with a history of diarrheal illness within the past 2 weeks.
 - Stool cultures from three to five symptomatic individuals is recommended.
 - Collect samples first from symptomatic individuals followed by those with most recent resolution of symptoms.
- 3) Reinforce exclusion of culture positive (symptomatic and asymptomatic) children and adults until submission of negative stool samples.

If >1 case or suspected case is identified among attendees or workers:

- 1) Contact KDHE-BEPHI and initiate an outbreak investigation.
- 2) Contact the KDHE Child-Care Licensing Program at (785) 296-1270, and/or the local daycare inspector to coordinate the following:
 - Thorough inspection of the facility.
 - Investigate hand washing, diapering and disinfection procedures.
 - Investigate for possible source of infection during last 7 days:
 - o Possible index cases or animal contact (on-site and field trips).
 - o Water-play areas.
 - o For suspected point source outbreaks, collect menus of food and drinks served during the last 7 days from the first date of onset.
 - Review findings with daycare operator and implement control measures.
 - Request stool samples from the following:
 - Symptomatic (or previously symptomatic) children, food handlers and childcare givers at the facility.
 - Symptomatic household/close contacts of symptomatic individuals.
 - Consider stool cultures of asymptomatic contacts that are food handlers, attendees, and staff in the facility.
 - For culture positive (symptomatic and asymptomatic) children and adults, exclude until requirements of K.A.R. 28-1-6 are met.
 - For culture negative symptomatic individuals, exclude until diarrhea resolves. A good practice is for individual to be diarrhea free for 24 hours.
 - Recommend all lab-confirmed individuals seek medical care for evaluation.
- 3) Closing of daycares:
 - Close to new admissions if there is evidence of noncompliance with control measures or continued transmission within the daycare center.
 - Closure to readmission or temporary closure is not recommended.
 - Permanent closure/revocation of license may occur only if deemed necessary by the Child Care Licensing Program.

In all instances:

- 1) Educate on how to prevent disease transmission at center and at home.
- 2) Facility should notify the health department immediately of new diarrheal cases.
- 3) Call or visit facility each week for 2 weeks after the last case's onset to verify no further cases and that appropriate hygienic measures are being carried out.

E. Commercial Dairy or Community Water Source Implicated:

Consult with the State epidemiology staff if a case reports drinking raw milk from a commercial dairy with no other identifiable source of infection or when the investigation implicates a community drinking water system.

F. Healthcare Setting Associated:

- 1) Hospitals: Diarrheogenic *E. coli*, while usually community acquired, is occasionally associated with nosocomial infections.
 - Nosocomial describes infections not present or incubating prior to the patient being admitted but acquired in hospitals and usually observed >48 hours after admission. As the incubation period will vary to some extent based on underlying health conditions, each infection should be assessed individually. Nosocomial infections include those acquired in the hospital but not evident until after discharge.
 - Coordinate investigation efforts with hospital infection control.
- 2) Nursing home: Crowded communal living conditions and age-related risk factors including immune status and higher rates of antibiotic usage, dementia, and incontinence may allow transmission of enteric pathogens.
 - Coordinate investigation efforts through nursing home administrator.
 - Kansas Department of Aging should be notified if a nursing home, adult care, or long-term care facility is involved in an outbreak.

G. Intentional Contamination

- 1) If suspected, notify local law enforcement and state public health officials.
 - Consider epidemiologic clues and law enforcement guidance.
 - Observations during environmental assessments may provide evidence.
- 2) Implement “Chain of Custody” procedures for all samples collected, as they will be considered evidence in a criminal investigation.

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 [STEC Investigation Form](#) can be used to collect information.
 - Alternatively, investigators can collect and enter all required information directly into EpiTrax [\[Demographics\]](#), [\[Clinical\]](#), and [\[Investigation\]](#) tabs.
 - During outbreak investigations, refer to guidance from a KDHE epidemiologist for appropriate collection tools.
 - C. Report data collected during the investigation via EpiTrax.
 - Verify that all data requested on the [STEC Investigation 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 [\[Administration\]](#) 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 bottom of 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:** American Academy of Pediatrics. 2009 Red Book: Report of the Committee on Infectious Disease, 30th Edition. Illinois, Academy of Pediatrics, 2015.
- B. **Epidemiology, Investigation and Control:** Heymann. D., ed., Control of Communicable Diseases Manual, 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. **Kansas Regulations/Statutes Related to Infectious Disease:** www.kdheks.gov/epi/regulations.htm
- E. **Kansas Food Code 2012:** http://agriculture.ks.gov/docs/default-source/fsl--handouts/2012_kda_food_code_12_14_12.pdf?sfvrsn=6
- F. **Animals in Public Places Compendium:** www.kdheks.gov/epi/human_animal_health.htm
- G. **Additional Information (CDC):** www.cdc.gov/health/default.htm

ATTACHMENTS

To view attachments in the electronic version:

1. Download, save, and open attachment.
2. Go to <View>; <Navigation Pane>; <Attachments> – OR – Click on the “Paper Clip”  icon at the left.
3. Double click on the document to open.