Escherichia coli O157:H7, Shiga Toxin-Producing (STEC), Other Pathogenic *E. coli*, and Hemolytic Uremic Syndrome (HUS)☎ !

PROTOCOL CHECKLIST

- ☐ Enter available information into Merlin upon receipt of initial report
- ☐ Review background on the disease and its epidemiology (see page 3), case definition (see page 5), and laboratory testing (see page 6)
- ☐ Contact provider, if necessary (see page 8)
- ☐ Interview patient
  - ☐ Review disease facts (see page 3)
    - ☐ Modes of transmission
    - ☐ Incubation period
    - ☐ Symptoms
  - ☐ Ask about exposure to relevant risk factors (see page 9)
    - ☐ Travel
    - ☐ Consumption of raw or undercooked beef
    - ☐ Consumption of raw or unpasteurized milk or dairy products
    - ☐ Consumption of raw, potentially contaminated, produce
    - ☐ Restaurant meals
    - ☐ Food at public gatherings
    - ☐ Source of drinking water
    - ☐ Recreational water exposure
    - ☐ Contact with livestock
    - ☐ Contact with diapered children with diarrhea
    - ☐ Occupational exposure
  - ☐ Identify symptomatic contacts
  - ☐ Determine if an infected patient or symptomatic contact is in sensitive situation (see page 12)
    - ☐ Recommend exclusions for those infected or symptomatic contacts (see page 12)
  - ☐ Provide education on controlling further spread (see page 10)
    - ☐ Practice proper hand hygiene
    - ☐ People with diarrhea should not use recreational water venues
    - ☐ People with diarrhea should not prepare food for others
  - ☐ Address patient's questions or concerns
- ☐ Follow-up on special situations, including outbreaks or patients in sensitive situations (see page 12)
- ☐ Enter additional data obtained from interview into Merlin (see page 10)

Pathogenic *E.coli* and HUS

1. DISEASE REPORTING

A. Purpose of reporting and surveillance

1. To detect individual people with *Escherichia coli* O157:H7, Shiga toxin-producing *E. coli* (STEC), other pathogenic *E. coli*, and hemolytic uremic syndrome (HUS) in such a way that public health, medical, or behavioral action can prevent spread from the reported patient.

2. To detect outbreaks of illnesses due to these agents, early enough to make a difference to the course of the outbreak.

3. To allow a better understanding of the descriptive epidemiology of cases, in order to be able to focus primary case prevention efforts, and formulate better prevention strategies.

4. To detect outbreaks of illnesses due to these agents, in order to understand better the events that lead to outbreaks and thus be able to focus outbreak prevention efforts (for possible future outbreaks). Note that there are numerous other ways that outbreaks are commonly detected, and this is not the most common.

B. Legal reporting requirements

Physicians are required to report people with enteric disease due to *E. coli* O157:H7 and other pathogenic *E. coli*, and HUS to the county health department (CHD) immediately (24 hours a day, 7 days a week) upon identification/diagnosis. Laboratories are required to report positive *E. coli* O157 cultures, other positive pathogenic *E. coli* cultures, and positive Shiga toxin tests on stool. Laboratories must submit *E. coli* O157:H7 isolates to the Florida Department of Health (DOH) Bureau of Public Health Laboratories (BPHL) for confirmation. Laboratories should submit other pathogenic *E. coli* isolates and Shiga toxin stool specimens to BPHL for confirmation.

C. County health department investigation responsibilities

1. Begin the investigation as soon as possible, but no later than one business day, after receiving report from a provider or laboratory.

2. Interview patient to:
   a. Determine whether the person with the reported infection may have put or be putting others at risk in a sensitive situation;
   b. Determine whether the person with the reported infection may be part of a recognized or unrecognized outbreak, as a trigger to further investigation; and
   c. Convey a highly focused, brief educational intervention to a person who is still symptomatic (or their parent or guardian) about how to avoid infecting others.

3. Administer appropriate measures to control further spread. **See Section 6 for recommendations on controlling further spread.**

4. Report all confirmed, probable, and suspect cases in Merlin.
   a. Both asymptomatic infections and infections at sites other than the gastrointestinal tract, if laboratory confirmed, are considered confirmed cases that should be reported.
   b. An STEC case report form is available to assist in follow up and investigation: http://www.doh.state.fl.us/Disease_ctrl/epi/topics/crforms.htm.
   c. An Extended Data screen is available and required in Merlin.

5. Review reported cases by street address, reporting source, race, ethnicity, age group, onset or report date, etc., to detect possible clusters of infected individuals.

