Cholera

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] through isolation of cholera toxin producing *Vibrio cholerae* serotype O1, O139, or other toxigenic serogroups from an appropriate clinical specimen (e.g., stool, rectal swab, vomit, blood). (1)

Note: Illnesses caused by strains of *V. cholerae* other than toxigenic *V. cholerae* should not be reported as cases of cholera. Note that cholera refers to toxigenic *V. cholerae* while vibriosis refers to both non-toxigenic *V. cholerae* and other *Vibrio* spp. (1)

1.2 Probable case

Clinical evidence of illness[1] in a person who is epidemiologically linked to a confirmed case,

OR

Detection of *Vibrio cholerae* nucleic acid by the ctx or toxR gene 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)

Notes (1):

- 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) 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 may also be required for antimicrobial susceptibility testing (AST) and/or antimicrobial resistance (AMR) predictions to guide clinical treatment and/or for AMR surveillance.
- NAT positive specimens should be submitted for culture of *V. cholerae* and confirmatory testing of the cholera toxin.
- NAT-positive (NAT+) and culture-negative (culture–) results would still be considered a probable case.

[1] Clinical illness may be characterized by the following signs or symptoms: Acute and/or profuse watery diarrhea (sometimes described as "rice-water stools"), nausea, leg cramps, myalgias, and/or vomiting. The severity of illness may vary. While not considered clinical illness, asymptomatic infections may also occur.

Back to Top

Laboratory comments:

Further strain characterization, including antibiotic susceptibility testing and whole genome sequencing (WGS), is required for epidemiologic, public health, and clinical management.

Although the toxR gene is specific for *V. cholerae*, it can be present in both toxigenic (ctx+) and non-toxigenic (ctx-) strains. Thus, a proportion of specimens positive for the toxR gene may not cause cholera.

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 for epidemiologic, public health and clinical management of that organism. (1)

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 or established electronic interface. A phone report must be made to a Medical Officer of Health (204-788-8666) **on the same day** the result is obtained, **in addition** to the standard surveillance reporting.

Manitoba clinical laboratories are required to submit residual specimens or isolate subcultures from individuals who tested positive for toxigenic Vibrio cholerae to Cadham Provincial Laboratory (CPL) (204-945-6123) within 48 hours of report. Submitting laboratories must notify CPL of the shipment PRIOR to submission.

Health Care Professional:

Confirmed and probable (clinical) cases of cholera must be reported to the MHSU during regular hours (8:30 a.m. to 4:30 p.m.) by secure fax (204-948-3044) 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) **on the same day** that they are identified. After hours telephone reporting is to the Medical Officer of Health on call (204-788-8666) with a subsequent faxed report form (MHSU-0013).

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 *General 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.

Back to Top

3. Clinical Presentation/Natural History

Infection with *V. cholerae* presents across a clinical spectrum that ranges from asymptomatic colonization to cholera gravis, the most severe form of the disease. (2) Cholera is characterized by copious watery diarrhea, without abdominal cramps or fever. (3) Most individuals infected with toxigenic *V. cholerae* O1 have no symptoms, and some have only mild to moderate diarrhea lasting three to seven days. (3) Nausea and vomiting are common and occur early in the course of the illness. (4, 5) In cases of severe cholera, the volume of watery diarrhea can exceed one litre per hour. (6) Stools are colourless, with small flecks of mucus ("rice water"), and contain high concentrations of sodium, potassium, chloride and bicarbonate. (3) Severe dehydration, hypokalemia, metabolic acidosis and, occasionally, hypovolemic shock can occur within four to 12 hours if fluid losses are not replaced. (3) Coma, seizures, hypoglycemia and death can occur, with children at greater risk. (3) The case fatality rate ranges from 50 percent or more without treatment to less than one percent among adequately treated individuals. (7, 8) *Vibrio cholerae* O139 has caused outbreaks in the past, but recently has only caused sporadic cases, with none identified outside of Asia. (7) There is no difference in the illness caused by the two serogroups. (7)

