

2.4 Cholera

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.

Case Definitions

Confirmed Case

Clinical evidence of illness with laboratory confirmation of infection through isolation of cholera toxin producing *Vibrio cholerae* serotype O1 or O139 from vomitus or stool.

Probable Case

Clinical evidence² of illness in a person who is epidemiologically linked to a confirmed case.

Clinical Presentation

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 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. For confirmation on laboratory specimens go to the public health laboratory web site www.publichealthlab.ca or call 709-777-6583.

Epidemiology

Occurrence

Cholera infections are associated with poor sanitation and continue to be a major health problem in developing countries. Epidemics are strongly linked to the consumption of

² Cholera is characterized by acute watery diarrhea and/or vomiting. The severity of illness may vary.

unsafe water, poor hygiene, and crowded living conditions. The incidence of cholera is low in Canada where good sanitation, clean water and good hygiene exist.

Reservoir

The main reservoir is humans.

Transmission

The usual mode of infection is the ingestion of large numbers of organisms from contaminated water or food (particularly raw or undercooked shellfish, raw or partially dried fish, or moist grains or vegetables held at ambient temperature). Cholera outbreaks are usually caused by contaminated water, where sewage and drinking water supplies have not been adequately treated. Direct person to person spread has not been documented.

Incubation Period

The incubation period is usually from a few hours to five (5) days, usually two (2) - three (3) days.

Communicability

An infected individual remains infectious from the onset of illnesses until recovery.

CONTROL MEASURES**Management of Case*****Investigations***

- Obtain a food history.
- Determine recent consumption of other potential sources (e.g., eggs, dairy products, sprouts, etc.). Determine recent consumption of undercooked fish or shellfish.
- Determine the possible source of infection taking into consideration the incubation period, reservoir, and mode of transmission.
- Identify history of traveling to or residing in areas with poor sanitation including improper water treatment and sewage disposal and include recent immigration.
- If necessary, identify history of high risk sexual practices, especially contact with feces.
- Determine 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 and
- individuals exposed to the same source (if it is identified).

Treatment

- 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. When tetracycline resistant strains of *V. cholerae* are prevalent, alternative antimicrobial regimens include TMP-SMX, furazolidone, or erythromycin.
- Tetracycline and other antimicrobial agents (erythromycin, azithromycin, ciprofloxacin, doxycycline, chloramphenicol, furazolidone or cotrimoxazole) shorten the duration of the diarrhea and reduce the volume of rehydration solutions required, as well as shortening the duration of *vibrio* excretion.

Exclusion

Exclusion (staying away from school or work) 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.
- 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.

Management of Contacts

- 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.

Management of Outbreaks

An outbreak management team should be established to direct and coordinate the investigation as well as address infection prevention and control measures. If the outbreak is limited to one region the region is responsible to manage the outbreak; if more than one region is involved the outbreak will be managed by the province or in consultation with the province.

Education and Preventive Measures

- 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.
- If necessary, educate about the risk of sexual practices that permit fecal-oral contamination.
- If necessary, educate about condom use for safer sex.
- Encourage breastfeeding of infants.
- Advise travelers to contact a travel medicine clinic or physician six to eight weeks prior to departure for adequate counseling and/or vaccine administration.
- Advise travelers to countries where cholera is endemic to take appropriate precautions to avoid contact with, or ingestion of, potentially contaminated food or water. Most travelers visiting an area where cholera occurs are at very low risk of acquiring infection.
- Vaccination with the Chol-Ecol-O vaccine as a prevention strategy against travelers' diarrhea is of limited value and is not routinely recommended for the majority of travelers. Travelers who may be at significantly increased risk (e.g., high-risk expatriates such as relief and aid workers or health professionals working in endemic countries) may benefit from immunization.

- Travelers may wish to consider receiving the vaccine keeping in mind that vaccination is not recommended for the prevention of cholera in the majority of travelers to endemic areas as:
 - The risk of acquiring cholera for travelers is generally low.
 - Travelers 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.
- Provide fact sheet available at:
 - <http://www.phac-aspc.gc.ca/tmp-pmv/info/cholera-eng.php#know>

For more information of cholera worldwide, visit the World Health Organization's Communicable Diseases Surveillance and Response page at:
<http://www.who.int/mediacentre/factsheets/fs107/en/>

Reporting Requirements and Procedures

- The laboratory (hospital or public health laboratories) report case/s to the attending physician, the Chief Medical Officer of Health and the Medical Officers of Health (MOH)
- The MOH office will notify, as required, local physicians, nurse practitioners, environmental health officers, community health nurses, communicable disease control nurses (CDCNs) and infection control practitioners (ICP), in the particular region as required for follow-up and case investigation.
- EHO will conduct an investigation of the case under the direction of the MOH and provide case details as per the food history.
- CDCN enters the case details into the electronic reporting system and uses the CNPHI tool, if indicated, for alerts or outbreak summaries

Provincial Disease Control

- Reports the aggregate case data to Public Health Agency of Canada
- Provides an analysis of the case/s with reports in the Quarterly Communicable Disease Report (CDR), also posted on the Public Health website
- Coordinates the response if an outbreak across RHAs (CMOH will likely coordinate an outbreak across RHAs with input from disease control and environmental health).

References

Clemens JD et al. Cross-protection by B. subunit-whole cell cholera vaccine against diarrhea associated with heat-labile toxin-producing *enterotoxigenic Escherichia coli*: Results of a large scale field trial. J Inf Dis 1988;158(2). Retrieved June 6, 2013 from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC174048/>

Weir E, Haider S. Cholera outbreaks continue. CMAJ 2004; 170(7). Retrieved June 6, 2013, from <http://www.cmaj.ca/content/170/7/1092.figures-only>