

# Reducing the Spread of *Cryptosporidium* in Aquatic Venues: A Quick Guide for Health Departments and Operators



## Background

This quick reference guide can be used by local, state, tribal, and territorial health departments and aquatic venue operators as a tool for understanding the Centers for Disease Control and Prevention's (CDC's) most important recommendations for reducing the spread of *Cryptosporidium*. This guide highlights key takeaways from CDC's 2023 Model Aquatic Health Code (MAHC). Go to [cdc.gov/model-aquatic-health-code/php/our-work/index.html](https://www.cdc.gov/model-aquatic-health-code/php/our-work/index.html) for more detailed information.

## What is *Cryptosporidium*?



*Cryptosporidium* is a type of microscopic parasite that causes a diarrheal illness called cryptosporidiosis. It can be found in every region of the United States in freshwater, food, soil, or on surfaces or hands that have been contaminated by the feces of humans or animals infected with the parasite. *Cryptosporidium* can survive for several days in even well-maintained pools and splash pads since it is chlorine tolerant. According to the MAHC, *Cryptosporidium* is the leading cause of outbreaks linked to treated aquatic venues in the United States.

## What aquatic venues are most at risk for *Cryptosporidium*?



Aquatic venues at increased risk have certain characteristics and intended users. These characteristics affect bathers by placing them at increased risk for microbial contamination and infection. All pools that become contaminated with diarrhea are at increased risk; particularly those frequented by children.



**Table: Increased Risk Aquatic Venues for *Cryptosporidium* and Their Users**

Increased Risk Aquatic Venues	Users and Risks
Wading pools	Users: Small children who may use diapers. <ul style="list-style-type: none"><li>• Incontinent infants and children are likely to increase the contamination burden.</li><li>• Additionally, the prevalence of cryptosporidiosis is higher in younger children.</li></ul>
Interactive water play venues (e.g., spray pads, fountains)	Users: Small children <ul style="list-style-type: none"><li>• Small children are likely to increase the contamination burden.</li><li>• They may also be more likely to suffer from more severe illness when infected.</li></ul>