4. Etiology

Cholera follows ingestion of food or water contaminated with the bacterium, *Vibrio cholerae*. (7) Of the more than 200 recognized *Vibrio cholerae* serogroups, only cholera toxin-producing O1 and O139 serogroups have caused large epidemics and are defined as causing cholera. (4) Massive loss of fluids is caused by the release of an enterotoxin that affects the small intestine. (4) Serogroup O1 causes more than 98 percent of cholera cases. (7) Serogroup O1 occurs as two biotypes, classical and El Tor. (4) Both of the classical and El Tor biotypes occur as three serotypes (Inaba, Ogawa and, rarely, Hikojima). (4) El Tor is present globally, but classical is limited to Bangladesh. (3) *Vibrio cholerae* serogroup O139 has been recognized as a cause of cholera in Asia since 1992. (3) In any single epidemic, one particular serogroup and biotype tends to be dominant. (4)

5. Epidemiology

5.1 Reservoir and Source

Reservoirs are humans and the environment. (4) The original reservoir was the Ganges delta in India. (7) *Vibrio cholerae* exists as a natural inhabitant of fresh and brackish water that survives and multiplies in association with zooplankton, phytoplankton and shellfish. (9, 10) *Vibrio cholerae* O1 and O139 can persist in water for long periods and will multiply in moist leftover food. (4)

5.2 Transmission

Transmission occurs through ingestion of food or water contaminated by the feces of infected individuals. (4) Contaminated raw or undercooked shellfish, raw or partially dried fish, or moist grains or vegetables held at ambient temperature have been implicated in cases of cholera. (3) Secondary transmission in developed countries is exceedingly rare as appropriate sanitation limits the potential for spread. Asymptomatically infected persons can transmit the infection. (4) Transmission of

Back to Top

cholera within households has been documented in Bangladesh. (11) Direct transmission from person to person, including health care workers during epidemics, has been rarely reported. (10)

5.3 Occurrence

General: Cholera is endemic in many countries. It is estimated that approximately three to five million cholera cases occur annually, with up to 120,000 deaths. (8) Cholera occurs most commonly in areas of the world where there is inadequate sanitation, poor hygiene, overcrowding and a lack of safe food and water. This includes parts of Africa, Asia and to a lesser extent, Central and South America. (12) Disasters (e.g., floods) resulting in population movements and overcrowded refugee camps are fertile ground for explosive outbreaks with high case fatalities. (4) Large outbreaks have occurred and are ongoing in Haiti and Yemen.

Canada: Between 2008 and 2014, 30 cases of cholera were reported nationally, all imported. (8) Three cases were reported in Canada in 2015, all imported. (13) Vancouver Island reported an outbreak (at least three cases) of cholera in March 2018 that was linked to locally harvested herring eggs.

Manitoba: No cases of cholera were reported to the MHSU since surveillance for cholera began in 1981.

5.4 Incubation Period

The incubation period ranges from a few hours to five days. (3)

5.5 Risk Factors for Infection

Typical at-risk areas include peri-urban slums, where basic infrastructure is not available, as well as camps for internally displaced persons or refugees, where the minimum requirements for clean water and sanitation have not been met. (7)

5.6 Host Susceptibility and Resistance

Infection with *V. cholerae* provides short-term protection against reinfection, particularly for a homologous strain. In endemic areas, most people acquire antibodies by early adulthood. Infection with O1 serogroup strains affords no protection against O139 infection, and vice versa. (4) Immunocompromised persons such as malnourished children or HIV-infected persons, are at greater risk of morbidity if infected. (8) Individuals with low gastric acidity and with blood group O are at increased risk of severe cholera infection. (3)

5.7 Period of Communicability

Bacteria are present in feces of infected individuals for up to 14 days after infection with *V. cholerae*. (2, 8) Asymptomatic patients typically shed the organism for one day. (2) Intermittent shedding may occur occasionally, but chronic carriage is rare. (4)

6. Diagnosis

Diagnosis is confirmed by isolating *V. cholerae* serogroup O1 or O139 (including the El Tor biotype) or other toxigenic serogroup from a stool specimen (preferred) or vomitus. Isolated organisms from initial suspected cases should be confirmed by appropriate biochemical and

Back to Top

serologic reactions and by testing the organisms for toxin production. Specify on the CPL requisition if cholera is suspected. Typing is referred out. In epidemics, once laboratory confirmation and antibiotic sensitivity have been established, laboratory confirmation is not required for all subsequent cases.

