

Cholera (O1, O139)

Revision Dates

Case Definition	August 2011
Reporting Requirements	April 2018
Remainder of the Guideline (i.e., Etiology to References sections inclusive)	December 2005

Case Definition

Confirmed Case

Clinical illness^(A) with laboratory confirmation of infection:

- Isolation of cholera toxin-producing *Vibrio cholerae* serotype O1 or O139 from urine, stool or blood.

Probable Case

Clinical illness^(A) in a person who is epidemiologically linked to a confirmed case.

^(A) Clinical illness is characterized by acute watery diarrhea and/or vomiting. The severity of illness may vary.

Reporting Requirements

1. Physicians, Health Practitioners and others

Physicians, health practitioners and others shall notify the Medical Officer of Health (MOH) (or designate) of the zone, of all confirmed and probable cases in the prescribed form by the Fastest Means Possible (FMP).

2. Laboratories

All laboratories shall report all positive laboratory results:

- by FMP to the MOH (or designate) of the zone, and
- by mail, fax or electronic transfer within 48 hours (two business days) to the Chief Medical Officer of Health (CMOH) (or designate).

3. Alberta Health Services and First Nations Inuit Health Branch

- The MOH (or designate) of the zone where the case currently resides shall notify the CMOH (or designate) by FMP of all confirmed and probable cases.
- The MOH (or designate) of the zone where the case currently resides shall forward the initial Notifiable Disease Report (NDR) of all confirmed and probable cases to the CMOH (or designate) within one week of notification and the final NDR (amendment) within two weeks of notification.
- For out-of-province and out-of-country reports, the following information should be forwarded to the CMOH (or designate) by FMP:
 - name,
 - date of birth,
 - out-of-province health care number,
 - out-of-province address and phone number,
 - positive laboratory report, and
 - other relevant clinical / epidemiological information.

Etiology

Two strains of cholera are associated with infection: *V. cholerae* serogroup O1 and *V. cholerae* serogroup O139. These are gram-negative, non-spore forming bacteria.

Vibrio cholerae serogroup O1 includes two biotypes: classical and El Tor. Each includes organisms of Inaba, Ogawa, and (rarely) Hikojima serotypes. The clinical pictures are alike because these organisms produce a similar enterotoxin. *V. mimicus* is a closely related species that can cause diarrhea. Some strains elaborate an enterotoxin indistinguishable from that produced by *V. cholerae* O1 and O139.

In late 1992, a new serogroup of *V. cholerae* was discovered as the causative organism of large-scale epidemics of severe dehydrating diarrhea, typical of cholera. *V. cholerae* O139 (Bengal), elaborates the same cholera toxin but differs from O1 strains in lipopolysaccharide (LPS) structure and in producing capsular antigen. The clinical and epidemiologic picture of illness caused by this organism is typical of cholera and cases should be reported as cholera. The nontoxigenic forms of cholera (non-O1 and non-O139) are covered in the *Vibrio cholera* guidelines and are not classified as cholera.

Clinical Presentation (1,2)

Symptoms range from asymptomatic to severe illness. Asymptomatic cases occur more often than severe ones, especially with organisms of the El Tor type. The enterotoxin is what causes the acute intestinal illness. Mild or moderate diarrhea is present in roughly 90% of cases. In 5-10% of cases, infected individuals experience sudden onset of profuse painless watery stools, nausea, and vomiting. Stools are typically colorless with flecks of mucous ("rice water" diarrhea). The resulting loss of fluids in an infected individual can lead to rapid dehydration and hypovolemic shock which may be life threatening. Mortality ranges from greater than 50% for those without treatment to less than 1% among adequately treated individuals.

Diagnosis

Diagnosis is made by culturing *Vibrio cholerae* of the serogroup O1 or O139 from stool specimens sent promptly to the laboratory confirms diagnosis. PLPH will culture for cholera. It grows best on Thiosulphate Citrate Bile Sucrose (TCBS) medium since it is a halophile. It is best to consult a medical microbiologist if this pathogen is suspected clinically so that the proper medium can be used. The diagnosis is primarily based on clinical findings. (R Rennie, personal communication, July 2003)

Epidemiology

Reservoir

The main reservoir is humans. Recent observations in the US, Bangladesh, and Australia clearly demonstrate that environmental reservoirs exist in association with copepods or other zooplankton in brackish water or estuaries.

Undercooked or raw shellfish such as crabs, fish, shrimp, mussels, and oysters as well as unpeeled fruits and vegetables have been associated with infection.

