Shigellosis (Bacillary Dysentery)

Manitoba
Public Health Branch

Summary of Updates

December 2024

Minor updates to case definitions to align with national case definitions (include NAT-positive results), and reporting requirements.

1. Case Definition

1.1 Confirmed case

Laboratory confirmation of infection with or without clinical illness[1].

- Isolation of *Shigella* spp. from an appropriate clinical specimen (e.g., stool, blood, rectal swab, deep tissue wounds, other sterile site, vomit, urine).(1)

1.2 Probable case

Clinical illness[1] in a person who is epidemiologically linked to a confirmed case;

OR

Detection of *Shigella* spp./Enteroinvasive *E. coli* (EIEC) nucleic acid with or without clinical illness, in an appropriate clinical specimen (dependent on the test used), using a nucleic acid test (NAT), such as a polymerase chain reaction (PCR).(1)

Note:

- Culture is required for public health and clinical management. Thus, culture must be performed on NAT-positive (NAT+) specimens to enable molecular typing (e.g., whole genome sequencing [WGS]) for surveillance, outbreak detection and response, as per Canadian Public Health Laboratory Network (CPHLN) guidance (https://www.canada.ca/en/public-health/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2017-43/ccdr-volume-43-12-december-7-2017/nonculture-based-diagnostics-gastroenteritis.html). An isolate is required for antimicrobial susceptibility testing (AST) and/or antimicrobial resistance (AMR) predictions to guide clinical treatment and/or for AMR surveillance, which is increasingly important due to substantial multidrug resistance among *Shigella*.
- NAT-positive (NAT+) and culture-negative (culture–) results would still be considered a probable case.

Laboratory comments:

Further strain characterization (e.g., antimicrobial susceptibility testing, serotyping, WGS) is required for epidemiologic, public health and control purposes.

If more than one target is positive on the gastrointestinal NAT panel, it may be indicative of a cross-reaction, co-infection and/or a single organism harbouring these genes. Reflex culture should be performed to confirm all suspect bacterial NAT signals and to meet requirements

[1] Clinical illness may be characterized by the following signs or symptoms: Diarrhea (watery and often bloody), fever, nausea, vomiting, abdominal pain and/or tenesmus. The severity of illness may vary. While not considered clinical illness, asymptomatic infections may occur.

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for epidemiologic, public health and clinical management of that organism.

2. Reporting Requirements

Laboratory:

All positive laboratory results noted in the case definition are reportable by laboratory to the Manitoba Health Surveillance Unit (MHSU) via secure fax (204-948-3044) or established electronic interface.

Clinical laboratories are required to submit isolate sub-cultures from individuals who tested positive for *Shigella* species to Cadham Provincial Laboratory (CPL) within seven days of report.

Health Care Professional:

Probable (clinical) cases of Shigellosis are reportable to the MHSU using the Clinical Notification of Reportable Diseases and Conditions form (MHSU-0013) (found in MHSU's Surveillance Forms webpage at https://www.gov.mb.ca/health/publichealth/surveillance/forms.html) ONLY if a positive lab result is not anticipated (e.g., poor or no specimen taken, person has recovered).

Regional Public Health/First Nations Inuit Health Branch (FNIHB):

All case investigations are to be completed in the Public Health Information Management System (PHIMS). For public health providers without access to PHIMS, the Communicable Disease Investigation Form (MHSU-0002) (found in MHSU's Surveillance Forms webpage at https://www.gov.mb.ca/health/publichealth/surveillance/forms.html) should be completed and submitted to Manitoba Health, Seniors and Long-Term Care (MHSLTC) by secure fax (204-948-3044). The critical data elements, which are required documentation for all case and contact investigation, are listed with an asterisk (*) on the investigation forms.

