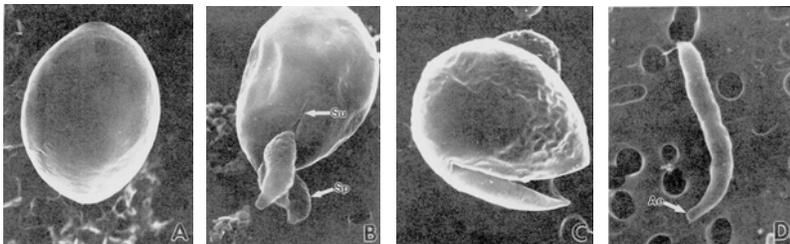


Cryptosporidiosis Outbreak Response & Evaluation^{1,2,3}



From Reducker et al., J Protozool., 32, 708-711, 1985

Cryptosporidiosis Outbreak Response & Evaluation (CORE) Guidelines⁴

¹ Initially developed with the Kansas Department of Health and Environment and the Lawrence-Douglas County Health Department, Kansas.

² State and local health departments might consider adapting this plan for other waterborne or enteric pathogens.

³ Public comments, requests, or outbreak reports can be sent to CDC via healthyswimming@cdc.gov or by phoning 770-488-7775. **Draft 06/05/2009.**

⁴ State and local health departments might consider adapting this plan for other waterborne or enteric pathogens.

Outbreak and case reporting data for cryptosporidiosis document increases in transmission of the parasite, *Cryptosporidium*, over the last 2 decades. This is in part due to the parasite's low infectious dose, potential for zoonotic transmission, presence in the natural environment, small size that challenges water filtration systems, and its high resistance to chlorine disinfection. As a result this parasite has become the leading cause of outbreaks associated with disinfected swimming venues (e.g., pools, waterparks, interactive fountains). Recent trends in transmission of *Cryptosporidium* illustrate its ability to cause community-wide outbreaks (e.g., United States, Australia). This propensity to expand community-wide from traditional swimming pool-related transmission to child care programs and person-to-person transmission prompted creation of guidance to potentially reduce this risk. CDC has worked since 2003 with multiple outbreak investigation partners to develop and refine guidance for reducing the risk of a community wide cryptosporidiosis outbreak. These guidelines suggest changing the traditional outbreak response. The guidelines suggest setting a disease threshold for early institution of prevention and control activities rather than waiting for an outbreak investigation to implicate a site of transmission before implementing such measures. The guidance suggests that expansion of *Cryptosporidium* transmission, like other enteric pathogens, may be controlled by environmental (e.g., hyperchlorination) and behavioral interventions (e.g., community-wide awareness raising program). Such interventions do not necessarily require extensive data gathering prior to implementation as is the case with clinical control measures. Therefore, early intervention can be more readily warranted and is more likely to reduce the risk of community-wide spread.

Lessons learned from community-wide outbreaks of cryptosporidiosis⁵, and shigellosis⁶, underscore the importance of pre-planning and rapid response and highlight that implementation of an early response does not require prior identification of the outbreak source. Pre-planning entails taking steps before the cryptosporidiosis season begins, establishing a communication plan with community partners that might be impacted by cryptosporidiosis, and educating those partners and the public on prevention of *Cryptosporidium* transmission. If a preset disease threshold (e.g., 2–3-fold increase in case-reports over previous 5 years) is exceeded, then public health staff can rapidly communicate with and mobilize community partners to potentially prevent transmission in settings beyond the site of primary transmission. By making public health action dependent on exceeding a threshold rather than identifying an outbreak source, response time can be reduced. This paradigm shift in the trigger for public health response could potentially reduce the chance of community-wide spread of cryptosporidiosis in the future.

The guidelines for health departments are divided into three sections for 1) health departments, 2) aquatics operators/managers, and 3) child care program operators. Each of these three sections is organized into three parts:

PREPARATION: Before a significant increase in cases or an outbreak is detected

ACTION: Once the preset disease threshold is exceeded or an outbreak is detected

POST-RESPONSE EVALUATION: After a significant increase in cases or an outbreak is controlled

⁵ CDC. Community cryptosporidiosis outbreak — Utah, 2007. (2008) MMWR 57:989-993.

⁶ Mohle-Boetani JC, Stapleton M, Finger R, et al. Communitywide shigellosis: control of an outbreak and risk factors in child day-care centers. Am J Public Health 1995;85:812–6.

