Shigellosis

Shigella spp.

DISEASE REPORTABLE WITHIN 24 HOURS OF DIAGNOSIS

Per N.J.A.C. 8:57, healthcare providers and administrators shall report by mail or by electronic reporting within 24 hours of diagnosis, confirmed cases of listeriosis to the health officer of the jurisdiction where the ill or infected person lives, or if unknown, wherein the diagnosis is made. A directory of local health departments in New Jersey is available at http://localhealth.nj.gov/.

If the health officer is unavailable, the healthcare provider or administrator shall make the report to the Department by telephone to (609) 826-5964, between 8:00 A.M. and 5:00 P.M. on non-holiday weekdays or to (609) 392-2020 during all other days and hours.

1 THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent and Background

Shigellosis is caused by any bacteria in the species *Shigella*. There are four *Shigella* species or serogroups: *S. dysenteriae* (Group A), *S. flexneri* (Group B), *S. boydii* (Group C), and *S. sonnei* (Group D). Group A has 13 serotypes, group B has 6 serotypes, group C has 18 serotypes, and group D has 1 serotype. *S. dysenteriae* and S*. boydii* are rare in the United States, though they continue to be important causes of disease in areas with less access to resources. *Shigella dysenteriae* type 1 can be deadly. Geographic distribution and antimicrobial susceptibility vary with different species. Antimicrobial resistant infections result in an estimated $93 million in direct medical costs.

B. Clinical Description

The most common symptoms of shigellosis are diarrhea (sometimes bloody), fever, nausea, vomiting, stomach cramps, and tenesmus (feeling the need to pass stool even when the bowels are empty). Dehydration may be severe, especially in infants and the elderly. Asymptomatic infections can also occur. The disease is usually self-limiting, lasting four to seven days.

The severity of the illness and the case-fatality rate are usually a function of the host and species, with the very young and the elderly experiencing the most severe illness. Complications may result in post-infectious arthritis, bloodstream infections, seizures, or hemolytic-uremic syndrome (HUS). When due to infection with *Shigella*, HUS is only associated with Shiga-toxin producing strains, most commonly *S. dystenteriae*.

C. Reservoirs

Humans are the primary natural reservoir, although nonhuman primates also can be infected.

D. Modes of Transmission

Shigella is transmitted via the fecal–oral route, through direct person-to-person contact, or indirectly through contaminated food, water, or fomites. Transmission directly from one person to another or via fomite is likely the most common mode of transmission in high resource settings; foodborne and waterborne transmission are additional important transmission routes in both high- and low-resource settings. *Shigella* can be transmitted by swallowing recreational water (for example, lake or river water) while swimming or drinking water that is contaminated with feces containing the bacteria. Person-to-person spread typically occurs among household contacts, preschool children in daycare, and the elderly and developmentally disabled living in residential facilities. Transmission can also occur from person to person through certain types of sexual contact (e.g., oral-anal contact) and contact with a contaminated inanimate object.

E. Incubation Period

A range of 12 hours to seven days has been reported, with a median incubation period of one to two days.

F. Period of Communicability or Infectious Period

The disease is communicable for as long as infected persons excrete *Shigella* in their stool. This usually lasts for about four weeks from onset of illness. Asymptomatic carriers may transmit infection; rarely, the carrier state may persist for months or longer. Effective antibiotic treatment has been shown to decrease the shedding period to a few days.

G. Epidemiology

Shigellosis has a worldwide distribution, with approximately 600,000 deaths reported annually throughout the world. Most of these deaths occur in children younger than ten years of age. Antimicrobial resistance is common and resistant strains can be acquired during travel to areas of high endemicity. Numerous outbreaks have been attributed to waterborne transmission, in both treated and untreated recreational water, and through ingesting contaminated drinking water. Outbreaks of shigellosis tend to occur in settings where sanitation and hygiene practices are inadequate; common settings include schools and daycare centers, private residences, and restaurants. Other populations with reported outbreaks of shigellosis include men who have sex with men, incarcerated individuals, and people experiencing homelessness. *Shigella* causes an estimated 450,000 infections in the United States each year. In New Jersey, approximately 600 cases are reported annually to the New Jersey Department of Health (NJDOH).

2 NJDOH CASE DEFINITION

A. Clinical Criteria

An illness of variable severity commonly manifested by diarrhea, fever, nausea, cramps, and tenesmus. Asymptomatic infections may occur.

B. Laboratory Criteria for Diagnosis

1. **Confirmatory laboratory evidence:**
   Isolation of *Shigella* spp. from a clinical specimen.

2. **Supportive laboratory evidence:**
   Detection of *Shigella* spp. or *Shigella*/enteroinvasive E. coli (EIEC) in a clinical specimen using a culture-independent diagnostic test (CIDT).

C. Epidemiologic Linkage

A clinically compatible case that is epidemiologically linked to a case that meets the supportive or confirmatory laboratory criteria for diagnosis.

D. Case Classification

1. Confirmed

- A case that meets the confirmed laboratory criteria for diagnosis.