7. Key Investigations for Public Health Response

- Travel history.
- Immunization history. Not all recipients of the cholera vaccine will be fully protected against cholera. The cholera vaccine protects against *Vibrio cholerae* serogroup O1, but not cholera caused by *V. cholerae* O139 or other species of *Vibrio*. Following the primary series cholera vaccine, protection against cholera lasts for six months in children aged two years to less than six years of age; individuals six years of age and older are protected for two years. (8)
- Contact history/common source exposure (e.g., food, water).
- Chemoprophylaxis history.

8. Control

8.1 Management of Cases

Oral or parenteral rehydration therapy to correct dehydration and electrolyte abnormalities is the most important therapeutic intervention and should be initiated as soon as the diagnosis is suspected. Oral rehydration is preferred unless the patient is in shock, is obtunded or has intestinal ileus. The World Health Organization's reduced-osmality oral rehydration solution (ORS) has been the standard, but data suggest that rice-based ORS or amylase-resistant starch ORS is more effective. (3) Mild and moderate volume depletion should be corrected with oral solutions by replacing, over four to six hours, a volume matching the estimated fluid loss (approximately five percent of body weight for mild and seven percent for moderate dehydration). Continuing losses are replaced by giving, over four hours, a volume of oral solution 1.5 times the stool volume lost in the previous four hours. (4) Continuing losses can be estimated as 10–20 mL/kg of body weight for each diarrhoeal stool or episode of vomiting. (5)

Severely dehydrated patients are at risk of shock and require the rapid administration of intravenous fluids. (7) Ringer's lactate is preferred for initial intravenous hydration, but normal saline can be used if ringer's lactate is not available. (4, 14) Initial fluid replacement should be 30 mL/kg in the first hour for infants and in the first 30 minutes for individuals over one year of age, after which the individuals should be reassessed. The next 70 mL/kg should be given over five hours for infants and over 2.5 hours for older children and adults. Once circulatory collapse has been effectively reversed, and patients are hemodynamically stable, most patients can be switched to oral rehydration to complete the 10 percent initial fluid deficit replacement and to match continuing fluid loss. (4)

Antimicrobial therapy is recommended for severely ill and hospitalized patients (refer to Table 1). It is particularly recommended for patients who are severely or moderately dehydrated and continue to pass a large volume of stool during rehydration treatment. (15) Antimicrobial agents can shorten the duration of diarrhea, reduce the volume of rehydration solutions required and shorten the duration of

Back to Top

vibrio excretion. (4) Knowledge of the sensitivity of local strains to the antibiotics, if available, should be used to guide antimicrobial therapy. Antimicrobial susceptibility testing should be performed.

Zinc supplementation has been shown to significantly reduce the duration of diarrhea and stool output in children with cholera. (16) The US Centers for Disease Control and Prevention recommends zinc supplementation (10–20 mg per day) in children less than five years old in resource poor areas during illness. (17) Consultation with a pediatric infectious diseases specialist is recommended on this issue.

Breastfeeding should be continued in infants with cholera. (6)

Antimotility agents should be avoided. (6)

Infection Prevention and Control Measures:

Routine Practices for adults. Contact precautions should be added for children who are incontinent or too immature to comply with hygiene. Contact precautions should also be considered for adults if stool cannot be contained or for adults with poor hygiene who contaminate their environment. Refer to the MHSLTC document *Routine Practices and Additional Precautions: Preventing the Transmission of Infection in Health Care* (found in http://www.gov.mb.ca/health/publichealth/cdc/docs/ipc/rpap.pdf).