6. Assure that laboratories forward *E. coli* O157:H7 isolates to BPHL for confirmation. If a laboratory identifies Shiga toxin in a stool specimen *but does not perform stool culture,* request that a stool specimen in broth be sent to BPHL for culture.

7. Patients with STEC who develop HUS should be reported in Merlin with BOTH disease codes (as if they were two separate cases).

8. A lab result that reports only "*E. coli*" does not necessarily indicate a notifiable case of pathogenic *E. coli*. Consult your laboratory liaison if you are unsure.

2. THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic agent

E. coli are Gram-negative bacteria classified into serotypes by antigens in their cell wall (the letter "O") and in their flagella (the letter "H"); most serotypes are non-pathogenic. Some kinds of *E. coli* cause disease by making a toxin called Shiga toxin. The bacteria that make these toxins are called "Shiga toxin-producing" *E. coli*, or STEC for short. These may also be called verocytotoxic *E. coli* (VTEC) or enterohemorrhagic *E. coli* (EHEC); these all refer generally to the same group of bacteria.

In addition to *E. coli* O157, many other kinds (called serogroups) of STEC cause disease. These serogroups are sometimes called "non-O157 STEC." As a whole, the non-O157 STEC serogroups are less likely to cause severe illness than *E. coli* O157; however, some non-O157 STEC serogroups can cause the severe manifestations of STEC illness.

The STEC serotype associated with most human illness in the U.S. is *E. coli* O157:H7. *E. coli* serogroups O26, O111, and O103 are the non-O157 serogroups that most often cause human disease. The non-O157 STEC are not nearly as well understood as *E. coli* O157, partly because outbreaks due to them are rarely identified.

Enterotoxigenic *E. coli* (ETEC), enteroinvasive *E. coli* (EIEC), and enteropathogenic *E. coli* (EPEC) are other types of pathogenic *E. coli* that cause diarrheal illness. Unlike STEC, these bacteria do not produce Shiga toxins. Disease reports of ETEC, EIEC, and EPEC infections are rare and the epidemiology in Florida is not well understood. They are reportable to the CHD to rule out STEC disease. ETEC, EIEC, and EPEC do not need to be reported in Merlin. The information in these guidelines is primarily based on studies of *E. coli* O157:H7 infections and outbreaks.

B. Description of illness

Most persons with confirmed STEC report bloody stools that typically begin 6–48 hours after the initial onset of non-bloody diarrhea. Diarrhea will likely be accompanied by abdominal pain and cramps; pain and cramps may be severe and may sometimes be the chief complaint. Nausea and vomiting are common. Fever is generally absent or low-grade in contrast to other bacterial enteric infections. Mild, non-bloody diarrheal illness is common and asymptomatic STEC infections do occur; these clinical manifestations will be rarely diagnosed if they are not part of an outbreak.

Around 5–10% of those who are diagnosed with STEC infection develop a potentially life-threatening complication known as hemolytic uremic syndrome (HUS), especially children age <5 years. Clues that a person is developing HUS include decreased frequency of urination, feeling very tired, and losing pink color in cheeks and inside the lower eyelids. People with HUS should be hospitalized because their kidneys may stop working and they may develop other serious problems. Most people with HUS recover within a few weeks, but some suffer permanent damage or die.

C. Reservoirs

E. coli are ubiquitous in the intestines of warm-blooded vertebrates. Cattle are the best characterized reservoir species for STEC and up to 50–80% of cattle herds (beef and dairy) may be colonized. The organism does not cause illness in bovines. There is no effective method to eradicate the organism from herds. Other potential sources of human infection include deer, elk, sheep, and goats. There have been rare reports of *E. coli* O157:H7 being isolated from other species including dogs, horses, flies and seagulls. The reservoirs for non-O157 STEC are not well characterized.

D. Modes of transmission

Fecal-oral transmission is the most common mode. For *E. coli* O157:H7, ingestion of contaminated food or direct contact with animals on farms or at petting zoos is common. Undercooked beef (especially hamburger), foods cross-contaminated from raw beef, and raw milk contaminated with cattle feces are the prototypical sources of common-source outbreaks. Dry, cured sausages and venison are other potential sources.

Contaminated produce, including leafy greens, alfalfa sprouts, and unpasteurized apple cider are other recognized exposure sources. Person-to-person transmission can occur directly (households, child care centers, institutions) or indirectly (contaminated drinking or recreational water).