**How should the water in aquatic venues be disinfected, filtered, and recirculated?**

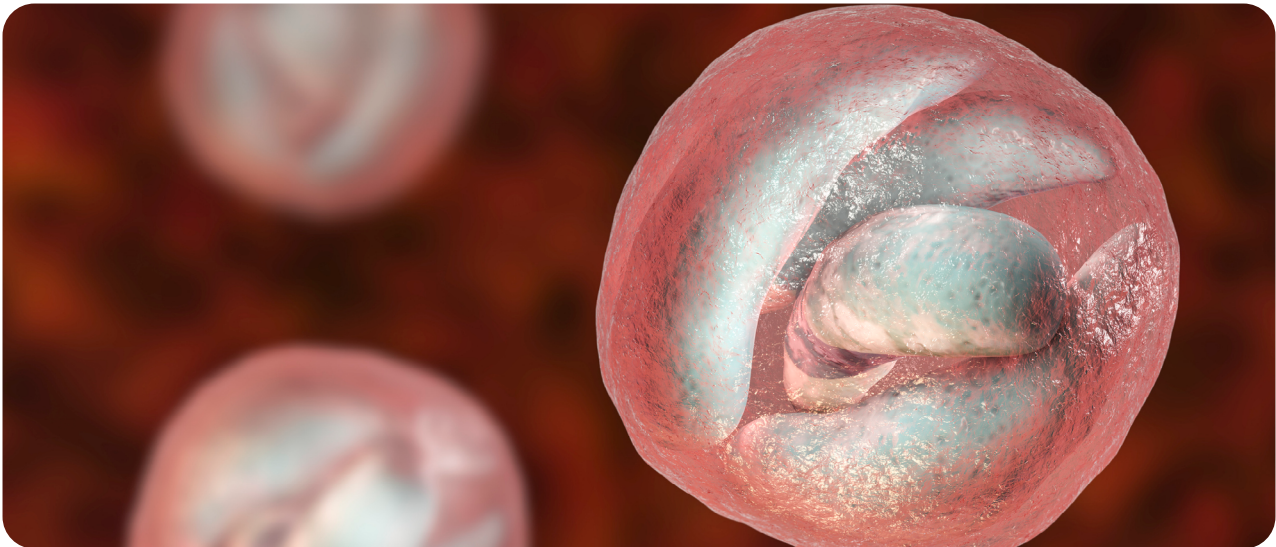


**Secondary Disinfection Systems:**

Since *Cryptosporidium* is disinfectant tolerant, all higher-risk aquatic facilities should include secondary disinfection systems such as UV disinfection and ozone disinfection to minimize risk of outbreaks. Secondary disinfection systems limit the length of time *Cryptosporidium* can survive after a fecal release in aquatic venues.

**Log Inactivation and Oocyst Reduction:**

A minimum of 99.9% reduction in the number of infective *Cryptosporidium* oocysts should be achieved per pass for all aquatic venues requiring secondary disinfection. See [cdc.gov/healthy-swimming/toolkit/operating-public-pools-hot-tubs-and-splash-pads.html](https://www.cdc.gov/healthy-swimming/toolkit/operating-public-pools-hot-tubs-and-splash-pads.html) for more information. Multiple treatment processes or steps may be necessary for each secondary treatment to result in the required minimum of 99.9% reduction in the number of infective *Cryptosporidium* oocysts.



## What can facility management staff do to help prevent *Cryptosporidium* infections at aquatic venues?



- Maintain proper levels of disinfectant concentration and pH of 7.0 to 7.8 to maximize the effectiveness of disinfection.
- Monitor and record all maintenance and water chemistry information as required by the MAHC.
- Ensure optimal water filtration and recirculation systems as required to maintain minimum flow rates.
- The flow rate should reduce assumed infective *Cryptosporidium* oocysts from 100 million (108) oocysts to a concentration of one oocyst/100mL.
- Backwash filtration systems when there is a drop in the flow rate, or the filter gauge pressure differential reaches a level specified by the equipment manufacturer or the MAHC.
- Maintain disinfectant residuals and water chemistry and maintain water temperatures at 77°F (25°C) or higher.
- Clean pool surfaces as necessary to remove accumulation of slime/biofilm.
- Add replacement water as necessary.
- Ensure hygiene facilities such as restrooms, showers, diaper-changing stations, and handwashing stations are clean and sanitary, and kept free of mold and mildew. Supplies such as toilet paper, soap, hand sanitizer, paper towels or hand drying devices, and trash receptacles should be available for swimmer hygiene.

## How should facility management staff respond to fecal contamination and subsequent treatment of aquatic venue water?



### Disinfection Procedures:

- Staff should be trained in procedures for contamination cleanup and response, personal protective equipment, and other Occupational Safety and Health Administration measures to minimize exposure to bodily fluids.
- Aquatic venues should be immediately closed to swimmers and bathers until remediation procedures are complete.
- If possible, remove and dispose of contaminating material in a sanitary manner.
- Clean and disinfect scoops, nets, and buckets. Items used for cleaning can be disinfected by being left in the pool during disinfection procedures.
- Do not use vacuum cleaners to remove contaminated material unless vacuum waste is discharged to a sanitary sewer and the vacuum equipment can be properly disinfected.

### Treatment Procedures:

- Make sure that the pH of the water is 7.5 or lower.
- Maintain water temperature at 77°F (25°C) or higher.
- Operate the filtration and recirculation systems during the remediation process while the aquatic venue reaches and maintains the proper Free Chlorine concentration.
- Make sure the proper Free Chlorine concentration is achieved throughout the pool for the entire disinfection time by testing the free chlorine residual at multiple sampling points.
- Ensure that only non-stabilized chlorine products are used to raise the Free Chlorine concentrations during the remediation process.

**Formed-Stool Contaminated Water:**

- The Free Chlorine concentration should be checked, and the concentration should be raised to 2.0 ppm (mg/L) and maintained for at least 25 minutes. Refer to the table below.