Table 1 – Antibiotic Treatment Regimens for Cholera (6, 15)

Population	Preferred Treatment	Alternate Treatment
Adults	• Doxycycline: 300 mg single dose (not recommended for children < 8 years or pregnant women)	• Azithromycin: 1 gram in a single dose • Ciprofloxacin: 500 mg bid x 3 days
Children	• Azithromycin: 20 mg/kg in a single dose (not to exceed adult dose)	• Erythromycin: 12.5 mg/kg/dose qid x 3 days • Ciprofloxacin: 15 mg/kg/dose bid x 3 days (only if azithromycin and erythromycin cannot be used)
Pregnant Women	• Azithromycin: 1 gram in a single dose	• Erythromycin: 250 mg qid x 3 days • Ciprofloxacin: 500 mg bid x 3 days (only if azithromycin and erythromycin cannot be used)

Back to Top

Public Health Measures:

Exclusion:

Confirmed Cases: It is recommended that confirmed cases of cholera in food handlers, health care workers (involved in direct patient care), and childcare facility staff and attendees be excluded until 48 hours after the last loose stool. Microbiological clearance specimens are not routinely required; however, they are required if sanitary facilities or personal hygiene are considered inadequate. If microbiological clearance is indicated, exclude until the provision of two consecutive negative stool samples taken after symptom resolution, collected not less than 24 hours apart. (18) If the case has received antimicrobial therapy, the first stool specimen should be obtained at least 48 hours after the last dose. (19)

8.2 Management of Contacts or Other Exposed Individuals

Public Health nurses will identify contacts and/or other exposed individuals and coordinate collection of stool specimens if necessary.

- Surveillance of persons who shared food and drink with a cholera patient for five days from last exposure is recommended. A search by stool culture for unreported cases is recommended only among household members or those exposed to a possible common source in a previously uninfected area. (4)
- **Symptomatic contacts or other individuals who are symptomatic with a common exposure** as the case should be excluded as per confirmed cases. (18)
- **Asymptomatic contacts or other individuals who are asymptomatic with a common exposure** do not need to be excluded. (18)
- Because secondary transmission of cholera is rare, routine chemoprophylaxis of contacts is NOT recommended. The administration of doxycycline, tetracycline, ciprofloxacin, ofloxacin or trimethoprim-sulfamethoxazole within 24 hours of identification of the index case may be considered to prevent coprimary cases of cholera among household contacts in special circumstances in which the probability of fecal exposure is high and medication can be delivered rapidly. (3) The choice of antibiotic should be based on the antibiotic susceptibility testing results of the strain infecting the case. **Note: MHSLTC does not cover the cost of prophylactic antibiotics.**

8.3 Management of Outbreaks

A cholera outbreak is defined by the World Health Organization as the occurrence of at least one confirmed case of cholera with evidence of local transmission in an area where there is not usually cholera. (7)

Refer to Section 8.1 and the MHSLTC *Enteric Illness Protocol* (http://www.gov.mb.ca/health/publichealth/cdc/protocol/enteric.html).

Investigate source of infection and take appropriate measures to prevent further transmission.

Back to Top

8.4 Preventive Measures

- Washing your hands with soap and running water for at least 20 seconds as often as possible, especially before eating or preparing food and after using the toilet or changing diapers. (12) Use alcohol-based hand sanitizer if soap and water are not available.
- Disinfection of drinking water through chlorination or boiling to prevent waterborne transmission of *V. cholerae*. (3)
- Thorough cooking of shellfish. (3)
- Prompt refrigeration of leftover foods such as fish, rice or grain gruels and thorough reheating before consumption. (3)
- Avoiding food from street vendors when traveling in developing countries.
- Breastfeeding of infants. (7)
- Immunization with cholera vaccine should be considered for specific groups following recommendations in the current *Canadian Immunization Guide*.
- Quarantine and embargoes on the movement of people and goods are ineffective in controlling the spread of cholera and are unnecessary. (13)

References

1. Nationally Notifiable Enteric Disease Case Definitions. Ottawa, ON: Public Health Agency of Canada; 2024.

2. Nelson EJ, Harris JB, Morris JG *et al.* Cholera Transmission: the host, pathogen and bacteriophage dynamic. *Nat Rev Microbiol* 2009; 7(10):1–24.

