

'CRYPTO' FACT SHEET FOR POOL OPERATORS

Crypto Basics

Cryptosporidiosis is a diarrheal disease caused by microscopic parasites, *Cryptosporidium*, that can live in the intestine of humans and animals and is passed in the stool of an infected person or animal. Both the disease and the parasite are commonly known as "Crypto." The parasite is protected by an outer shell that allows it to survive outside the body for long periods of time and makes it very resistant to chlorine-based disinfectants. **During the past 2 decades, Crypto has become recognized as one of the most common causes of waterborne disease (recreational water and drinking water) in humans in the United States.** The parasite is found in every region of the United States and throughout the world.

Cryptosporidium lives in the intestine of infected humans or animals. An infected person or animal sheds Crypto parasites in the stool. Millions of Crypto germs can be released in a bowel movement from an infected human or animal. Shedding of Crypto in the stool begins when the symptoms begin and can last for weeks after the symptoms (e.g., diarrhea) stop. You can become infected after accidentally swallowing the parasite. *Cryptosporidium* may be found in soil, food, water, or surfaces that have been contaminated with the feces from infected humans or animals. Crypto is not spread by contact with blood. Crypto can be spread:

- **By swallowing recreational water contaminated with Crypto. Recreational water is water in swimming pools, hot tubs, Jacuzzis, fountains, lakes, rivers, springs, ponds, or streams. Recreational water can be contaminated with sewage or feces from humans or animals.**
- By putting something in your mouth or accidentally swallowing something that has come into contact with stool of a person or animal infected with Crypto.
Note: You may not be able to tell by looking whether something has been in contact with stool.
- By swallowing water or beverages contaminated with stool from infected humans or animals.
- By eating uncooked food contaminated with Crypto. Thoroughly wash with uncontaminated water all vegetables and fruits you plan to eat raw. See below for information on making water safe.
- By touching your mouth with contaminated hands. Hands can become contaminated through a variety of activities, such as touching surfaces (e.g., toys, bathroom fixtures, changing tables, diaper pails) that have been contaminated by stool from an infected person, changing diapers, caring for an infected person, changing diapers, caring for an infected person, and handling an infected cow or calf.
- By exposure to human feces through sexual contact.

The most common symptom of cryptosporidiosis is watery diarrhea. Other symptoms include:

- Stomach cramps or pain
- Dehydration
- Nausea
- Vomiting
- Fever
- Weight loss

Some people with Crypto will have no symptoms at all, which is another reason why maintaining your pool properly can prevent an outbreak. While the small intestine is the site most commonly affected, Crypto infections could possibly affect other areas of the digestive tract or the respiratory tract.

12 STEPS FOR PREVENTING RECREATIONAL WATER ILLNESS (RWI)

STEP 1: Lead your staff.

Every aquatic facility is different with distinct priorities that have to be juggled on a daily basis while working within limitations on staff and resources. However, all aquatic facilities make safety and health a top priority.

Making a choice to integrate an RWI protection plan into an existing facility risk management plan is the single greatest decision you can make to protect swimmers from RWIs. Take the lead, outline your vision, show your commitment to your staff, and put yourself at the forefront of the aquatics field. Decide that RWI protection is a priority; back it up with resource investment and commitment, and that will set the tone for the rest of the staff. Determine which of the Healthy Swimming recommendations are feasible to implement in your facility with available resources.

Investing heavily after the outbreak occurs, a common occurrence, is great but it would have been better for the public's health and more cost-effective if this were done before the outbreak occurred.

STEP 2: Develop Partnerships

Building a communication bridge to your health department and other aquatic facilities is a great way to get information about other outbreaks occurring in your community. If you start to hear about outbreaks associated with other pools, daycares, schools, etc., where your swimmers attend, then take proactive measures and increase vigilance to protect your pool. Increase education of staff, swimmers, and visiting daycare groups. If a pool closes because of a suspected outbreak, that does not mean that all of the swimmers should descend on your pool without giving them some education about RWI prevention. Work with your health department to get the word out when a potential RWI outbreak is occurring. Remind them that one of the messages to send out whenever a diarrheal outbreak is occurring is **“don't swim when ill with diarrhea.”** Use your communication networks and the media to alert patrons that they should not be swimming if they are ill with diarrhea. Protect your facility, make the contacts early, and build a communication network so that you are aware of the health status of your community at all times.

STEP 3: Educate pool staff.

1. Ensure that the pool operator, at a minimum, has taken part in a standardized training course given by aquatics professionals.
2. Integrate the "P-L-E-As" for Healthy Swimming (see next page) into staff training.
3. Promote good hygiene and safety around the pool by knowing the "P-L-E-As" for Healthy Swimming.
4. Inform parents that unhealthy behaviors at poolside and elsewhere are no longer acceptable. Parents told CDC that they wanted to be able to rely on the lifeguards for help and enforcement.
5. Ensure that all staff know the critical role of water testing, proper testing methods, and how to respond if disinfectant levels are not adequate.
6. **Make sure that staff can explain, in a way that is inoffensive and acceptable to parents, why behaviors such as using public tables and chairs for diaper changing is a health risk.** This may require that an older, more experienced staff member be assigned to the kiddie pool.
7. Maintaining pool water quality according to existing public health requirements will prevent the spread of most recreational water illnesses (RWIs).