1. State/Local Health Departments

Optimizing the impact of these recommendations calls on health departments to take the following steps **before an increase in cases or an outbreak is detected**:

1. Establish good communication and strong working relationships both within the health department (particularly among epidemiologists, environmental health specialists, health communication specialists, and laboratorians) with other health departments, and with community partners that might be affected by a cryptosporidiosis outbreak.
2. Make public health response dependent on exceeding a threshold rather than identifying the source of transmission — i.e., set a disease action threshold (e.g., 2–3 fold increase over baseline over the previous five years) and once it is exceeded (or an outbreak is detected), notify and mobilize community partners to implement intensified control measures.

PREPARATION: Before a significant increase in cases occurs or an outbreak is detected

- Develop a communication plan for internal and external partner interaction.
- Implement the communication plan to establish strong working relationships with:
 - Community partners in your jurisdiction that might be impacted by cryptosporidiosis
 - Aquatics operators/managers
 - Child care programs (CCPs)
 - Laboratories
 - Media
 - Healthcare providers, hospitals, and clinics
 - Immunocompromised persons
 - Schools
 - Nursing homes/extended care facilities
 - Restaurants and hotels/motels
 - Emergency responders (law enforcement and fire/EMT)
 - Other important community partners
 - Colleagues within the health department (particularly among epidemiologists, environmental health officials, health communication specialists, and laboratorians)
 - Encourage colleagues of different public health disciplines to collaborate and develop a strategy for how to optimally mount a public health response.
 - Routinely involve and communicate with these partners during health event planning and response.
 - Neighboring state/local health departments
- Maintain updated e-mail, fax, and/or phone lists for community partners, colleagues within the health department, and neighboring sister state/local health departments.
- Set the disease action threshold (e.g., 2–3 fold increase over baseline for the previous 5 years) at which community partners are notified and mobilized to implement intensified control measures.
- Educate community partners about:
 - Cryptosporidiosis, how *Cryptosporidium* is transmitted, and how to prevent transmission.
 - Intensified control measures to be implemented (see partner-specific guidance in the following sections) if the preset disease action threshold is exceeded or an outbreak is detected (e.g., implementing and enforcing diarrhea-exclusion policies, installing supplemental disinfection systems like ultraviolet light or ozone in aquatics venues).
- Collaborate with public health colleagues and community partners to educate the public about how they can help prevent *Cryptosporidium* transmission.
 - Educate the public about healthy swimming and hand washing basics (see Appendix 1), with increased efforts during National Recreational Water Illness Prevention Week, the week before Memorial Day.
 - For information for the general public, visit www.cdc.gov/healthyswimming/tools.htm and www.cdc.gov/healthyswimming/swimmer_protection.htm.

- For information specifically for immunocompromised persons, visit <http://www.cdc.gov/crypto/ic.html>.
- Develop health communications materials for cryptosporidiosis control and outbreak response.
 - Check out other resources at www.cdc.gov/crypto and www.cdc.gov/healthyswimming. If the posted materials do not meet your health department's needs, contact CDC's Parasitic Diseases Branch (CDC) at 770-488-7775 for assistance in developing and posting resources that do.
- Check out additional outbreak-response resources at www.cdc.gov/healthyswimming/rwi_outbreak.htm.
 - Become familiar with resources CDC can offer (e.g., diagnostic testing and molecular typing, serology, and water testing).

ACTION: Once the preset disease threshold is met or exceeded or an outbreak is detected

- Notify colleagues within the health department (particularly epidemiologists, environmental health specialists, health communication specialists, and laboratorians) that the disease action threshold has been exceeded or an outbreak has been detected.
 - Include representatives from different public health disciplines in conference calls and share written communication about notifying and mobilizing community partners of the need to implement intensified control measures.
- Notify and mobilize community partners to implement intensified control measures (see partner-specific guidance in following sections). Contact community partners using current e-mail, fax, and/or phone lists.
- Reinforce educational efforts on healthy swimming and hand washing basics (see Appendix 1).
 - Engage the media to help disseminate these public health messages (see 5. Media).
- Share information with neighboring state/local health departments. If your health department is low on resources, other public health agencies might be able to assist.
- Alert CDC/PDB for assistance with identified needs unmet by resources posted on the Cryptosporidiosis and Healthy Swimming websites (e.g., testing clinical specimens and environmental samples and developing specific health communication materials).