3. Clinical Presentation/Natural History

Clinical presentations and disease severity vary with *Shigella* species and serotype.(2, 3) However, all species cause an acute bacterial disease involving the large and distal small intestine, characterized by diarrhea, fever, nausea, vomiting, abdominal cramps, tenesmus and sometimes toxemia.(1, 4) The stools usually contain blood and mucus (dysentery); however, many cases present with watery diarrhea.(4) The disease may be biphasic, with an initial period of watery diarrhea and cramps, followed by development of dysentery.(4) Illness is usually self-limited, lasting four to seven days.(4) Infection is more severe in malnourished children, elderly people and immunocompromised people.(5, 6) Mild and asymptomatic infections occur.(4)

Shigella sonnei and *Shigella boydii* usually cause relatively mild illness in which diarrhea may be watery or bloody.(5) *Shigella dysenteriae* type 1 (Sd1) causes the most severe disease(5) and the mortality associated with untreated disease during epidemics may be as high as 20.(7) Complications of *Shigella* infection are unusual but may include severe dehydration, febrile seizures, septicemia or pneumonia, keratoconjunctivitis, immune complex glomerulonephritis, post-*Shigella* irritable bowel syndrome, Reiter syndrome

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(more common after *S. flexneri* infection), hemolytic uremic syndrome (after *S. dysenteriae* type 1 infection), intestinal perforation and toxic megacolon.(2, 4, 5, 7) Acute, life-threatening complications are most often seen in malnourished infants and young children living in developing countries.(8)

Shigella sonnei is found more frequently in industrialized countries; *S. flexneri*, *S. dysenteriae* and *S. boydii* are more commonly found in developing countries.(3, 4)

4. Etiology

Shigella species are aerobic gram-negative bacilli in the family Enterobacteriaceae.(2) The following four species or serogroups have been identified.(4) Groups A, B and C are further divided into serotypes and subtypes.

- Group A, *S. dysenteriae*;
- Group B, *S. flexneri*;
- Group C, *S. boydii*;
- Group D, *S. sonnei*.

5. Epidemiology

5.1 Reservoir and Source

Humans represent the main reservoir for infection,(2, 4, 7) although prolonged outbreaks have occurred in primate colonies.(4) The source is usually feces of infected humans with diarrhea. Asymptomatic carriers with normal, formed stools are rarely a source, except in special risk groups (e.g., food handler). Contaminated food (especially nonrefrigerated) and water are also potential sources. Once excreted, *Shigella* is highly sensitive to environmental conditions and dies rapidly, especially when dried or exposed to direct sunlight.(5)

5.2 Transmission

Transmission is fecal-oral including direct person-to-person contact. It is most likely to occur in children and those who fail to clean hands thoroughly, including under fingernails after defecation.(2, 4) Transmission occasionally occurs with sexual contact.(2) Two features of the disease facilitate person-to-person transmission: the infective dose is low (as few as 100 viable organisms)(9) so minor hygiene omissions allow fecal-oral spread, and many persons have only a mild illness, so they remain in contact with and can transmit the infection to others.(5, 10) Transmission may be indirect through ingestion of contaminated food or water and less commonly through contaminated inanimate objects.(2, 4) Flies may serve as vectors for transmission of shigellosis, particularly in settings where disposal of human feces is inadequate.(5, 7, 8)

5.3 Occurrence

General: Shigellosis is endemic in most developing countries and the most important cause of bloody diarrhea worldwide.(5) Most shigellosis cases are sporadic.(11) Globally, *Shigella* is estimated to cause at least 80 million cases of bloody diarrhea and 700,000 deaths annually.(5) Ninety-nine percent of infections caused by *Shigella* occur in developing countries and the majority of cases and deaths occur among children less than five years of age.(5, 12) Outbreaks of shigellosis have been associated with food, water, men who have sex with men (MSM) and conditions of crowding and/or where personal hygiene is poor such as

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child care centres and institutionalized populations.(11, 13-20)

Canada: The reported isolation rate is an underrepresentation of actual infections as not all people exhibiting symptoms of gastroenteritis seek medical care and not all isolations of *Shigella* are reported. The reported incidence rate for *Shigella* in 2008 was 2.3 per 100,000 population(21); the highest (4.4 per 100,000 population) in the 1-4 year age group and lowest (0.6 per 100,000 population) in the 15-19 year age group (21). In 2006, *Shigella sonnei* accounted for 41% of *Shigella* isolates, followed by *S. flexneri* (31%), *S. boydii* (6%) and *S. dysenteriae* (4%).(22) It is estimated that 60-75% of reported *Shigella* cases are related to international travel.(23-25)

Manitoba: The reported incidence rate has declined in recent years. In 1999, the reported incidence rate was 14.0 per 100,000 population whereas in 2010, the rate was 4.2 per 100,000 population. The average reported incidence rate for 2000-2010 was highest (4.9 per 100,000) in the 1-4 year age group followed by the 5-9 year age group (3.6 per 100,000).