Contact Time for Formed-Stool Contamination Response*	
Chlorine Concentrations (mg/L)	Disinfection Time
1.0	45 minutes
2.0	25-30 minutes
3.0	19 minutes

\*(based on MAHC Table 6.5.3.1)

- If the water contains cyanuric acid (CYA) or a stabilized chlorine product, double the inactivation time as required.
- Begin measurement of the inactivation time when the aquatic venue reaches the intended Free Chlorine concentration.

**Diarrheal-Stool Contaminated Water:**

- The Free Chlorine concentration should be checked, and the concentration should be raised to 20 ppm (mg/L) and maintained for at least 12.75 hours. Refer to the table below.

OR

- Circulate the water through a secondary treatment to theoretically reduce the number of *Cryptosporidium* oocysts in the aquatic venue below one oocyst/100 mL. Refer to the table below.

Contact Time for Diarrheal Contamination Response*	
Chlorine Concentrations (mg/L)	Disinfection Time
1.0	15,300 minutes (255 hours)
10.0	1,530 minutes (25.5 hours)
20.0	765 minutes (12.75 hours)

\*(based on MAHC Table 6.5.3.2)

- If the water contains CYA or a stabilized chlorine product, lower the CYA concentration to less than or equal to 15 ppm (mg/L) by draining and refilling, if necessary.
  - The Free Chlorine concentration should be checked, and the concentration should be raised to 20 ppm (mg/L) and maintained for at least 28 hours; 30 ppm (mg/L) for at least 18 hours; or 40 ppm (mg/L) for at least 8.5 hours.

**Procedures for Brominated Pools:**

- Contamination in brominated aquatic venues should be treated by adding an amount of chlorine to the venue that increases the concentration of Free Chlorine to the specific level and is maintained for the specified time determined by the type of contamination.
- Adjust the bromine residual, if necessary, before reopening the aquatic venue.



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### Additional Information

Refer to the following sections in the 2023 MAHC for more information:

- **Filter, disinfect, and recirculate water:** Compiled from 2023 MAHC Sections 4.7.2A, 4.7.3.3.2A, 4.7.3.3.2.4, 4.7.3.3.3A, 4.7.3.3.4, 4.7.3A, 5.7.3.2A, 5.7.4.7, and 5.10.5.
- **Facility Management:** Compiled from 2023 MAHC Section 6.4A
- **Aquatic Venue Water Contamination Response and Disinfection:** Compiled from 2023 MAHC Section 6.5.1A, 6.5.2, and 6.5.3.

### Resources

1. 2023 Model Aquatic Health Code | Centers for Disease Control and Prevention. ([www.cdc.gov/model-aquatic-health-code/media/pdfs/2023-MAHC-508.pdf](http://www.cdc.gov/model-aquatic-health-code/media/pdfs/2023-MAHC-508.pdf)). Accessed May 2024.
2. About Mini-MAHCs | Centers for Disease Control and Prevention. ([www.cdc.gov/model-aquatic-health-code/php/our-work/mini-mahcs.html](http://www.cdc.gov/model-aquatic-health-code/php/our-work/mini-mahcs.html)). Accessed May 2024.
3. Cryptosporidiosis Fact Sheet | Minnesota Department of Health. ([www.health.state.mn.us/diseases/cryptosporidiosis/index.html](http://www.health.state.mn.us/diseases/cryptosporidiosis/index.html)). Accessed May 2024.

### Information for the Public and Public Health Professionals

- [Aquatics Professionals Toolkit | CDC](#)
- [Healthy Swimming Communication Resources | Healthy Swimming | CDC](#)
- [MAHC Tools and Training | CDC](#)
- [The MAHC Current Edition | CDC](#)
- [Cryptosporidiosis Fact Sheet | Minnesota Department of Health](#)



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### Have Questions?

Contact NACCHO at [mahcnet@naccho.org](mailto:mahcnet@naccho.org).



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