POST-RESPONSE EVALUATION: After a significant increase in cases or an outbreak is controlled

- Report the disease outbreak to CDC (*for state, territory, and Freely Associated State health departments only*).
 - Report a waterborne disease outbreak to CDC electronically via the National Outbreak Reporting System (NORS). Report a foodborne, person-to-person, and animal-to-person disease outbreak electronically via NORS.
 - Jurisdictions that do not have access to NORS can complete paper forms and forward them to their state, territory, and Freely Associated State health department. Training videos and the paper form are available at www.cdc.gov/healthywater/statistics/wbdoss/nors and www.cdc.gov/foodborneoutbreaks/nors.html.
- Encourage community partners to establish, implement, and enforce policies that prevent *Cryptosporidium* transmission (e.g., all child care programs should have diarrhea-exclusion policies for attendees and staff).
- Encourage community partners to supplement every-day control measures that prevent *Cryptosporidium* transmission (e.g., aquatics operators/managers should supplement conventional chlorination and filtration with treatments such as ultraviolet radiation and ozone, which are known to inactivate *Cryptosporidium*), if they have not already done so.

- Share lessons learned with CDC/PDB (healthyswimming@cdc.gov). This document and other resources on the CDC's Cryptosporidiosis and Healthy Swimming websites were developed in response to needs identified by other state/local health departments during previous outbreak investigations. Sharing your experiences and insights will help improve these resources for the next health department investigating an increase in cryptosporidiosis case reporting or an outbreak.
- Return to steps listed under ***PREPARATION: Before a significant increase in cases or an outbreak is detected.***

2. Aquatics Operators/Managers

Transmission of *Cryptosporidium* peaks in the late summer/early fall, which tracks with the summer swim season. Preventing *Cryptosporidium* contamination of water in pools, water parks, interactive fountains, etc. (i.e., treated recreational water venues) is as important as instituting engineering control measures (e.g., an in-line ultraviolet [UV] radiation or ozone treatment system) to supplement conventional chlorination and filtration and inactivate *Cryptosporidium*.⁷ Swimmers are the source of the *Cryptosporidium* contamination and should be engaged to help prevent waterborne transmission of the parasite. Findings from focus group discussions with parents of young children indicate that the parents 1) do not think of swimming as communal bathing or recognize the shared nature of the water used for swimming, 2) do not know that treated recreational water can potentially transmit illness, and 3) think that chlorine kills all pathogens immediately so that treated recreational water is essentially “sterile.”⁸ Such beliefs likely lead to risky swimming behaviors, such as swimming while ill with diarrhea and swallowing the water.

PREPARATION: Before a significant increase in cases occurs or an outbreak is detected

- Maintain updated contact information (e.g., e-mail, fax, and/or phone list) for aquatics operators/managers in your jurisdiction.
- Educate aquatics operators/managers about:
 - Cryptosporidiosis, how *Cryptosporidium* is transmitted at aquatics venues, and how to prevent transmission at aquatics venues
 - See control measures listed in Appendix 2a.
 - Intensified control measures that aquatics operators/managers will need to implement if the preset disease action threshold is exceeded or an outbreak is detected.
 - See control measures listed in Appendix 2b.
- Collaborate with aquatics operators/managers to educate the public about healthy swimming basics (e.g., not swimming while ill with diarrhea). See Appendix 1.
 - Check out educational resources available at www.cdc.gov/healthyswimming/health_materials.htm.
 - Increase educational efforts during National Recreational Water Illness (RWI) Prevention Week, the week before Memorial Day.
 - Visit www.cdc.gov/healthyswimming/rwi_prevention_week.htm for RWI Prevention Week resources.
- Develop health communications materials for cryptosporidiosis control and outbreak response specific to aquatics venues (e.g., posters about healthy swimming basics to be hung up at aquatics facilities in places where patrons can easily see and read them before entering the facility and water).
 - Check out resources at www.cdc.gov/crypto and www.cdc.gov/healthyswimming. If the posted materials do not meet your health department’s needs, contact CDC/PDB at 770.488.7775 for assistance in developing and posting resources that do.

ACTION: Once the preset disease threshold is met or exceeded or an outbreak is detected

- Notify and mobilize aquatic venues operators/managers in your jurisdiction to implement intensified control measures. See intensified control measures listed in Appendix 2b.
- Distribute health communications materials.
- Confirm that aquatics operators/managers have implemented the intensified control measures.

