

Shigellosis

BASIC EPIDEMIOLOGY

Infectious Agent

Shigella species, a Gram negative bacilli. Shigellosis can be caused by four species of *Shigella*: *S. dysenteriae*, *S. flexneri*, *S. boydii*, and *S. sonnei*. *S. sonnei* is the most common cause of shigellosis in the United States.

Transmission

Mainly by direct or indirect fecal-oral transmission from a symptomatic patient or asymptomatic carrier. The infectious dose can be as low as 10–100 organisms. Transmission can occur through ingestion of contaminated food or water, direct contact with a contaminated inanimate object (fomites) or sexual contact, including oral-anal contact. Person-to-person transmission is common within households and child-care facilities or other close contacts, especially when hand washing is inadequate. Care givers are also at risk of infection if there is fecal contamination of hands.

Incubation Period

Usually 1-3 days (ranges 12 to 96 hours).

Communicability

People are infectious as long as bacteria are shed in their stool. Shedding may last 1 to 4 weeks after onset of illness. Rarely, individuals can remain carriers for several months. The period of excretion is usually shortened by appropriate antibiotic therapy.

Clinical Illness

Symptoms include acute onset of diarrhea, usually accompanied by moderate to high fever, abdominal pain, cramping, nausea, and tenesmus. Diarrhea is often watery but may contain blood and mucus (dysentery). Mild and asymptomatic infections also occur.

Severity

Infections can be severe, particularly in young children and the elderly. Complications from shigellosis can include pseudomembranous colitis, toxic megacolon, intestinal perforation, hemolysis, and hemolytic uremic syndrome (HUS).

DEFINITIONS

Clinical Case Definition

An illness of variable severity characterized by diarrhea, fever, nausea, cramps, and tenesmus. Asymptomatic infections can occur.

Laboratory Confirmation

- Isolation of *Shigella* from a clinical specimen.

Case Classifications

- **Confirmed:** A case that meets the laboratory criteria for diagnosis. When available, *Shigella* serogroup or species and serotype characterization should be reported.
- **Probable:**
 - A case with *Shigella* spp. or *Shigella*/EIEC detected, in a clinical specimen, by use of culture independent laboratory methods (non-culture based), **OR**
 - A clinically compatible case that is epidemiologically linked to a case that meets the probable or confirmed laboratory criteria for diagnosis.

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

Note: A case should not be counted as a new case if laboratory results were reported within 90 days of a previously reported infection in the same individual, unless additional information is available indicating a separate infection, e.g., different serotype

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

It is recommended that local and regional health departments investigate all reported cases of shigellosis to identify potential sources of infection. Sporadic cases of shigellosis do not require an investigation form to be sent to DSHS EAIDU unless they are identified as part of a multi-jurisdictional cluster or outbreak. Any case associated with a cluster or outbreak should be interviewed.

Case Investigation Checklist

- Confirm laboratory results meet the case definition.
- Review medical records or speak to an infection preventionist or healthcare provider to verify case definition, identify possible risk factors and describe course of illness.
- If time and resources allow or the case is part of an outbreak or cluster, interview the case to identify potential sources of infection. Ask about possible exposures 1–7 days before onset of symptoms, including:
 - Contacts or household members with a diarrheal illness. Obtain the name, phone number or address, and clinical information of the ill person.
 - Attendance or employment at a child-care facility by the case or a household member of the case. If the case or a household member attends or works at a child-care facility, see *Managing Special Situations*.
 - Restaurant or other food service meals. Obtain the name of the restaurant, and date and location of the meal.
 - Public gathering where food was consumed. Obtain the date, location, and sponsor of the event.
 - Recreational water exposure, including lakes, streams, swimming pools, water parks or wading pools. Obtain the date and location of exposure.
 - Source(s) of drinking water as well as water from streams or lakes (either consumed purposefully or accidentally during work or sports activity). Water used only after boiling need not be included.
 - Travel within Texas, outside Texas or outside the United States, or contact with others who have traveled outside the United States. Determine dates of travel.
 - Sexual contact involving potential oral-fecal exposure.
 - Note: If the case is not available or is a child, conduct the interview with a surrogate who would have the most reliable information on the case, such as a parent or guardian.
- Provide education to the case or his/her surrogate about effective hand washing, particularly after using the toilet, changing diapers, and before preparing or eating food. Meticulous hand washing is required to prevent transmission. See *Prevention and Control Measures*.
- Identify whether there is a public health concern: persons should not work as food handlers, child-care or health care workers, or attend child-care as long as they have diarrhea. See *Exclusions*.
- All confirmed, probable, and suspect case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures

- Routine hand washing with soap and warm water especially:
 - Before preparing, handling or eating any food.
 - After going to the bathroom.
 - After changing a diaper.
 - After caring for someone with diarrhea.
- Do not participate in recreational water activities such as swimming while diarrhea is present and for one week after diarrhea has resolved.

- Avoid fecal exposure during sexual contact.
- When traveling, drink only treated or boiled water and eat only cooked hot foods or fruits you peel yourself.

