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# Cholera: Transmission and Symptoms, Treatment

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## Abstract

Cholera is an infection of the small intestine by some strains of the bacterium Vibrio cholerae. Symptoms may range from none, to mild, to severe. The classic symptom is large amounts of watery diarrhea that lasts a few days [1]. Vomiting and muscle cramps may also occur. Diarrhea can be so severe that it leads within hours to severe dehydration and electrolyte imbalance. This may result in sunken eyes, cold skin, decreased skin elasticity, and wrinkling of the hands and feet. Dehydration can cause the skin to turn bluish. Symptoms start two hours to five days after exposure.

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## Introduction

Cholera is caused by a number of types of Vibrio cholerae, with some types producing more severe disease than others. It is spread mostly by unsafe water and unsafe food that has been contaminated with human feces containing the bacteria [2]. Undercooked shellfish is a common source. Humans are the only known host for the bacteria. Risk factors for the disease include poor sanitation, not enough clean drinking water, and poverty. Cholera can be diagnosed by a stool test [3]. A rapid dipstick test is available but is not as accurate. Prevention methods against cholera include improved sanitation and access to clean water. Cholera vaccines that are given by mouth provide reasonable protection for about six months. They have the added benefit of protecting against another type of diarrhea caused by E. coli. By 2017 the US Food and Drug Administration (FDA) had approved a single-dose, live, oral cholera vaccine called Vaxchora for adults aged 18-64 who are travelling to an area of active cholera transmission. It offers limited protection to young children. People who survive an episode of cholera have long-lasting immunity for at least 3 years (the period tested.) The primary treatment for affected individuals is oral rehydration salts (ORS), the replacement of fluids and electrolytes by using slightly sweet and salty solutions. Rice-based solutions are preferred. Zinc supplementation is useful in children. In severe cases, intravenous fluids, such as Ringer's lactate, may be required, and antibiotics may be beneficial. Testing to see which antibiotic the cholera is susceptible to can help guide the choice [4].

## Symptoms

Typical cholera diarrhea that looks like "rice water" The primary symptoms of cholera is profuse diarrhea and vomiting of clear fluid. These symptoms usually start suddenly, half a day to five days after ingestion of the bacteria. The diarrhea is frequently described as "rice water" in nature and may have a fishy odor. An untreated person with cholera may produce 10 to 20 litres (3 to 5 US gal) of diarrhea a day. Severe cholera, without treatment, kills about half of affected individuals. If the severe diarrhea is not treated, it can result in life-threatening dehydration and electrolyte imbalances. Estimates of the ratio of asymptomatic to symptomatic infections have ranged from 3 to 100. Cholera has been nicknamed the "blue death" because a person's skin may turn bluish-gray from extreme loss of fluids [5]. Fever is rare and should raise suspicion for secondary infection. Patients can be lethargic and might have sunken eyes, dry mouth, cold clammy skin, or Cholera is an acute diarrhoeal infection caused by ingestion of food or water contaminated with the bacterium Vibrio cholerae. Cholera remains a global threat to public health and an indicator of inequity and lack of social development. Cholera is an extremely virulent disease that can cause severe acute watery diarrhoea. It takes between 12 hours and 5 days for a person to show symptoms after ingesting contaminated food or water (2) [6]. Cholera affects both children and adults and can kill within hours if untreated. Most people infected with V. cholerae do not develop any symptoms, although the bacteria are present in their faeces for 1-10 days after infection and are shed back into the environment, potentially infecting other people. Among people who develop symptoms, the majority have mild or moderate symptoms, while a minority develop acute watery diarrhoea with severe dehydration. This can lead to death if left untreated [7].

## Diagnosis

A rapid dipstick test is available to determine the presence of

V. cholerae. In those samples that test positive, further testing should be done to determine antibiotic resistance. In epidemic situations, a clinical diagnosis may be made by taking a patient history and doing a brief examination. Treatment via hydration and over-the-counter hydration solutions can be started without or before confirmation by laboratory analysis, especially where cholera is a common problem. Stool and swab samples collected in the acute stage of the disease, before antibiotics have been administered, are the most useful specimens for laboratory diagnosis. If an epidemic of cholera is suspected, the most common causative agent is V. cholerae O1 [8]. If V. cholerae serogroup O1 is not isolated, the laboratory should test for V. cholerae O139. However, if neither of these organisms is isolated, it is necessary to send stool specimens to a reference laboratory.