2. Probable

- A case that meets the supportive laboratory criteria for diagnosis;

OR

- A clinically compatible case that is epidemiologically linked to a case that meets the supportive or confirmatory laboratory criteria for diagnosis.

Case Classification Notes

The use of CIDTs as stand-alone tests for the direct detection of *Shigella*/EIEC in stool is increasing. EIEC is genetically very similar to *Shigella* and will be detected in CIDTs that detect *Shigella*. Specific performance characteristics such as sensitivity, specificity, and positive predictive value of these assays likely depend on the manufacturer and are currently unknown. It is therefore useful to collect information on the type(s) of testing performed for reported shigellosis cases. When a specimen is positive using a CIDT, it is also helpful to collect information on all culture results for the specimen, even if those results are negative.

Culture confirmation of CIDT-positive specimens is ideal, although it might not be practical in all instances. State and local public health agencies should make efforts to encourage reflexive culturing by clinical laboratories that adopt culture-independent methods, should facilitate submission of isolates/clinical material to state public health laboratories, and should be prepared to perform reflexive culture when not performed at the clinical laboratory. Isolates are currently necessary for molecular typing (PFGE and whole genome sequencing) that are essential for outbreak detection and for antimicrobial susceptibility testing, which is increasingly important because of substantial multidrug resistance among *Shigella*.

E. Criteria for Distinguishing a New Case from an Existing Case

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

F. Differences from CDC Case Definition

There are no substantive differences between the NJDOH and CDC case definitions.

3 LABORATORY TESTING

The NJDOH Public Health and Environmental Laboratories (PHEL) will confirm the identification of *Shigella* spp. in stool specimens. Laboratories must submit all *Shigella* isolates to PHEL within three days to aid in public health surveillance (N.J.A.C. 8:57).

The Foodborne and Waterborne Disease Unit (FWD Unit) within the Communicable Disease Service (CDS) will determine if testing of food items implicated in clusters or outbreaks is warranted. NJDOH can help coordinate pickup of food samples and testing at PHEL.

4 PURPOSE OF SURVEILLANCE AND REPORTING REQUIREMENTS

- To identify transmission sources of public health concern (e.g., a restaurant or a commercially distributed food product) and to stop transmission.
- To provide education about reducing the risk of infection.
- To identify whether the patient may be a source of infection for other persons (e.g., a diapered child, daycare attendee or food handler) and, if so, to prevent further transmission.

5 CASE INVESTIGATION

A. Forms

It is the health officer's responsibility to investigate the case by interviewing the patient and others who may be able to provide pertinent information about the case patient's illness. Some of the required information can be obtained from the patient's healthcare provider or the medical record. Much of the information on exposure and food history must be obtained from the patient as it is not likely to be found in the medical record. The *Shigella* Case Report Worksheet is an investigation tool for LHDs to use when conducting interviews. All information should be entered into CDRSS.

B. Update CDRSS

Please refer to the disease prioritization guidance that provides LHDs with timeframes for public health response and enter critical details on all cases in CDRSS: demographics, signs/symptoms, clinical status, laboratory information, patient location, and sources of infections and risk factors for shigellosis. Shigellosis is a Priority Level 4 disease and critical details should be entered into CDRSS within 2 weeks. If critical details cannot be obtained, local health departments (LHDs) should document the reason for the delay and the anticipated time when these details will be available.

C. Other Reporting/Investigation Issues

Once LHD completes its investigation and assigns a report status of "LHD CLOSED," the FWD Unit will review the case and approve the case by changing the report status to "DHSS APPROVED." At this time, the case will be submitted to CDC and locked for editing. If additional information is received after a case has been placed in "DHSS APPROVED," you will need to contact the FWD Unit at NJDOH to reopen the case. This should be done only if relevant exposure information becomes available or if the additional information changes the case status of the report.

6 CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (NJAC 8:57)

LHDs should exclude food handlers with shigellosis from handling food until they no longer have symptoms, and they have at least two successive negative stool cultures (collected 24 or more hours apart, but not sooner than 48 hours following completion of antimicrobial therapy).

B. Protection of Contacts of a Case

Contacts of a *Shigella* case with diarrhea who are food handlers should be isolated and quarantined in the same manner as a confirmed/probable *Shigella* case (see section 6A) and handled in the same fashion.

C. Managing Special Situations

Because shigellosis may be transmitted person to person through fecal-oral transmission, it is important to carefully follow up cases in daycare settings, schools, and community residential programs, including long-term care and developmental facilities.

1. Daycare Settings

General recommendations include the following:

- When *Shigella* infection is identified in a childcare attendee or staff person, stool specimens from other symptomatic attendees, staff and household members must be cultured. Symptomatic persons with positive stool cultures for *Shigella* may receive antibiotic therapy. The decision to use antibiotics is based on the severity of the case and potential to spread infection.
- Children and staff members with shigellosis should be excluded until their diarrhea has resolved and two successive stool cultures are negative for *Shigella* species. These stool specimens should be collected 24 hours or more apart but not sooner than 48 hours after completion of antibiotic therapy.
- Infection control procedures including proper handwashing, sanitary disposal of diapers and feces, proper food handling and environmental sanitation should be implemented.

