

Coliform Bacteria

Background/Overview

Biological organisms are among the oldest health threats to drinking water quality and the agents currently responsible for most waterborne diseases. They are the most common contamination incident water operators will encounter. Organisms known to cause disease include bacteria, protozoa, and viruses; some algae and helminths (worms) may also be capable of producing disease. These disease-causing organisms thrive in the intestines of warm-blooded animals. They are easily transmitted to drinking water if the feces of an animal contaminates a water supply for which there is not suitable disinfection. Potential sources of contamination include sewers, septic systems, feedlots, and animal yards.

Role of coliforms in detecting contamination

Unfortunately, specific disease-producing (pathogenic) organisms present in water are not easily identified. It would be very difficult, expensive, and time consuming to monitor for them. For this reason, it is necessary to select an easily measured “indicator organism,” whose presence indicates that pathogenic organisms may be present. A group of closely related bacteria, the total coliform, has been selected as an indicator of harmful organisms in drinking water.

Sources of coliform bacteria

Total coliform (TC) bacteria are common in the environment (such as in soil) and the intestines of animals and are generally not harmful. *Escherichia coli* (*E. coli*) bacteria are found in greater quantities than total coliform in animal fecal matter. If *E. coli* is detected along with TC in drinking water, there is strong evidence that sewage is present; therefore, a greater potential for pathogenic organisms exists.

Response to coliform detection

MDH monitors drinking water for public water supplies (PWSs) on a routine basis. If *E. coli* is detected in the distribution system of a PWS, the system must be disinfected. In most cases this includes emergency chlorination, which can last for two to five days. At the same time a system is being disinfected, customers of the PWS are ordered to vigorously boil their drinking and cooking water (Boil Water Advisory) for one minute before using it. Once the system has been disinfected and flushed, the MDH tests the water again for coliform bacteria. If none are detected, the Boil Water Advisory is lifted.

If only TC is detected (without the presence of *E. coli*), the source is most likely from contamination from the environment, introduced during construction or while repairs to

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plumbing or a water main were underway. The system will identify the source of the contamination, correct the problem, and thoroughly disinfect its system. The public will also be notified of the situation; however, unless unusual circumstances exist to cause particular concern about the safety of the water, a Boil Water Advisory will not be issued.

Exceptions

Total coliforms are not a perfect indicator of the actual or potential presence of harmful organisms. Some disease-producing organisms, especially protozoa such as *Giardia* and *Cryptosporidium*, are able to withstand treatment which kill the total coliform. These two protozoa are often found in surface waters (the principle carriers of these organisms) contaminated by human sewage or wildlife. However, for the majority of PWSs this is not a significant threat since most PWSs obtain their water from wells rather than surface-water sources such as rivers and lakes. For those PWSs that use surface water, a combination of coagulation, filtration, and disinfection has been successful and is recommended to reduce the risk of *Giardia* or *Cryptosporidium* contamination.

Health effects

Symptoms of waterborne diseases may include gastrointestinal illnesses such as severe diarrhea, nausea, and possibly jaundice as well as associated headaches and fatigue. It is important to note, however, that these symptoms are not associated only with disease-causing organisms in drinking water. They may also be caused by a number of other factors. In addition, not all people will be affected to the same degree; young children and the elderly are usually more susceptible.

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July 2019

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