Recommended Control Measures for Schools and Child-Care Centers:

- **Hand Washing**
 - Encourage children and adults to wash their hands frequently, especially before handling or preparing foods and after wiping noses, diapering, using toilets, or handling animals.
 - Wash hands with soap and water long enough to sing the “Happy Birthday” song twice.
 - Sinks, soap, and disposable towels should be easy for children to use.
 - If soap and water are not available, clean hands with gels or wipes with alcohol in them.
- **Diapering**
 - Keep diapering areas near hand washing areas.
 - Keep diapering and food preparation areas physically separate. Keep both areas clean, uncluttered, and dry.
 - The same staff member should not change diapers and prepare food.
 - Cover diapering surfaces with intact (not cracked or torn) plastic pads.
 - If the diapering surface cannot be easily cleaned after each use, use a disposable material such as paper on the changing area and discard the paper after each diaper change.
 - Sanitize the diapering surface after each use and at the end of the day.
 - Wash hands with soap and water or clean with alcohol-based hand cleaner after diapering.
- **Environmental Surfaces and Personal Items**
 - Regularly clean and sanitize all food service utensils, toys, and other items used by children.
 - Discourage the use of stuffed toys or other toys that cannot be easily sanitized.
 - Discourage children and adults from sharing items such as combs, brushes, jackets, and hats.
 - Maintain a separate container to store clothing and other personal items.
 - Keep changes of clothing on hand and store soiled items in a nonabsorbent container that can be sanitized or discarded after use.
 - Provide a separate sleeping area and bedding for each child, and wash bedding frequently.

Exclusions:

School/child-care: No exclusion specified for shigellosis but the standard exclusion for diarrhea or fever applies:

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

Food Employees: Symptomatic food employees infected with *Shigella spp.* are to be excluded from work. Asymptomatic food employees diagnosed with an infection from *Shigella spp.* are to be excluded from working in a food establishment serving a highly susceptible population or restricted if they do not serve a highly susceptible population.

Food employees can be reinstated with approval from the Regulatory Authority and if one of the following conditions is met:

- Medical documentation stating that the food employee is free of infection from *Shigella spp.* based on test results showing two consecutive, negative stool specimen cultures. The stool specimens should be collected at least 24 hours apart and not sooner than 48 hours after the last dose of antibiotics, if antibiotics were given.
- More than 7 days have passed since the food employee became asymptomatic (without the use of diarrhea suppressing medications) or
- The food employee did not develop symptoms and more than 7 days have passed since being diagnosed.

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

MANAGING SPECIAL SITUATIONS

Case Attends or Works at a Child-Care Facility

- Interview the director and review written attendance records to identify other possible cases among staff or attendees during the previous month.
- Review food handling, hand washing techniques, and diaper changing practices with the director and staff.
- If other cases are suspected, recommend that they seek medical attention from a healthcare provider.
- Cases should be excluded until free from diarrhea and/or fever. See Exclusions in Case Investigation section.
 - Recommendations can be made to exclude cases until they have two negative stool cultures collected at least 24 hours apart and at least 48 hours after discontinuation of antibiotics
- Parents of children in the same child-care group as a case should be notified of the occurrence of shigellosis in the group. Notification letters should include following elements:
 - Children should be monitored carefully for signs of illness such as diarrhea, abdominal pain, nausea, vomiting and fever.
 - Notify the daycare operator or local health jurisdiction should symptoms occur.
 - A symptomatic child should not be brought to the daycare facility or placed in any other group of children.
 - Information on the illness and how transmission can be prevented.
- If indicated, conduct an inspection of the facility.
- Instruct the facility director to call immediately if new cases of illness occur.
- Follow-up with the child-care center to ensure that surveillance and appropriate prevention measures are being carried out (see Prevention and Control Measures).

Outbreaks

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

The local/regional health department should:

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

Line list example:

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

- If the outbreak was reported in association with an apparent common local event (e.g., party, conference, rodeo), a restaurant/caterer/home, or other possible local exposure (e.g., pet store, camp), contact hospitals in your jurisdiction to alert them to the possibility of additional shigellosis cases.
- Isolates can be submitted to the DSHS laboratory for serotyping and WGS. See Laboratory Procedures.
- Work with any implicated facilities to ensure staff, students, residents, and volunteers receive hand hygiene education, and review hygiene and sanitary practices currently in place including:
 - Policies on, and adherence to, hand hygiene
 - Storage and preparation of food
 - Procedures for changing diapers and toilet training
 - Procedures for environmental cleaning
- Recommend that anyone displaying symptoms seeks medical attention from a healthcare provider.
- Restrict individuals from handling food, engaging in child-care, healthcare work, or attending child-care, as long as they are symptomatic. See Exclusions in Case Investigation section.
- Enter outbreak into NORS at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

Whole Genome Sequencing clusters:

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

Note:

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

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements

Confirmed, probable and suspected cases are required to be reported **within 1 week** to the local or regional health department or the Texas Department of State Health Services (DSHS), Emerging and Acute Infectious Disease Branch (EAIDU) at **(512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed, and probable** cases.
 - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
 - A case should not be counted as a new case if laboratory results were reported within 90 days of a previously reported infection in the same individual, unless additional information is available indicating a separate infection, e.g., different serotype. A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- If investigation forms are requested, they may be faxed to 512-776-7616 or emailed securely to an EAIDU foodborne epidemiologist at FoodborneTexas@dshs.texas.gov.

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

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

LABORATORY PROCEDURES

CLINICAL SPECIMENS:

Testing for shigellosis is widely available from most private laboratories. Isolates are encouraged to be submitted to the DSHS laboratory for serotyping and Whole Genome Sequencing (WGS).

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

Specimen Collection

- Submit pure cultures on an agar slant at ambient temperature or 2-8°C (*ice pack*) as soon as possible to

ensure viability.

- For raw stool or stool in transport medium, please refer to table below:

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

* Note: Pathogen recovery rates decrease over time. For best results, submit ASAP.

Submission Form

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

Specimen Shipping

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

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

Causes for Rejection:

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

FOOD SAMPLES AND ENVIRONMENTAL SWABS:

Testing of food and environmental swabs for *Shigella* spp. is available at the DSHS laboratory. Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist and the DSHS Laboratory.

General policy

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

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

REVISION HISTORY

March 2021

- Minor edits