

Florida Poison Information Center/Jacksonville
At Shands Jacksonville
University of Florida Health Science Center
1-800-222-1222

Cholera

History

Vibrio cholerae is a relatively weak organism that resides in contaminated and impure water systems. It is not durable, but may lead to large outbreaks in communities with poor hygiene and soiled water/food supplies. It has been known to devastate areas such as Peru and Mexico, but has been easily overcome with education and sanitation. It thus far has shown very little potential for biological warfare given its poor aggression. There are approximately 400 asymptomatic carriers during an outbreak for every one symptomatic carrier.

Mechanism of Action

Cholera, once ingested from either contaminated water or via fecal-oral spread, adheres to the mucosa of the small intestine. It produces an enterotoxin similar to *E. coli* that stimulates adenylate cyclase. This, in turn, up-regulates cGMP intracellularly and creates fluid secretion. The amount of fluid secreted in the small intestine overwhelms the large intestine and produces voluminous watery diarrhea.

Properties

1. Only $10^5 - 10^8$ organisms are needed as an inoculation dose.
2. *V. cholerae* is easily killed by drying, dry heat of 117 degrees C, steam, boiling, ordinary disinfectants, and chlorinated water.
3. *Vibrio cholera* cannot live in pure water.
4. The organism will live 24 hours in sewage.
5. The organism may live up to 6 weeks in impure water containing organic matter/
6. Spread via fecal contamination of water, food, hand, and utensils.
7. It can withstand freezing for 3-4 days.

Symptoms

Incubation may be from 4 hours to 5 days. It is characterized by a sudden onset of massive diarrhea. The hallmark effect is rice water stools (5 – 10 L of watery diarrhea/day). Nausea, profuse vomiting and diarrhea can result in hypotension, severe dehydration, and shock.

Medical Management

Decontamination: *Vibrio cholera* is easily killed, as mentioned above, with heat, steam, disinfectant solutions, and boiling. Thorough hygiene and hand-washing will prevent the spread. Water purification for a community will prevent outbreaks. Avoid ice, fruits, vegetables and seafood that are raw or undercooked.

IV fluids (saline) should be administered to replace the lost fluid.

Antibiotics will shorten the course of the disease, but will neither prevent nor definitively cure it. Untreated cholera can have a mortality rate greater than 50%. WHO recommends:

- a. Tetracycline
- b. Doxycycline OR
- c. Ciprofloxacin OR
- d. Erythromycin

Ciprofloxacin is the preferred choice due to least toxicity and GI upset and in light of some resistance to Tetracycline.

Vaccine is available for prevention, but yields only short-term coverage with poor efficacy. Recent studies may suggest improvement in vaccines, but long-term protection is still being assessed.

Bibliography

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4. Daniels, HA. "First do no harm: making oral rehydration solution safer in a cholera epidemic." *Am J Trop Med Hyg* 1999 Jun;60(6):1051-5.

Call the Florida Poison Information Center Network for information and/or to report exposures.

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Florida Poison Information Center Network

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