Transmission (1)

Cholera is acquired through ingestion of contaminated food or water contaminated directly or indirectly with the feces or vomitus of an infected person. Faulty water systems, beverages prepared with contaminated water or ice, raw or undercooked shellfish, raw or partially dried fish, cooked grains with sauces, fruits and vegetables washed with untreated water have served as vehicles of transmission.

Person to person transmission is unlikely when good hygiene practices (e.g., handwashing) are in place. Outbreaks are usually caused by contaminated water, where sewage and drinking water supplies have not been adequately treated.

Incubation Period (3)

The incubation period ranges from a few hours to five days but is usually two to three days.

Period of Communicability (3)

Cholera is communicable for the duration of the stool-positive stage, usually only a few days after recovery. Occasionally a carrier state may exist for several months. Appropriate antibiotics can shorten the period of communicability.

Host Susceptibility

Susceptibility is variable. Gastric hypochlorhydria and the lack of immunity seen in small children increase risk of illness. Breast feeding offers protection.

Infection by *V.cholera* O1 of the classical biotype confers protection against either classical or El Tor biotypes. In contrast, an initial clinical infection caused by biotype El Tor results in only a modest level of long-term protection that is limited to El Tor infections. Infection with serogroup O1 affords no protection against O139 infection and vice versa. Infectious dose ranges from 10^6 to 10^{11} depending on gastric acidity (3).

Occurrence

General (1,2,4)

During the 19th century, pandemic cholera spread repeatedly from the Gangetic Delta of India to most of the world. At the end of the 19th century, Koch isolated the pathogen *Vibrio cholera*. There have been seven pandemics of cholera caused by the O1 (El Tor) serotype. The seventh pandemic originated in Indonesia and affected most regions around the world (India, Africa, South America, and southern Europe). Cholera had not been present in West Africa for over 100 years when it reappeared in the 1970's. The disease is now endemic to most of Africa. In 1991, cholera appeared in Latin America (Peru), after an absence of more than a century.

In 1992, serotype O139 (Bengal) was identified. This new serotype was the cause of an epidemic that began in India and Bangladesh, around the Bay of Bengal. Within one year, it had spread to 11 countries in the Amazon, South-East Asia and subsequently to Central American countries.

New outbreaks can occur sporadically in any part of the world where water supplies, sanitation, food safety, and hygiene are inadequate. The greatest risk of cholera occurs in overpopulated communities and refugee settings characterized by poor sanitation and unsafe drinking water. In 1992, cholera afflicted more than 100,000 people and resulted in more than 1400 deaths

Canada (2,5,6)

Cholera was first reported in Canada in 1974. It is rarely seen. Since 1989 there has been an average of three cases per year reported in Canada. Four cases were reported in 2002 and five cases were reported in 2003. All reported cases have been related to travel or immigration. No secondary transmission occurred.

Alberta (5,7)

Since 1979, approximately one case per year has been reported in Alberta. There have been 10 cases reported in the last ten years. Males are equally at risk of acquiring disease as females. All cases reported in Alberta since 1993 have been acquired while travelling abroad and all cases recovered from the illness.

Key Investigation

Single Case/Household Cluster

- Identify history of traveling to or residing in areas with poor sanitation including improper water treatment and sewage disposal and include recent immigration.
- Determine the possible source of infection taking into consideration the incubation period, reservoir, and mode of transmission. Assessment may include:
 - determining recent consumption of undercooked fish or shellfish,
 - determining recent consumption of other potential sources (e.g., eggs, dairy products, sprouts, etc.),
 - obtaining a food history,
 - identifying history of high risk sexual practices, especially contact with feces, and
 - determining history of exposure to pets or farm animals that may harbor the disease.
- Suspected contaminated food may be held or destroyed to prevent consumption.
- Identify contacts, which may include:
 - persons living in the household,
 - children and childcare workers in a daycare/dayhome, and
 - individuals exposed to the same source (if it is identified).

Control

Management of a Case

- All cases should be instructed about disease transmission, appropriate personal hygiene, routine practices, and contact precautions.
- Exclusion should be considered for symptomatic and asymptomatic cases who are:
 - food handlers whose work involves
 - touching unwrapped food to be consumed raw or without further cooking and/or
 - handling equipment or utensils that touch unwrapped food to be consumed raw or without further cooking,
 - healthcare, daycare or other staff who have contact through serving food with highly susceptible patients or persons, who, in an intestinal infection would have particularly serious consequences,
 - involved in patient care or care of young children, elderly or dependent persons,
 - children attending daycares or similar facilities who are diapered or unable to implement good standards of personal hygiene, and
 - older children or adults who are unable to implement good standards of personal hygiene (e.g., mentally or physically challenged).
- Exclusion applies to symptomatic and asymptomatic cases until 48 hours after treatment with appropriate antibiotics, if required, has been completed and two stool specimens taken from the infected person not less than 24 hours apart and at least 48 hours after normal stools have resumed are reported as negative.
- Reassignment to a low risk area may be used as an alternative to exclusion.
- Contact precautions should be used in healthcare settings where children or adults have poor hygiene or incontinence that cannot be contained. Otherwise, routine practices are adequate.