5.4 Incubation Period

Usually one to three days, but ranges from one to seven days.(2, 4)

5.5 Host Susceptibility

In endemic areas, the disease is more severe in young children than in adults.(4) The elderly, the debilitated and the malnourished of all ages are more susceptible to severe disease and death.(4) Breastfeeding is protective for infants and young children.(4) Children five years of age or younger in child care settings, their caregivers, and other people living in crowded conditions are at increased risk of infection.(2) Individuals travelling or living in resource-limited countries with poor sanitation are at higher risk of infection.(2, 11) Immunity is serotype specific.(5)

5.6 Period of Communicability

Shigellosis is one of the most communicable of the bacterial diarrheas,(7) and is communicable as long as the organism is present in feces.(2) Even without antimicrobial therapy, the carrier state usually ceases within one week of the onset of illness; chronic carriage (one year or longer) is rare.(2) Infection in carriers is less communicable because the number of organisms excreted by carriers is generally less than those with active disease.(7) The secondary attack rate is high in institutionalized or crowded populations.(7)

6. Laboratory Diagnosis

Isolation of *Shigella*, usually by culture from stool specimen. If the patient cannot pass a stool, a sample should be collected with a sterile rectal swab and placed in transport media.(5) Fresh stool samples should reach the laboratory within two hours as *Shigella* species are fragile organisms. If this is not possible, specimens should be placed in transport medium, refrigerated immediately and processed within 72 hours.(5) Infection is usually associated with the presence of pus cells in the stool. Contact your direct-service laboratory if multiple tests for other organisms are required. Antimicrobial susceptibility testing is available upon request. Serotyping is performed on all isolates, through samples and isolates submitted to CPL.

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When a foodborne illness is suspected, "suspected foodborne illness" should be indicated on the requisition and the sample submitted directly to CPL for processing.

7. Key Investigations for Public Health Response

- Stool culture is recommended for symptomatic contacts of a case (e.g., household, child care facility contacts).
- Investigation of food, water and milk supplies for source of infection Collection of implicated food/water samples for testing (usually performed by Public Health Inspectors). Refer to the Enteric Illness Protocol available at: www.gov.mb.ca/health/publichealth/cdc/protocol/enteric.pdf.
- Investigation of sewage and/or garbage facilities.
- Travel history, especially when travel has occurred to areas with poor sanitation.
- History of sexual practices placing individuals at higher risk of infection (e.g., oral-anal contact).

8. Control

8.1 Management of Cases

Education on disease transmission and the importance and effectiveness of hand washing with soap and water especially after defecation and before handling food.(4)

Exclusion from food handling and from providing child or patient care until symptoms have resolved and two consecutive negative stool specimens (collected 24 hours apart) are obtained(4, 26) is recommended for cases.

Exclusion of attendance until symptoms have resolved and two consecutive negative stool specimens (collected 24 hours apart) are obtained is also indicated for cases attending child care facilities.(2, 26) If cases were treated with antibiotics, the initial stool culture should be taken at least 48 hours after the last dose of antibiotic. Individuals who continue to excrete the organism should be handled on a case-by-case basis at the discretion of the Medical Officer of Health.

Infection Control Measures:

Contact precautions are indicated in children who are incontinent or unable to comply with hygiene and should be considered for incontinent adults if stool cannot be contained or for adults with poor hygiene who contaminate their environment. Otherwise, routine practices are adequate.

Treatment:

Fluid and electrolyte replacement is important for watery diarrhea or when there are signs of dehydration.(4)

Intestinal motility inhibitors such as loperamide should not be used in the treatment of shigellosis as their efficacy is doubtful and they may cause severe adverse effects.(5)

Resistance of *Shigella* to ampicillin, co-trimoxazole, tetracyclines and nalidixic acid has become widespread and these antibiotics are no longer recommended.(5)

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Adults: Empiric treatment is recommended for patients with severe disease, dysentery or underlying immunosuppressive conditions.(2) In mild disease, the primary indication for treatment is to prevent spread of the organism.(2, 4) Oral fluoroquinolones (e.g., ciprofloxacin)(5, 7) are recommended until antibiotic susceptibilities are known.(2)

Children: In otherwise well children, antibiotics for diarrheal diseases are not recommended until the disease causing agent is known. Choice of antibiotic should be based on the antibiotic sensitivity pattern. Treatment is only suggested if the patient is not improving by the time the result of testing is known. For sepsis, a broad spectrum antibiotic against gram negative sepsis (e.g., ceftriaxone) is recommended, with modification as needed when culture and sensitivity results are known.