E. Incubation period

1–10 days; usually 3-4 days (longer incubations are possible but uncommon).

F. Period of communicability

STEC typically disappear from the feces by the time the illness is resolved, but may be shed for several weeks, even after symptoms resolve. Young children tend to carry STEC longer than adults. Although uncommon, bacterial shedding can continue for several months.

G. Treatment

Supportive therapy with hydration is usually sufficient to treat this infection. Most people recover within 5–10 days without antibiotics and most experts do not recommend the use of antibiotics. Some studies have shown that the use of antibiotics is associated with the development of HUS. Antidiarrheal agents, such as loperamide (Imodium®), should also be avoided.

Data from the Foodborne Diseases Active Surveillance Network found that young children have an increased risk of HUS after *E. coli* O157 infection, while elderly have the highest rate of death associated with *E. coli* O157 infection, regardless of developing HUS. These findings support recommendations that young children and elderly persons should receive aggressive supportive care during the early stages of illness due to *E. coli* O157:H7.*

Although the *E. coli* O157:H7 serotype may be more likely to cause hospitalization and HUS, non-O157 STEC infections do result in bloody diarrhea, hospitalization, and HUS. In several small case series, up to 20-30% of identified non-O157 STEC infections resulted in HUS. Consequently, non-O157 *E. coli* infections should be treated as aggressively as disease due to *E coli* O157:H7 infections.**

Children with bloody diarrhea should be closely monitored for the development of HUS. If a complete blood cell count with smear, blood urea nitrogen and creatinine are normal 3 days after the resolution of diarrhea, it is unlikely HUS will develop.

*Clin Infect Dis 2009 Nov 15;49(10):1480-5
** Clin Infect Dis 2006 Dec 15;43(12):1587-95

H. Prophylaxis

None indicated.

I. STEC in Florida

DOH receives approximately 150-250 reports of STEC per year. Almost half of these infections are based on detection of Shiga toxin, without isolation of the toxin-producing *E. coli* bacteria, and therefore only meet the suspect case definition. Approximately 15% of all cases are reported as outbreak-associated.

3. CASE DEFINITION

STEC

A. Clinical description

An infection of variable severity characterized by diarrhea (often bloody) and abdominal cramps. Illness may be complicated by hemolytic uremic syndrome (HUS) or thrombotic thrombocytopenic purpura (TTP); asymptomatic infections also may occur and the organism may cause extra intestinal infections.

B. Laboratory criteria for diagnosis

Isolation of Shiga toxin-producing *Escherichia coli* (STEC) from a clinical specimen. *Escherichia coli* O157:H7 isolates may be assumed to be Shiga toxin-producing. For all other *E. coli* isolates, Shiga toxin production or the presence of Shiga toxin genes must be determined to be considered STEC.

C. Case classification

Confirmed: a case that meets the laboratory criteria for diagnosis. When available, O and H antigen serotype characterization should be reported.

Probable*:*

- a case with isolation of *E. coli* O157 from a clinical specimen, without confirmation of H antigen or Shiga toxin production,
  OR
- a clinically compatible case that is epidemiologically linked to a confirmed or probable case,
  OR
- identification of an elevated antibody titer to a known Shiga toxin-producing *E. coli* serotype from a clinically compatible case.

Suspect: a case of postdiarrheal HUS or TTP, or identification of Shiga toxin in a specimen from a clinically compatible case without the isolation of the Shiga toxin-producing *E. coli*.

D. Comment

Both asymptomatic infections and infections at sites other than the gastrointestinal tract, if laboratory confirmed, are considered confirmed cases that should be reported.

E. Note

Patients with STEC infection who develop hemolytic uremic syndrome (HUS) should be reported in Merlin with BOTH disease codes (as if they were two separate cases). A lab result that reports only "*E. coli*" does not indicate pathogenic *E. coli*.

Isolates from all cases of *E. coli* O157:H7 must be sent to the BPHL for confirmation and PFGE typing. All Shiga toxin-positive specimens should be

sent to the BPHLfor confirmation and additional testing. There is a strong possibility that Shiga toxin may degrade in transit. A person with any positive Shiga toxin result and no other enteric pathogens detected should be reported as a suspect case in Merlin, regardless of whether Shiga toxin is confirmed by the BPHL.

Hemolytic Uremic Syndrome (HUS)

A. Clinical description

Hemolytic uremic syndrome (HUS) is characterized by the acute onset of microangiopathic hemolytic anemia, renal injury, and low platelet count. Thrombotic thrombocytopenic purpura (TTP) also is characterized by these features but can include central nervous system (CNS) involvement and fever and may have a more gradual onset. Most cases of HUS (but few cases of TTP) occur after an acute gastrointestinal illness (usually diarrheal).