## Transmission

Patients infected with V cholerae O1 or O139 who have no symptoms generally shed the organism for only a few days; however, patients who are symptomatic shed the organism for between 2 days and 2 weeks, and rarely longer. Transmission of cholera within households has been documented. V cholerae are present in human stool both as individual planktonic cells and in biofilm-like aggregates. In environmental water, organisms convert to conditionally viable environmental cells within 24 h.49 these organisms are infectious on reintroduction into people, although the infectious dose in this form is not known. Filtration of water through sari cloth reduces cholera transmission by nearly 50%, consistent with removal of organisms attached to zooplankton. The peak of a cholera epidemic is often preceded by increasing prevalence of the pathogenic strain in the environment. Bacteriophages that are lytic for V cholerae O1 or O139 are also found in the stools of patients and in environmental water. Bacteriophage density increases as an outbreak proceeds, and these bacteriophages could modulate the severity and duration of an outbreak [9].

As V cholerae O1 leave a person, the organisms have a phenotype referred to as hyper infectivity-that is, the infectious dose is 10–100 times lower than for non-human-shed organisms. Hyper infectivity of recently shed organisms persists in water for 5–24 h, suggesting that organisms transmitted from person to person might be more infectious than those that have acclimatised to the environment. When hyper infectivity is incorporated into a mathematical model of a cholera outbreak, the characteristically explosive nature of such an outbreak is better reproduced than if hyper infectivity is not included. Other key components of cholera transmission models include the concentration of V cholerae O1 or O139 in stool, the difference of infectivity between planktonic cells and stool aggregates, the rapidity of spread of the organism from person to person, the presence of lytic bacteriophage in stool and water, and the concentration in water of the conditionally viable environmental cells for environment-to-person transmission.

## Treatment

Cholera patient being treated by oral rehydration therapy in 1992. Continued eating speeds the recovery of normal intestinal function. The WHO recommends this generally for cases of diarrhea no matter what the underlying cause. A CDC training manual specifically for cholera states: Continue to breastfeed your baby if the baby has watery diarrhea, even when traveling to get treatment. Adults and older children should continue to eat frequently. Cholera is an easily treatable disease. The majority of people can be treated successfully through prompt administration of oral rehydration solution (ORS). The WHO/UNICEF ORS standard sachet is dissolved in 1 litre (L) of clean water [10]. Adult patients may require up to 6 L of ORS to treat moderate dehydration on the first day. Severely dehydrated patients are at risk of shock and require the rapid administration of intravenous fluids. These patients are also given appropriate antibiotics to diminish the duration of diarrhoea, reduce the volume of rehydration fluids needed, and shorten the amount and duration of V. cholerae excretion in their stool.

## Conclusion

Cholera can be prevented and controlled more effectively at environment level. This requires a multi-disciplinary approach including poverty alleviation.

Cholera-endemic areas should prioritize cholera control measures. Countries facing complex emergencies and displacement of internally displaced people (IDP) on a large scale or refugees to places where the provision of safe water and proper sanitation is compromised, and they are vulnerable to cholera outbreaks. In such situations, it is critical to depend on surveillance data to watch for an outbreak and to implement appropriate intervention measures. Thus, strengthening of surveillance system and early warning system is vital in places at high risk of cholera outbreak. The main strategies for cholera control include appropriate and prompt management of cholera cases; strengthening laboratories; training and capacity building of health-care workers; and availability of adequate medical supplies for management. In addition, access to safe water, proper sanitation, appropriate waste management; personal hygiene and food hygiene practices; improved communication and public information are needed for the control of cholera outbreaks.

## Acknowledgement

None

## Conflict of Interest

None

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