

Epidemiology and Outbreak Response Unit

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Frequently asked questions on:

Cholera – A public health perspective

What is cholera?

Cholera is a historically feared epidemic diarrhoeal disease associated with severe disease and death. It still affects various regions of the world and has the potential to cause outbreaks, for example the extensive Zimbabwe-South Africa outbreak in 2008-2009 and more recently the outbreak in Haiti.

What causes cholera?

Cholera is caused by a bacterium, *Vibrio cholerae*. There are approximately 206 serogroups of *V. cholerae* that have been identified to date, but only serogroups O1 and O139 are associated with clinical cholera and have pandemic potential. This is because *V. cholerae* O1 and O139 can produce a toxin (cholera toxin) that acts on the mucosal surface of the human intestine to cause water and electrolytes to be excreted into the intestinal lumen (i.e. causing diarrhoea). Not all O1 or O139 *V. cholerae* strains are able to produce cholera toxin.

V. cholerae O1 occurs as one of two biotypes, called Classic and El Tor. The current outbreaks in Africa are caused by the El Tor biotype. In addition, *V. cholerae* O1 can be classified into three serotypes according to the presence of somatic antigens: serotypes Inabal, Ogawa and Hikojima. Serotypes are useful in analysing the epidemiology of cholera but have no clinical significance.

At present, *V. cholerae* O1 El Tor is responsible for the majority of cholera cases and outbreaks worldwide (including Africa), except for Bangladesh where *V. cholerae* O1 Classic still circulates. *V. cholerae* O139 is found in Bangladesh and India and causes continuous epidemics there.

How is infection acquired?

V. cholerae lives in aquatic environments (water bodies) which are their natural reservoirs – typically brackish (salt) water (for example river estuaries). Both O1 and non-O1 strains co-exist in these environments, with non-O1 and non-toxigenic O1 strains predominating over the toxigenic O1 strains. From the aquatic environment, *V. cholerae* is introduced to humans through contamination of water sources and contamination of food. Sources of infection include the following:

- Drinking water that has been contaminated at its source, or during storage or usage,

- Contaminated foods or vegetables: those that have been fertilised with human excreta (nightsoil) or "freshened" with contaminated water,
- Soiled hands can also contaminate clean drinking water and food, and
- Fish, particularly shellfish taken from contaminated water and eaten raw or insufficiently cooked.

Of importance, environmental conditions modulate *Vibrio* spp abundance and may affect the expression of virulent genes of *V. cholerae*. Drastic climatic events such as floods and droughts also influence cholera transmission, and global warming is also having an effect on cholera epidemiology.

Once humans are infected, incredibly high attack rates may occur, especially in previously non-exposed populations. Person-to-person transmission is less likely to occur because a large inoculum is necessary to transmit the disease.

V. cholerae survives for up to 14 days in some foods, especially when contamination occurs after preparation of the food.

Who is at risk of acquiring cholera?

The people most at risk of contracting cholera are those who do not have access to safe water and adequate, proper sanitation.

How can infection be prevented?

The most important measures to reduce cholera transmission include provision of potable water and ensuring proper management of excreta to avoid contamination of water sources. However, the experience with continuous epidemics in developing countries shows that these simple measures can be difficult to implement or maintain. Alternative ways to prevent cholera transmission are therefore necessary: water can be made safer to drink by boiling or adding chlorine, and adequate cooking and heating of food is also important. Education of the population at risk about appropriate hygienic practices and water safety is crucial.

What are the clinical features of cholera?

The incubation period ranges from a few hours to 5 days, (usually 2 - 3 days).

Most cholera infections are asymptomatic (up to 75%) or mild, but severe and life-threatening disease can occur. Cholera toxin causes a massive outpouring of fluid and electrolytes into the bowel. The onset of diarrhoea is typically sudden, and is characteristically painless and watery, with flecks of mucus in the stool ("rice water" stools). However, not all patients with cholera will have characteristic 'rice water' stools and stool appearance can vary. Vomiting may occur, usually early in the illness, and the majority of patients (95%) are afebrile (although children are more often febrile than adults). In severe cases, profuse diarrhoea can occur and lead to life-threatening dehydration within a matter of hours (up to 1000ml/hour of diarrhoea may be produced). Complications of the loss of fluids and electrolytes in stool and vomitus include muscle cramps, acidosis, and ultimately renal and circulatory failure. Arrhythmias and death may occur if treatment is not given timeously. With proper treatment, the case fatality rate should be <1%.

What is the treatment of cholera?

The mainstay of treatment for cholera cases is aggressive rehydration therapy. Appropriate antibiotics should be used in addition only in those cases who are severely dehydrated. Health promotion interventions and access to potable water and sanitation are essential to prevent further spread of infection in the community. In addition, healthcare workers need to be on high alert to ensure early recognition of cases.

How is cholera diagnosed?

The first step in diagnosing cholera is to suspect it! If the appropriate transport media and selective media aren't used, the likelihood of detecting *V. cholerae* is low. Healthcare workers

need to alert the laboratory about a specimen from a patient with suspected cholera so that specimen transport and processing can be optimised.

Additionally, laboratory staff should also be on the alert for stool specimens that have the typical 'rice water' appearance suggestive of cholera and consider testing in these situations (even if it hasn't been specifically requested); cases of cholera have been detected by astute laboratory staff in this way.

The specimen:

- Stool specimens (or rectal swab specimens if stool specimens are not possible; however, these are suboptimal specimens) should be placed in Cary-Blair transport medium if they cannot be processed immediately.
- Label specimen request form clearly with patient's details (name, DOB/age), location (hospital/clinic, ward etc), healthcare workers' details (name, contact number), date of specimen collection.
- Request 'MCS and cholera' testing on the form

Is cholera common in South Africa (SA)?

Cholera has a predisposition to cause epidemics and has the ability to remain endemic in affected areas. SA experienced an outbreak of cholera which affected all nine provinces and lasted for several months from November 2008 to June 2009. There are recent reports of cholera in neighbouring countries (including Zimbabwe and Mozambique) and so the risk of imported cholera causing outbreaks is an ever-present risk.

What is the recommended public health response in SA to a case of cholera?

Cholera is a notifiable disease. All suspected cases should be immediately notified to the local Department of Health to be investigated. Every case of cholera reported to the Department of Health is investigated to assess for possible sources of infection and epidemiologically linked cases. A strong programme for the control of diarrhoeal diseases is the best preparation for a cholera epidemic. In the long term, improvements of safe water supply and adequate sanitation are the best means of preventing cholera. In an outbreak, the best control measures are the early detection of cases and treatment of patients, coupled with health education. In order to respond quickly to a cholera epidemic and to prevent deaths, health facilities must have access to adequate quantities of essential supplies (particularly oral rehydration solution and intravenous fluids). Medical and paramedical personnel involved in the treatment of cholera should receive intensive and continuing training to ensure that they are familiar with the most effective techniques for the management of patients with cholera. Laboratories also have a responsibility to ensure that they have the capacity/protocols to handle increased numbers of specimens during an outbreak setting, as well as ensuring that laboratory staff are familiar with cholera-related SOPs.

Reference:

1. Carlos Seas / Eduardo Gotuzzo. *Vibrio cholerae*. In: Mandell GL, editor. Principles and Practice of Infectious Diseases (seventh edition). Philadelphia: Churchill Livingstone Elsevier; 2010. pp2773-2783.
2. [www.doh.gov.za issues cholera guidelines.pdf](http://www.doh.gov.za/issues_cholera_guidelines.pdf)