B. Laboratory criteria for diagnosis

The following are both present at some time during the illness:

- Anemia (acute onset) with microangiopathic changes (i.e., schistocytes, burr cells, or helmet cells) on peripheral blood smear,
  AND
- Renal injury (acute onset) evidenced by either hematuria, proteinuria, or elevated creatinine level (i.e., >1.0 mg/dL in a child aged <13 years or >1.5 mg/dL in a person aged >13 years, or >50% increase over baseline).

Note: A low platelet count can usually, but not always, be detected early in the illness, but it may then become normal or even high. If a platelet count obtained within seven days after onset of the acute gastrointestinal illness is not <150,000/mm_3, other diagnoses should be considered.

C. Case classification

Confirmed: an acute illness diagnosed as HUS or TTP that both meets the laboratory criteria and began within three weeks after onset of an episode of acute or bloody diarrhea.

Probable:

- an acute illness diagnosed as HUS or TTP that meets the laboratory criteria in a patient who does not have a clear history of acute or bloody diarrhea in preceding three weeks,
  OR
- an acute illness diagnosed as HUS or TTP, that a) has onset within three weeks after onset of an acute or bloody diarrhea and b) meets the laboratory criteria except that microangiopathic changes are not confirmed.

D. Comment

Some investigators consider HUS and TTP to be part of a continuum of disease. Therefore, criteria for diagnosing TTP on the basis of CNS involvement and fever are not provided because cases diagnosed clinically as postdiarrheal TTP also should meet the criteria for HUS. These cases are reported as postdiarrheal HUS.

Most diarrhea-associated HUS is caused by Shiga toxin-producing *Escherichia coli* (STEC), most commonly *E. coli* O157.

If a patient meets the case definition for both Shiga toxin-producing *E. coli* (STEC) (Merlin code = 00800) and HUS (Merlin code = 4200), the case should be reported for each of the conditions (as if they were separate cases) in Merlin.

4. LABORATORY TESTING

A. Criteria for diagnosis

STEC infection is confirmed by isolation of *E. coli* and detection of Shiga toxin in a clinical specimen or isolation of the *E. coli* O157:H7 serotype from a clinical specimen. Many STEC infections are missed due to testing policies. The Centers for Disease Control and Prevention (CDC) recommend that all stool specimens submitted for diagnosis of community-acquired diarrhea be simultaneously cultured for *E. coli* O157 on selective and differential agar and assayed for non-O157 *E. coli* with tests that detect Shiga toxin (e.g., enzyme immunoassay or EIA). This should be done regardless of patient age, season of the year, or presence or absence of blood in the stool.

Stools should be tested as early as possible in the course of the illness, since bacteria and/or Shiga toxin may be difficult to detect in the stool after 1 week of illness. Early detection of STEC contributes to proper patient management, especially among young children and elderly persons.

Chapter 64D-3, F.A.C. **requires** that all *E. coli* O157:H7 isolates be forwarded to BPHL for confirmation. Additionally, please request that all other STEC isolates be forwarded to BPHL for confirmation, serotyping (determining the type of O and H antigens), and pulsed-field gel electrophoresis (PFGE) subtyping as soon as possible. Laboratories that only screen for Shiga toxin via EIA should submit a stool specimen in broth for culture.

The use of non-culture methods as standalone tests for the direct detection of *E. coli* O157 in stool appears to be increasing.

B. Services available at the Bureau of Public Health Laboratories (BPHL)

1. Jacksonville BPHL laboratory confirms Shiga toxin production, cultures *E. coli* O157:H7 and O157:NM from stool, and serogroups pure *E. coli O157* isolates.

2. Stool enrichments that are positive for Shiga toxin but did not yield an *E. coli* O157:H7 isolate are forwarded to the CDC for detection of less frequent serogroups (*E. coli* O111, O26, O45, etc.) as well as molecular virulence antigen detection (eae, hylA).