Treatment of a Case (4)

- Mild disease does not require the use of antimicrobial therapy.
- Prompt fluid therapy with volumes of electrolyte solution adequate to correct dehydration, acidosis and hypokalemia is the keystone of treatment.
- Mild and moderate volume depletion should be corrected with oral solution (glucose-electrolyte solution).
- Since VO1 or VO139 can be resistant to antimicrobials and the treatment options are extensive, consultation with an infectious disease physician is suggested.
- Tetracycline and other antimicrobial agents (erythromycin, azithromycin, ciprofloxacin, doxycycline, chloramphenicol, furazolidone or cotriamoxazole) shorten the duration of the diarrhea and reduce the volume of rehydration solutions required, as well as shortening the duration of *vibrio* excretion.
- When tetracycline resistant strains of *V. cholerae* are prevalent, alternative antimicrobial regimens include TMP-SMX, furazolidone, or erythromycin.
- *V. cholerae* O139 strains are resistant to TMP-SMX.

Management of Contacts

- Contacts should be instructed about disease transmission, appropriate personal hygiene, routine practices, and contact precautions.
- Symptomatic contacts should be assessed by a physician.
- All identified infections should be treated at the same time as the case.
- Contacts who are symptomatic may be excluded from daycare or similar facilities or occupations involving food handling, patient care or care of young, elderly or dependent persons as per MOH assessment.
- Two stool specimens or cultures may be requested from symptomatic contacts not less than 24 hours apart. Specimens must be reported as negative prior to returning to daycare or similar facilities or occupations involving food handling, patient care or care of young, elderly or dependent persons.
- Asymptomatic contacts, in general, are not excluded from work or daycare.
- Persons who shared food and drink with a confirmed cholera case should be asked to report any diarrheal symptoms for five days from their last exposure.
- An MOH may exclude healthcare and food handling contacts for the five days if deemed a transmission risk.
- If there is a high probability of transmission based on food preparation history and usual hygiene, household members may be considered for chemoprophylaxis.

General Preventive Measures (1,2)

- Educate the public about personal hygiene, especially the sanitary disposal of feces and careful hand washing after defecation and sexual contact, and before preparing or eating food.
- Educate food handlers about proper food handling and hygiene, especially in avoiding cross-contamination from raw meat products, and thorough hand washing.
- Advise infected individuals to avoid food preparation.
- Persons shedding *Salmonella* must be advised to maintain impeccable personal hygiene especially hand washing after defecation. This is particularly important if they handle food.
- Educate about the risk of sexual practices that permit fecal-oral contamination.
 - Educate about condom use for safer sex.
- Encourage breastfeeding of infants.
- Advise travellers to contact a travel medicine clinic or physician six to eight weeks prior to departure for adequate counseling and/or vaccine administration.

- Advise travellers to countries where cholera is endemic to take appropriate precautions to avoid contact with, or ingestion of, potentially contaminated food or water. Most travellers visiting an area where cholera occurs are at very low risk of acquiring infection.
- Dukoral™ is an oral, inactivated traveller's diarrhea and cholera vaccine that has been shown to protect against traveller's diarrhea for three months (6, 8, 9).
- Immunize with oral, live attenuated cholera vaccine-CVD 103-HgR (Mutachol™). This vaccine is also licensed in Canada and is partially effective against cholera (against serogroup O1 only). The vaccine is administered as a single dose and is approved for adults and children over two years of age.
 - Vaccinate travellers who may be at increased risk for acquiring cholera, including health professionals working in endemic areas, aid workers in refugee camps, travellers to remote cholera areas without access to safe water supplies.
 - Travellers may wish to consider receiving the vaccine.
 - Travellers should seek a detailed, individual risk assessment to determine their need for vaccination as neither Dukoral™ nor Mutachol™ are provincially funded vaccines
 - Vaccination is not recommended for the prevention of cholera in the majority of travellers to endemic areas as:
 - the risk of acquiring cholera for travellers is generally low,
 - the vaccine efficacy, while very good for serogroup O1, affords no protection against serogroup O139, which is currently found in 11 countries in South-East Asia, and
 - the vaccine is of a relative high cost given the low risk of cholera infection.
- Travellers should be advised to exercise general food and water precautions to minimize their risk of exposure. The key principals to remember are: boil it, cook it, peel it, leave it or be able to unseal it.

References

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