3. American Academy of Pediatrics. Cholera (*Vibrio cholerae*). In Pickering LK ed. *Redbook: 2012 Report of the Committee on Infectious Diseases 29th ed.* Elk Grove Village, IL: American Academy of Pediatrics, 2012; 789–91.

4. Heymann DL. Cholera and Other Vibrioses. In: *Control of Communicable Diseases Manual 20th ed.* American Public Health Association, Washington, 2014; 102–9.

5. Harris JB, LaRocque RC, Qadri F *et al.* Cholera. *Lancet* 2012; 379: 2466–76.

6. Waldor MK and Ryan ET. *Vibrio cholerae*. In: *Mandell, Douglas and Bennett's Principles and Practice of Infectious Diseases 8th ed.* Elsevier, Philadelphia, 2015.

7. World Health Organization. Cholera Fact Sheet, Updated August 2017 http://www.who.int/mediacentre/factsheets/fs107/en/.

8. Government of Canada. Cholera and Enterotoxigenic *Escherichia Coli* (ETEC) Travellers' Diarrhea vaccine, Canadian Immunization Guide https://www.canada.ca/en/public-

Back to Top

health/services/publications/healthy-living/canadian-immunization-guide-part-4-active-vaccines/page-3-cholera-enterotoxigenic-escherichia-coli-travellers-diarrhea-vaccine.html.

9. Weir E and Haider S. Cholera outbreaks continue. *CMAJ* 2004; 170 (7):1092–93.

10. Wong KK, Burdette E and Montz ED. Cholera. *CDC Yellowbook* 2018 https://wwwnc.cdc.gov/travel/yellowbook/2018/infectious-diseases-related-to-travel/cholera.

11. Weil AA, Khan AI, Chowdhury F *et al.* Clinical Outcomes in Household Contacts of Patients with Cholera in Bangladesh. *Clinical Infectious Diseases* 2009; 49:1473–79.

12. Government of Canada. Cholera. https://travel.gc.ca/travelling/health-safety/diseases/cholera.

13. World Health Organization. Cholera, 2015. *Weekly Epidemiological Record* 2016; 38(91): 433–40. http://apps.who.int/iris/bitstream/10665/250142/1/WER9138.pdf?ua=1.

14. Global Task Force on Cholera Control. Prevention and control of cholera outbreaks: WHO policy and recommendations. https://iris.who.int/bitstream/handle/10665/68404/WHO;jsessionid=A1D775A805CE45A9794C514E203FC1CB?sequence=1#:~:text=WHO%20recommends%20the%20following%20approaches,and%20manage%20epidemics%20more%20effectively.&text=Improved%20surveillance%20to%20obtain%20better,the%20early%20detection%20of%20outbreaks.&text=Improved%20preparedness%20to%20provide%20a,outbreaks%20and%20limit%20their%20spread.

15. Centers for Disease Control and Prevention. Recommendations for the Use of Antibiotics for the Treatment of Cholera. https://www.cdc.gov/cholera/treatment/antibiotic-treatment.html.

16. Roy SK, Hossain MJ, Khatun W *et al.* Zinc supplementation in children with cholera in Bangladesh: randomised controlled trial. *BMJ* 2008; 336(7638):266–71. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2223005/pdf/bmj-336-7638-res-00266-el.pdf.

17. Centers for Disease Control and Prevention. Zinc Treatment https://www.cdc.gov/cholera/treatment/zinc-treatment.html.

18. BC Centre for Disease Control. Enteric Cases and their Contacts: Exclusion from High Risk Settings May 2013 http://www.bccdc.ca/resource-gallery/Documents/Guidelines%20and%20Forms/Guidelines%20and%20Manuals/Epid/CD%20Manual/Chapter%201%20-%20CDC/EntericCasesandtheirContacts_May2013.pdf

19. Guerrant RL, Van Gilder T, Steiner TS *et al.* Practice Guidelines for the Management of Infectious Diarrhea. *Clinical Infectious Diseases* 2001; 32:331–50.