3. BPHL algorithm
   a. If a hospital or commercial laboratory forwards a positive or weakly positive Shiga toxin specimen, BPHL will repeat the Shiga toxin EIA test and culture on selective media for identification of *E. coli* O157:H7.
      i. If BPHL confirms the specimens as Shiga toxin positive or weakly positive and *E. coli* O157:H7 is isolated, BPHL will perform pulsed-field gel electrophoresis (PFGE) on the isolate to obtain a fingerprint of the isolate.
      ii. If BPHL confirms the specimens as Shiga toxin positive or weakly positive and *E. coli* O157:H7 is not isolated, then the specimen will be forwarded to CDC for further characterization.
      iii. If BPHL is **not** able to detect Shiga toxin or isolate *E. coli* O157:H7, the laboratory report is negative and the specimen will **not** be forwarded to CDC.
   b. For specimens forwarded to CDC, please understand it will take some time to get the results. Please continue with your investigation of sporadic cases or clusters. Do not wait for BPHL or CDC confirmation to implement public health action.

4. Culturing food items is generally non-productive in sporadic cases; however, implicated food items may be cultured by BPHL during outbreak investigations. Please consult BPHL and your Regional Environmental Epidemiologist to discuss culturing food items.

C. Testing requests

1. Submitting specimens/isolates to BPHL
   a. All submissions should be accompanied by Clinical Lab Submission Form 1847 (http://www.doh.state.fl.us/lab/addpages/BOL_Forms.html).
   b. Electronic Laboratory Ordering (ELO) may also be used by entering request into the HMS State Laboratory System, placing bar coded label on the Cary-Blair vial, and writing the date collected on the vial.

2. Specimen collection
   a. Patient stools: a small portion (acorn size) of formed stool or equal portion of liquid stool should be transferred aseptically to a modified Cary-Blair transport vial that is properly labeled (name, date of birth, date collected).

      Note: for stool specimens, simply mark test 1900 on the Clinical Lab Submission Form 1847 and all enteric pathogens are automatically screened (*Salmonella*, *Shigella*, *Campylobacter*, *E. coli* O157).

   b. Suspected Shiga toxin-positive broths: inoculate a GN Broth tube or Mac Broth tube with the original stool specimen, properly label (name, date of birth, date collected), and incubate 18-24 hours at 35ºC before shipping to the laboratory to ensure viable growth.

      Note: for isolates, please write “Shiga toxin-positive broth” in the comment section of the Clinical Lab Submission Form 1847.

c. Pure isolates of suspected STEC: subculture a pure single colony of your suspect STEC on a general purpose bacterial slant (TSA slant, chocolate slant, etc.), properly label (name, date of birth, date collected), and incubate the suspect slant for 18-24 hours at 35-37ºC before shipping to the laboratory to ensure viable growth.

Note: please write "suspect STEC for confirmation" in the comment section of the Clinical Lab Submission Form 1847.

3. Packaging and shipping
   a. Stools, broths, and isolates for STEC testing should be sent to the Jacksonville BPHL laboratory.
   b. Place labeled vial in the proper inner/outer container (aluminum screw-cap inner container with spill absorber holds the primary vial and that is then placed in an outer cardboard screw-cap container). Please place the Clinical Lab Submission Form 1847 in a plastic Ziploc bag between the inner and outer container. Package according to International Air Transport Association (IATA) regulations, labeling the outer shipping container: *UN3373, Biological Substance Category B.*
   c. Stools, broths, and isolates should be sent at ambient temperature or cooler, but cool packs should not be in direct contact with vials.
   d. http://www.doh.state.fl.us/lab/PDF_Files/Packaging_Flowchart_0422051.pdf
   e. http://www.doh.state.fl.us/lab/PDF_Files/Packaging_Flowchart_notes_0422051.pdf

D. Interpretation of results

Hospital and commercial labs may detect Shiga toxin in specimens that are subsequently found to be negative for Shiga toxin by BPHL. Due to possible decay of Shiga toxin during transport to BPHL, these discordant results frequently occur. These cases meet the suspect case definition, regardless of negative BPHL result, and should be investigated, managed, and reported appropriately. For questions about interpretation of serogroup and serotype information, consult BPHL or the Bureau of Epidemiology.

5. CASE INVESTIGATION

All people with a positive STEC result, regardless of laboratory method, should be investigated and managed as follows.

A. Contact the physician or hospital

1. Confirm that an STEC infection has been diagnosed in the reported patient.

2. Obtain the following:
   a. Date of onset
   b. Signs and symptoms
   c. Predisposing conditions (e.g., immunosuppression)
   d. Tests performed (including cultures, EIA, PFGE testing, etc.)

e. Treatment (especially antimicrobials).

3. Ask what information has been given to the patient, including whether the patient knows about the diagnosis.

4. Obtain as much demographic information as possible, including contact information (home, cellular, pager and/or work numbers). Ask how and where the patient can be contacted (i.e., at hospital or home).