⁷ CDC. Cryptosporidiosis Outbreaks Associated with Recreational Water Use — Five States, 2006. *MMWR* 2007;56(29):729–732. Available at: www.cdc.gov/mmwr/preview/mmwrhtml/mm5629a1.htm.

⁸ Beach MJ. Waterborne: Recreational Water. In: Fayer R, Xiao L, eds. *Cryptosporidium* and Cryptosporidiosis, Second Edition. Boca Raton, FL: CRC Press; 2008:335-369.

- Consider community-wide hyperchlorination of pools, water parks, interactive fountains, and other treated venues.

POST-RESPONSE EVALUATION: After a significant increase in cases occurs or an outbreak is controlled

- Notify aquatics operators/managers that the significant increase in cases or the outbreak has been controlled.
- Debrief with aquatics operators/managers.
 - Identify barriers to control measures and brainstorm how to best address/overcome them.
 - Discuss how well communication worked between public health and aquatics operators/managers and what can be done to improve it.
 - Determine how to improve health communication messages and their dissemination.
- Modify strategies (based on the information shared during the debriefing) to:
 - Implement control measures and
 - Communicate with aquatics operators/managers.
- Revise and distribute health communication messages and modify strategies to disseminate them to the public based on information shared during the debriefing.
- Share lessons learned with CDC/PDB (healthyswimming@cdc.gov), particularly regarding factors contributing to the increase in cases/outbreak (e.g., those identified during an environmental investigation of the aquatics venues implicated in the epidemiologic investigation).
- Encourage aquatics operators/managers to supplement conventional chlorination and filtration with treatments known to inactivate *Cryptosporidium* (e.g., an in-line UV radiation or ozone system), if they have not already done so.
- Encourage aquatics operators/managers to establish, implement, and enforce diarrhea-exclusion policies for patrons and staff, if they have not already done so.
- Return to steps listed under **PREPARATION: Before a significant increase in cases or an outbreak is detected.**

3. Child Care Program (CCP) Operators

Cryptosporidiosis is most common among young children who are not toilet trained and their caregivers, and those who change their diapers.^{9,10} This underscores the need for CCP operators (this included residential and non-residential settings) to implement control measures to decrease the likelihood of transmission among attendees and staff and use disinfectants effective against *Cryptosporidium*. Encourage CCP operators to establish, implement, and enforce policies regarding diarrhea-exclusion for attendees and staff, hand washing, diaper changing and disposal, and water-related play activities (e.g., prohibiting the use of fill-and-drain pools). Additionally, CCP operators should use hydrogen peroxide to disinfect diaper-changing areas, toys, etc during an outbreak of cryptosporidiosis. Bleach solutions, which are commonly used for disinfection in CCPs, are not effective against the chlorine-resistant parasite. Of note, alcohol-based hand gels and sanitizers are also not effective against *Cryptosporidium*.

PREPARATION: Before a significant increase in cases/an outbreak is detected

- Maintain updated contact information (e.g., e-mail, fax, and/or phone list) for CCP operators in your jurisdiction.
- Educate CCP operators about
 - Cryptosporidiosis, how *Cryptosporidium* is transmitted at CCPs, and how to prevent transmission at CCPs as well as
 - Intensified control measures that CCP operators will need to implement if preset disease action threshold is met or exceeded or an outbreak is detected.
 - See control measures listed at www.cdc.gov/crypto/daycare/outbreak.html.
 - During outbreaks, stress the importance of using hydrogen peroxide to disinfect diaper-changing areas, toys, etc. effectively (e.g., store hydrogen peroxide in opaque containers because it is light sensitive) and safely (e.g., use dedicated equipment for safe handling of hydrogen peroxide because it is incompatible with bleach).
- Collaborate with CCP operators to educate attendees' parents and guardians about cryptosporidiosis, how the infection is transmitted at CCPs, and how it can be prevented.
- Encourage CCP operators to implement the preventive measures listed at www.cdc.gov/crypto/daycare/prevent.html.
- Develop health communications materials for cryptosporidiosis control and outbreak response specific to CCPs (e.g., letter to attendees' parents and guardians notifying them of the implementation of intensified control measures).
 - Check out resources at www.cdc.gov/crypto and www.cdc.gov/healthyswimming. If the posted materials do not meet your health department's needs, contact CDC/PDB at 770.488.7775 for assistance in developing and posting resources that do.