8.2 Management of Contacts

Education on disease transmission and the importance and effectiveness of hand washing with soap and water especially after defecation and before handling food.(4)

Symptomatic contacts should be managed as cases.(refer to Section 8.1)

Screening stool specimens of asymptomatic contacts for *Shigella* during an investigation is necessary only for food handlers, hospital attendants and other situations where the spread of disease is likely. If stool specimens are positive for *Shigella*, refer to Section 8.1.

8.3 Management of Outbreaks

An outbreak is defined as the occurrence of case(s) in a particular area and period of time in excess of the expected number of cases.

Outbreaks should be investigated to identify a common source of infection and prevent further exposure to that source. The extent of the outbreak investigation will depend upon the number of cases, the likely source of contamination and other factors. Because of the diverse problems that may be involved in shigellosis, it is not possible to provide a specific set of guidelines applicable to all situations.

- Common source foodborne or waterborne outbreaks require prompt investigation and intervention without regard to the infecting species. Refer to the Enteric Illness Protocol available at www.gov.mb.ca/health/publichealth/cdc/protocol/enteric.pdf for suspected foodborne and waterborne outbreaks.
- Public notification should occur. The level of notification will usually be at the discretion of regional Public Health and/or the provincial Public Health Division for local outbreaks but may be at the discretion of the Federal Government for nationally linked foodborne outbreaks as per *Canada's Foodborne Illness Outbreak Response Protocol (FIORP) 2017: To Guide a Multi-Jurisdictional Enteric Outbreak Response* available at: https://www.canada.ca/en/public-health/services/publications/health-risks-safety/canadas-foodborne-illness-outbreak-response-protocol-fiorp-guide-

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multi-jurisdictional-enteric-outbreak-response.html

- Cases and contacts should be managed as above (Sections 8.1 and 8.2, respectively). In large outbreaks, it may not be practical or necessary to obtain laboratory clearance in every case before persons are allowed to return to work or school.
- The importance of hand washing with soap and water after defecation and before preparing and eating food should be emphasized. Hand sanitizers (containing at least 60% ethyl alcohol) may be an effective option in circumstances where access to soap or clean water is limited.(2, 27)
- Special measures such as cohorting and supervised hand washing of affected individuals may be required to reduce transmission in nursing homes, child care centres and institutions for the developmentally handicapped.(2, 10)
- In child care facilities, food preparation and diaper-changing responsibilities should be performed by different persons whenever possible.(10)
- Closure of affected child care centres and exclusion of child care facility attendees is not, by itself, an effective control measure as it may lead to placement of infected children in other centres (with subsequent transmission in those centres).(4)

8.4 Preventive Measures

- Ensuring the availability of safe drinking water.(5, 7)
- Safe handling and processing of food, including appropriate refrigeration and proper cooking of potentially infected foods.(7)
- Control of flies in food handling areas.(5)
- Encouragement of breastfeeding of infants.(2, 5, 7)
- Hand washing with soap and water.(5)
- Safely disposing of human waste.(5)
- Voluntary removal of persons with diarrhea from roles as food handlers.(7)
- For symptomatic patients, not using recreational water venues (e.g., swimming pools, water parks) or sharing a bath with others until 48 hours after symptoms resolve.(2, 26)
- The most important prevention measure in child care facilities is supervised hand washing after toileting and before eating/preparing food. Hand washing upon arrival provides additional protection.(10)
- Education about how enteric bacteria are spread,(7) including practices to avoid or reduce the risk for sexual transmission of enteric infections.(3, 13, 19)
- Cases abstaining from sexual behaviour that is likely to transmit infection during their illness.(13) MSM should avoid direct oral-anal sexual contact especially if sex partners are ill or if there are community outbreaks of enteric infection.(28)

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