5. Notify the physician that you will be contacting the patient as DOH follows up on all cases of STEC to assess risks factors, to better characterize the occurrence of STEC infection in Florida, and to identify potential means for preventing further illness. It may also be appropriate at this point to determine if the physician has any concerns in regards to the CHD contacting the patient.

B. Interview the case

1. Contact the patient to complete an interview as soon as possible after being reported to optimize recall.
   a. Make at least three phone call attempts to reach the case.
   b. Calls should be made at different times of the day, with at least one attempt in the evening.

2. **STEC Case Report Form (required):** http://www.doh.state.fl.us/Disease_ctrl/epi/topics/crforms.htm. This form can be used to guide the interview and can be completed during the interview.

3. Use the required Extended Data screen in Merlin to enter data from the Case Report Form.

4. Items to cover during interview include:
   a. Provide brief background on disease, including possible modes of transmission, incubation period, symptoms, etc.
   b. Activities during exposure period (7 days before onset):
      i. Travel outside Florida or the United States. Determine dates of travel.
      ii. Handling or consumption of raw or undercooked beef.
      iii. Consumption of raw milk or other unpasteurized dairy products.
      iv. Consumption of raw, potentially contaminated produce, including sprouts, leafy greens, and unpasteurized apple juice or cider.
      v. Restaurant meals. Obtain the name of the restaurant(s), date(s), and location(s) of the meal(s).
      vi. Public gathering where food was consumed (e.g., birthday parties, picnics, etc.). Obtain the date, location, and sponsor of the event.
      vii. Source(s) of drinking water as well as water from streams or lakes.
      viii. Recreational water exposure. This includes swimming, playing, or other exposure to lakes, streams, swimming pools, water parks or wading pools where water may have been swallowed.
      ix. Contact with livestock, especially cattle, or other animals, such as at a petting zoo.
      x. Contact with diapered children with diarrhea, or children in child care or other settings for preschool children.

xi. Occupational exposures. Evaluate the potential for exposure to human or animal excreta.
xii. **Note:** If the patient reports **no** gastrointestinal symptoms, the patient seems to be a case of secondary transmission, or the infection was acquired outside of the U.S., there is no need to collect exposure information for the exposure period.

c. Determine if others (e.g., family, friends, coworkers, customers, patients, etc.) are known or thought to be ill with similar symptoms. If so, inquire about possible common source exposures. Obtain the name, phone number or address and clinical information of the ill person. Anyone meeting the probable case definition should be reported and investigated in the same manner as a confirmed case.
d. Determine if the patient or any of their symptomatic household or other close contacts are associated with **sensitive situations** (i.e., an attendee or employee of a daycare/ childcare setting, a food handler, or an employee in a healthcare setting with direct patient care). Determine the dates and times he/she worked to determine the risk of transmission to others. **See Section 7 for recommended exclusions for symptomatic patients or contacts in sensitive situations.**
e. Provide basic instruction to patients and potentially exposed contacts about hand washing after defecation, diaper changing, and before food preparation; about the importance of proper food handling and adequate cooking of meat; and, in general, provide pointers about minimizing fecal contamination in daily life. **See Section 6 for recommendations on controlling further spread.**

C. Environmental evaluation

During routine case investigations of STEC, if a particular food or water exposure is suspected as the likely source of infection, then the CHD investigator should complete the Tri-Agency Foodborne Illness Survey/Complaint Form (http://www.foodandwaterdisease.com/forms/Tri-Agency_Foodborne_Illness_Form_Electronic_2-16-2011.pdf). The CHD investigator should record that complaint in their complaint log, and forward it to the appropriate agency with jurisdiction.

For each interviewed sporadic case of STEC with an environmental exposure that could affect many people (e.g., a restaurant, water park, or high-risk commercially distributed food item), review complaint logs and recent STEC cases in Merlin for additional cases that may be linked to the same facility or exposure source. When a community outbreak of STEC is identified, most or all cases will be in the high-priority Group 1 and be a high priority for interview and investigation. A joint investigation/environmental assessment for single, sporadic cases of STEC is not necessary. If additional cases are suspected or an outbreak is detected, the Regional Environmental Epidemiologist should be notified and a joint investigation/ environmental assessment will be conducted with the appropriate regulatory authority. Investigation guidelines and forms for when and how to perform a joint investigation/environmental assessment are available on the Food and Waterborne Disease Program's Investigation Tools webpage (http://www.foodandwaterdisease.com/investigation_information.htm). Technical assistance is also available from your Regional Environmental Epidemiologist, if needed