ACTION: Once the preset disease threshold is met or exceeded or an outbreak is detected

- Notify and mobilize CCP operators in your jurisdiction to implement intensified control measures.
 - See control measures listed at www.cdc.gov/crypto/daycare/outbreak.html.
- Confirm that CCP operators have implemented the intensified control measures.

POST- RESPONSE EVALUATION: After a significant increase in cases or an outbreak is controlled

⁹ Yoder JS, Beach MJ. Cryptosporidiosis Surveillance — United States, 2003–2005. *MMWR* 2007; 56(SS-7):1–10. Available at: www.cdc.gov/mmwr/preview/mmwrhtml/ss5607a1.htm.

¹⁰ Roy SL, DeLong S, Stenzel S, Shiferaw B, Roberts J, Khalakdina A, Marcus R, Nelson R, Segler S, Shah D, Thomas S, Vugia D, Zansky S, Dietz V, Beach MJ, and the Emerging Infections Program FoodNet Working Group. (2004) Risk factors for sporadic cryptosporidiosis among immunocompetent persons in the United States, 1999 – 2001. *J Clin Micro* 42: 2944-2951.

- Notify CCP operators that the significant increase in cases/outbreak has been controlled.
- Debrief with CCP operators.
 - Identify barriers to control measures and brainstorm how to best address/overcome them.
 - Discuss how well communication worked between public health and CCP operators and what can be done to improve it.
 - Determine how to improve health communication messages and their dissemination.
- Modify strategies (based on information shared during the debriefing) to:
 - Implement control measures.
 - Communicate with CCP operators.
- Revise health communication messages and modify strategies to disseminate them based on information shared during the debriefing.
- Distribute modified strategies and revised health communication messages to CCP operators.
- Encourage CCP operators to establish, implement, and enforce policies regarding diarrhea-exclusion for attendees and staff, hand washing and diaper changing and disposal, and water-related play activities, if they have not already done so.
- Return to steps listed under ***PREPARATION: Before a significant increase in cases or an outbreak is detected.***

Appendix 1- Basic Hygiene Messages for the Public

- **Healthy Swimming** (www.cdc.gov/healthyswimming/6_steps.htm)
 - **Please** do not swim when you have diarrhea. You can spread germs in the water and make other people sick.
 - **Please** do not swallow pool water. Avoid getting water in your mouth.
 - **Please** practice good hygiene. Shower with soap before swimming and wash your hands after using the toilet or changing diapers. Germs on your body end up in the water.
 - **Please** take your kids on bathroom breaks or check diapers often. Waiting to hear "I have to go" may mean that it's too late.
 - **Please** change diapers in a bathroom or a diaper-changing area and not at poolside. Germs can be spread in and around the pool.
 - **Please** wash your children thoroughly (especially the rear end) with soap and water before they go swimming. Invisible amounts of fecal matter can end up in the pool.

- **Hand Washing** (www.cdc.gov/cleanhands/)

1. Wet your hands with clean running water and apply soap. Use warm water if it is available.
2. Rub hands together to make a lather and scrub all surfaces.
3. Continue rubbing hands for 20 seconds. Need a timer? Imagine singing "Happy Birthday" twice through to a friend!
4. Rinse hands well under running water.
5. Dry your hands using a disposable paper towel or air dryer.
6. Use your disposable paper towel, if possible, to turn off the faucet.

*** NOTE: Alcohol-based hand gels and sanitizers do not kill *Cryptosporidium* (or "Crypto"), so they do not help stop the spread of Crypto. ***

- When to wash
 - Before handling or eating food
 - After going to the bathroom
 - After changing diapers or assisting someone with toileting
 - Before and after tending to someone who is sick
 - After handling an animal or animal waste
 - After handling garbage

Note: Child care program attendees and staff should also wash their hands when they arrive at the child care setting. ***

- **For information about steps immunocompromised persons to reduce their risk of becoming infected with *Cryptosporidium*, visit www.cdc.gov/crypto/ic.html.**

Appendix 2a. Standard Cryptosporidiosis (Crypto) Control Measures for Aquatics Facilities