- If more than one person is infected, cohorting should be considered until stool tests are negative.

2. **School Settings**
   General recommendations include the following:
   - Students or staff with *Shigella* infection who have diarrhea should be excluded until their diarrhea has resolved.
   - Students or staff with *Shigella* infection who do not handle food, have no diarrhea, and are not otherwise sick may remain in school if special precautions are taken.
   - Students or staff who handle food and have *Shigella* infection (symptomatic or not) must not prepare food until their diarrhea has resolved and they have two negative stool cultures collected 24 hours or more apart but not sooner than 48 hours after completion of antibiotic therapy, if antibiotics are given.

3. **Community Residential Programs**
   Actions taken in response to a case of shigellosis in a community residential program will depend on the type of program and the level of functioning of the residents.

   In long-term care facilities, residents with shigellosis should be placed on standard (including enteric) precautions until their symptoms subside and they have two consecutive negative cultures for *Shigella*. Staff members who give direct patient care (e.g., feed patients, give mouth or denture care, or give medications) are considered food handlers and are subject to food handler restrictions (see section 6A above). In addition, staff members with *Shigella* infection who are not food handlers should not work until their diarrhea has resolved.

   In residential facilities for the developmentally disabled, staff and clients with shigellosis must refrain from handling or preparing food for other residents until their diarrhea has resolved and they have two negative stool cultures collected 24 hours or more apart but not sooner than 48 hours after completion of antibiotic therapy, if antibiotics are given. In addition, staff members with *Shigella* infection who are not food handlers should not work until their diarrhea has resolved.

7 OUTBREAK SITUATIONS

If the number of reported cases of shigellosis in a facility or jurisdiction is higher than usual, or if an outbreak is suspected, LHDs should investigate to determine the source of infection and mode of transmission. A common vehicle (such as food) should be sought, and applicable preventive or control measures should be instituted. NJDOH staff will help determine a course of action to prevent further cases and perform surveillance for cases across jurisdictions that may be difficult to identify at a local level.

Suspected outbreaks should be immediately reported to the LHD where the facility is located. A directory of LHDs with after-hours contact information is available at www.localhealth.nj.gov.

LHDs should immediately notify NJDOH by telephone at (609) 826-5964 during business hours and (609) 392-2020 after business hours and on weekends and holidays.

8 PREVENTIVE MEASURES

A. Environmental Measures

Implicated food items may be recalled by federal partners and recall notices will be shared by the NJDOH Public Health Food Protection Program (PHFPP) via NJ LINCS. If a commercial product is suspected, PHFPP will coordinate follow-up and provide technical assistance with traceback and environmental investigation (e.g., interpreting the New Jersey Food Code, conducting a hazard analysis and critical control point risk assessment, initiating enforcement actions, collecting food samples).

B. Personal Preventive Measures/Education

To avoid future exposure, LHDs should recommend that individuals:

- Always wash their hands thoroughly with soap and water before eating or preparing food, after using the toilet, and after changing diapers.
- After changing diapers, wash the child's hands as well as their own.
- In a daycare setting, dispose of feces in a sanitary manner.
- When caring for someone with diarrhea, scrub their hands with plenty of soap and water after cleaning the bathroom; helping the person use the toilet; or changing diapers, soiled clothes or soiled sheets.
- Avoid sexual practices that may permit fecal-oral transmission. Latex barrier protection should be emphasized as a way to prevent the spread of shigellosis to sexual partners as well as to prevent the exposure to and transmission of other pathogens.
- Keep flies from contaminating food.
- Anyone with diarrhea should not use a pool or swim in a pond.

C. International Travel

The following recommendations can be helpful to travelers in developing countries:

- "Boil it, cook it, peel it, or forget it."
- Drink only bottled or boiled water, keeping in mind that bottled carbonated water is safer than noncarbonated water.

- Ask for drinks without ice unless the ice is made from bottled or boiled water. Avoid popsicles and flavored ices that may have been made with contaminated water.
- Eat foods that have been thoroughly cooked and are still hot and steaming.
- Avoid raw vegetables and fruits that cannot be peeled. Vegetables such as lettuce are easily contaminated and are very hard to wash well.
- Peel your own raw fruits or vegetables and do not eat the peelings.
- Avoid foods and beverages from street vendors.

References

1. [NJDOH] NJ Administrative Code: https://www.nj.gov/health/cd/reporting/acode/
2. [NJDOH] General Guidelines for Foodborne Illness in Food Handlers Work Exclusion List: https://www.nj.gov/health/cd/documents/topics/foodborne/foodhandler_exclusion_list.pdf
3. [CDC] Shigella (*Shigellosis*) Webpage: https://www.cdc.gov/shigella/about/index.html
4. [CSTE] 16-ID-04 Revisions to the Surveillance Case Definition, Case Classification, Public Health Reporting, and National Notification for Shigellosis: https://cdn.ymaws.com/www.cste.org/resource/resmgr/2016PS/16_ID_04.pdf
5. Control of Communicable Diseases Manual (Heymann), Shigellosis