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

D. Merlin data entry

Create a case in Merlin under disease code **ESCHERICHIA COLI, SHIGA TOXIN PRODUCING – 00800**. Create a separate case in Merlin under disease code **HEMOLYTIC UREMIC SYNDROME (HUS) – 42000** if the patient also meets that case definition. Enter the data collected into Merlin, being sure to include all required fields on the Basic Data screen, complete the Case Symptoms screen, the Extended Data screen, and attach all relevant labs. Please attach **ALL** labs received via electronic laboratory reporting (ELR) to the case. For questions regarding serogroup or serotype results, please contact the Bureau of Epidemiology (BOE).

6. CONTROLLING FURTHER SPREAD

A. Patient/household education on prevention recommendations

1. Patients should be educated on preventing transmitting infection to others.
   a. Wash hands after using the toilet, changing diapers, handling soiled clothing or linens.
   b. People with diarrhea should not prepare food for others.
   c. People with diarrhea should not use recreational water venues (e.g., pools, lakes, interactive fountains, water parks) until two weeks after symptoms resolve.

2. General information on preventing disease may also be covered.
   a. Wash hands after handling pets, pet wastes, pet food and treats made from animal products, fowl, other animals, raw meat, or raw poultry, and always before food preparation.
   b. Avoid eating raw or undercooked meat, especially hamburger. Hamburger prepared at home should be cooked to an internal temperature of at least 160° F. While it is best to use a thermometer, cook at least until there is no red or pink remaining and meat juices have no color.
   c. Avoid cross-contamination of ready to eat foods with raw foods of animal origin via cooking surfaces and utensils. Wash food preparation surfaces and utensils thoroughly after contact with raw meat or poultry, especially before handling and preparing food that will be served raw.
   d. Wash fruits and vegetables thoroughly before consumption. Peel when possible.
   e. Avoid unpasteurized milk and other unpasteurized products including soft cheese, juices, and cider.
   f. Avoid drinking or swallowing untreated surface water. Untreated water should be boiled or otherwise disinfected before consumption.

B. Isolation of cases

People with diarrhea should stay home from daycare, school, or work until they are asymptomatic for 24 hours. Follow-up or release from isolation based on stool

culture results is not required. **See Section 7 for recommended exclusions for symptomatic cases in sensitive situations**.

C. Management of contacts

1. Symptomatic contacts: symptomatic contacts should be investigated and managed in the same manner as a confirmed case. Symptomatic contacts of confirmed cases meet the probable case definition and should be reported in Merlin. **See Section 7 for recommended exclusions for symptomatic contacts in sensitive situations.**

2. Asymptomatic contacts: may be permitted to continue in their sensitive situation.

D. Laboratory testing during outbreaks

1. Laboratory testing should be performed to assist in public health decision making and for epidemiologic studies.

2. Symptomatic contacts may be required to submit stool specimens to establish the etiology of the outbreak.

3. Once the etiologic agent for the outbreak has been identified (4-6 specimens) further testing is usually not required for public health purposes.

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

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

7. MANAGING SENSITIVE SITUATIONS

A. Determining a sensitive situation

Sensitive situation is not defined in Chapter 64D-3, F.A.C. in relation to any particular disease. The examples provided in Chapter 64D-3, F.A.C. are all related to enteric infections, but it should not be assumed that all sensitive situations are equal for all diseases, especially given the markedly different age distributions, and presumed different risk of transmission by age.

Section 64-D3-3.037(3), F.A.C. specifically gives CHD directors the authority to decide what is a sensitive situation, and provides broad authority to take necessary action to control disease.

For example, a CHD director may use his/her discretion to designate an elementary school, or the lower grades of an elementary school, as a sensitive situation, but he/she is not required to do so. This decision should be based on evidence of transmission within a particular setting.

B Case or symptomatic contact attends or works at a day care facility

1. Exclusion: before returning to day care facility, patient should submit two negative specimens collected at least 24 hours apart. If the patient was on antibiotic therapy, the first specimen should be collected at least 48 hours after cessation of antibiotic therapy.

2. Instruct the operator and other staff in proper methods for food handling and hand washing, especially after changing diapers.

3. Interview the operator and check attendance records to identify other possibly infected persons that attended daycare in the previous month.