Cryptosporidium or (“Crypto”) is a germ that causes diarrhea (see www.cdc.gov/healthyswimming/pdf/cryptofacts.pdf). It can be spread in pools, water parks, interactive fountains, and other treated swimming venues if someone who is ill with Crypto has a diarrheal incident while in the water. Crypto is resistant to chlorine at levels that are safe for swimming. This means even well-maintained aquatics facilities can spread Crypto. The following steps can help keep Crypto out of the water:

- Establish good communication and a strong working relationship with the local health department.
 - Assist the health department with maintaining updated e-mail, fax and/or phone lists for aquatics operators/managers. If the health department discovers that Crypto infections are spreading in the community, these lists will allow the health department to alert you quickly of the need to take extra steps (see Appendix 2b) to help keep Crypto out of the water.
- Work with the local health department to educate patrons about Crypto, how it is spread in the water, and how they can help protect themselves and other swimmers from Crypto by following healthy swimming basics (see www.cdc.gov/healthyswimming/6_steps.htm).
 - Check out educational resources available at www.cdc.gov/healthyswimming/health_materials.htm.
 - Increase educational efforts during National Recreational Water Illness (RWI) Prevention Week, the week before Memorial Day.
 - Visit www.cdc.gov/healthyswimming/rwi_prevention_week.htm for RWI Prevention Week resources.
- Establish, implement, and enforce diarrhea-exclusion policies for patrons and staff.
 - Alert swim coaches to suspend swimmers who are ill with diarrhea.
 - Consider reassigning staff ill with diarrhea to duties that do not require them to enter the water (for example, administrative duties) until their symptoms resolve.
- Develop a fecal incident response plan and train your staff on the response procedures. All diarrheal incidents are considered potential high-risk Crypto events.
 - Check out CDC’s fecal incident response recommendations at www.cdc.gov/healthyswimming/pdf/Fecal_Incident_Response_Recommendations_for_Pool_Staff.pdf.
- Consider adding supplemental disinfection systems or actions known to kill Crypto to your regular water treatment. For example, add an in-line ultraviolet radiation or ozone treatment system or hyperchlorinate (see www.cdc.gov/healthyswimming/pdf/Hyperchlorination_to_kill_Cryptosporidium.pdf) frequently (for example, weekly) at levels known to kill Crypto.
- Visit www.cdc.gov/healthyswimming/twelvesteps.htm, for additional steps your aquatics facility can take to help protect your patrons from Crypto and other illnesses.
- Sign up for the Crypto outbreak alert system at www.nspf.org/CryptoToolkit.html to find out about big outbreaks in your region that could possibly affect your aquatics facility.

Appendix 2b. Intensified Cryptosporidiosis (Crypto) Control Measures for Aquatics Facilities

Cryptosporidium or (“Crypto”) is a germ that causes diarrhea (see www.cdc.gov/healthyswimming/pdf/cryptofacts.pdf). It can be spread in pools, water parks, interactive fountains, and other treated swimming venues if someone who is ill with Crypto has a diarrheal incident while in the water. Crypto is resistant to chlorine at levels that are safe for swimming, so even well-maintained aquatics facilities can spread Crypto. Crypto can cause community-wide outbreaks, which makes taking the following steps very important:

- Work with the local health department to reinforce efforts to educate patrons about Crypto, how it is spread in the water, and how they can help protect themselves and other swimmers from Crypto by following healthy swimming basics (see www.cdc.gov/healthyswimming/6_steps.htm).
 - Check out educational resources available at www.cdc.gov/healthyswimming/health_materials.htm.
 - Post diarrhea-exclusion messages where patrons can easily see and read them before entering the facility and the water.
- Reinforce diarrhea-exclusion policies for patrons and staff.
 - Post diarrhea-exclusion messages where patrons can easily see and read them before entering the facility and the water.
 - Alert coaches to suspend swimmers who are ill with diarrhea.
 - Consider reassigning staff ill with diarrhea to duties that do not require them to enter the water (for example, administrative duties) until their symptoms resolve.
- Hyperchlorinate the water (when not being used) at levels to kill Crypto if the health department notifies your facility of the need to hyperchlorinate.
- Consider hyper-chlorinating regularly (for example, weekly) to help stop Crypto from spreading at your facility.
- Discuss with the health department other possible steps to help stop Crypto from spreading such as suspending group events, especially those involving high-risk groups, like groups of young children in child care programs.