4. Instruct the operator to notify the CHD immediately if new people with diarrhea are identified. Call or visit once each week for two weeks after onset of the last case to verify that surveillance and appropriate hygienic measures are being implemented. Manage newly symptomatic children as outlined above.

5. Outbreak: defined as two or more cases of gastrointestinal illness with similar symptoms occurring within 72 hours among children or staff who do not live in the same household; if the etiologic agent is known, an outbreak is defined as two or more cases of infection occurring within the incubation period for the disease.
   a. If an outbreak is identified, do a sanitary inspection and implement control measures as outlined in the Guidelines for Control of Outbreaks of Enteric Disease in Child Care Settings (http://www.doh.state.fl.us/Disease_ctrl/epi/surv/enteric.pdf), per Rule 64D-3.040(5), F.A.C.
   b. Phase 1: *E. coli* O157:H7 and related species suspected or confirmed; phase 1 continues for two incubation periods after control measures have been put into place.
      i. Exclusion: All persons who have been symptomatic (diarrhea and/or abdominal cramps) within three weeks prior to onset of a confirmed case will be excluded.
      ii. Release from exclusion: based on the submission of two negative stool specimens taken from the excluded person collected no sooner than 24 hours apart.
      iii. Children who develop symptoms while at the day care should be isolated from other children until the parent or guardian removes the child from the facility.
      iv. Personal control measures: require all persons (including, but not limited to: children, parents, siblings, staff, visitors, and service personnel) to wash hands upon entering the facility, after using the bathroom, after assisting with toileting or diaper changes, after playing outside**,** and before and after handling food or eating. Adults will supervise children's hand washing, infants' hands will be washed after diaper changes, and staff involved in food preparation should not change diapers.
      v. Environmental control measures
         - Ensure that hand toys are limited to single child use between cleaning and sanitizing
         - Ensure that food is served in individual portions
         - Prohibit use of swimming pools
         - Prohibit playing with dough or clay

- Regularly clean tables and other contact surfaces during the day using an appropriate germicide
- Clean and sanitize potty chairs after each use
- Clean frequently during the day and sanitize at least once a day

c. Phase 2: if *E. coli* O157:H7 and related species cases continue to occur more than seven days (two median incubation periods), continue Phase 1 control measures.

C. Case or symptomatic contact is a food handler

1. Exclusion: before returning to food handling, patient must submit two negative specimens collected at least 24 hours apart. If the patient was on antibiotic therapy, the first specimen should be collected at least 48 hours after cessation of antibiotic therapy.

2. Contact your Regional Environmental Epidemiologist (http://www.doh.state.fl.us/environment/medicine/foodsurveillance/about_us.htm)

D. Case or symptomatic contact works at a healthcare or residential care facility

Exclusion: before returning to a healthcare or residential care facility, patient must submit two negative specimens collected at least 24 hours apart. If the patient was on antibiotic therapy, the first specimen should be collected at least 48 hours after cessation of antibiotic therapy.

8. IMPORTANT LINKS

A. STEC Case Report Form:
http://www.doh.state.fl.us/Disease_ctrl/epi/topics/crforms.htm

B. Guidelines for Control of Outbreaks of Enteric Disease in Child Care Settings:
http://www.doh.state.fl.us/Disease_ctrl/epi/surv/enteric.pdf

C. Tri-Agency Foodborne Illness Survey/Complaint Form
(http://www.foodandwaterdisease.com/forms/Tri-Agency_Foodborne_Illness_Form_Electronic_2-16-2011.pdf

D. Food and Waterborne Disease Program – Investigation Tools
http://www.foodandwaterdisease.com/investigation_information.htm

E. Food and Waterborne Disease Program – Contact List
http://www.foodandwaterdisease.com/contact_docs/RegionalEpidemiologist_ContactsList.pdf

F. APHA Media Advocacy Manual:
http://www.apha.org/NR/rdonlyres/A5A9C4ED-1C0C-4D0C-A56C-C33DEC7F5A49/0/Media_Advocacy_Manual.pdf

9. REFERENCES

A. Heymann, D.L. (Ed.). (2008). *Control of communicable diseases manual* (19th ed.). Washington: American Public Health Association.

B. American Academy of Pediatrics. (2012). *Red Book: 2012 Report of the Committee on Infectious Diseases* (29th ed.). Grove Village, IL: American Academy of Pediatrics.

C. Aronson, S.S. and Shope, T.R. (Eds.). (2009). *Managing Infectious Diseases in Child Care and Schools: A Quick Reference Guide* (2nd ed.). Grove Village, IL: American Academy of Pediatrics.