STEP 4: Educate swimmers and parents.

1. **Educate your season pass holders.** You may choose to begin by educating them first since they may feel more ownership of the facility and want to make the facility as safe as possible.
2. **Educate your daily patrons.** You might hand out prevention messages ("P-L-E-As" for Healthy Swimming or CDC brochure) as patrons enter the pool or park area.
3. Remember that people care about their health, so a lead-in might be: "To ensure the health and safety of all our visitors, we ask that you remember to follow these easy "P-L-E-As" for Healthy Swimming."
4. **Consider implementing a short safety and RWI orientation for larger groups before they enter the pool complex.** This is especially important for groups with young children (see step ten).

Poster is available at www.cdc.gov/healthyswimming/posters.htm

Six "P-L-E-As" for Protection Against Recreational Water Illnesses (RWIs)

- PLEASE** don't swim when you have diarrhea...this is especially important for kids in diapers.
- PLEASE** don't swallow the pool water.
- PLEASE** practice good hygiene.
- PLEASE** take your kids on bathroom breaks often.
- PLEASE** change diapers in a bathroom and not at poolside.
- PLEASE** wash your child thoroughly (especially the rear end) with soap and water before swimming.

STEP 5: Maintain water quality and equipment.

Keep the chemical feed equipment and chemicals at optimal levels within state and local government regulations.

This includes maintaining the disinfectant at regulated levels; optimal pH (7.2-7.8); alkalinity (80-120 ppm); calcium hardness (200-400 ppm), and total dissolved solids (below 2500mg/liter).

As you know, poor pH control can compromise chlorine's effectiveness as a disinfectant. Remember that maintaining recommended chlorine levels will prevent most bacterial outbreaks such as *E. coli* O157:H7.

Water Quality	pH
- Poor Chlorine Disinfection - Eye Irritation - Skin Irritation	> 8.0
- Most Ideal for Eye Comfort and Disinfection	7.8 7.6 7.2
- Eye Irritation - Skin Irritation - Pipe Corrosion	< 7.0

Be sure to monitor chlorine regularly where the chlorine is needed—at poolside. You should be able to prevent waterparks, pools, or hot tubs from running out of chlorine through regular monitoring, and pumphouse and systems checks.

Ensure regular and thorough maintenance of the recirculation and filtration equipment to provide maximum filtration.

STEP 6: Evaluate aquatic facility design.

Some pools and waterparks have already started to redesign their facilities for the purpose of illness protection.

If you are building a new waterpark, get feedback from your industry colleagues and public health experts about the safety and protection features you need to consider in the design stage.

Pool designers will respond to you, their customer, if you are clear that your public health needs are a high priority and you consider it an investment in safe operations.

Evaluate your filtration system.

If your kiddie pool filtration system is connected with other pools, fecal contamination can be dispersed from the kiddie pool to the other pools. The best situation is one in which there is a separate filtration system for the kiddie pool.

Increasing the water turnover rates in kiddie pools may decrease the length of time that swimmers are exposed to contaminating germs. This decision needs to be made in collaboration with your state and local

regulators and design consultants to avoid causing suction injuries. This may require installation of antivortex drain covers (with no top openings and automatic cut-off valves).

When it comes to the spread of some illnesses, filtration can help but it takes substantial time to completely filter the pool.

Evaluate your form of disinfection.

There is a great deal of interest in new technologies that disinfect pool water such as ozone, ultraviolet (UV) irradiation, and mixed oxidants.

They look promising. Seek out the experts for the latest information but keep in mind that you are still going to need some residual disinfectant in the pool when using ozone and UV.

STEP 7: Institute disinfection guidelines.

Even if you are not required to do so, have a written fecal accident response policy and keep records of all fecal accidents, chlorine and pH level measurements, and any major equipment repairs or changes. This may help you respond more efficiently to any problems. You may have little control over a toddler's soiling your kiddie pool, but you do have control over how you document and respond to this occurrence.

It pays to be proactive.

For detailed disinfection guidelines go to:
http://www.cdc.gov/healthyswimming/disinfection_and_remediation.htm

STEP 8: Evaluate hygiene facilities.

In CDC's parent interviews, parents uniformly said they change diapers at poolside because changing rooms were unclean, poorly maintained, and/or had inadequate diaper-changing facilities.

Here are some questions that you could ask to improve your facilities:

- Do you have an adequate number of facilities?
- Are the facilities close to the pool?
- Are the facilities well maintained (stocked and cleaned)?
- Would you walk barefoot in them as your patrons do?

Remember....ask your patrons for feedback.

If your facility is large enough, determine the utility of hiring a person just to maintain the restrooms or consider remodeling your diaper-changing stations. Both improvements may be good investments if they increase the number of parents and children who use them.

Install diaper-changing cabanas with soap and running water close by the kiddie pools. This is a great way to discourage parents from changing diapers on tables or lounge chairs. It can also help mothers who are also keeping an eye on other kids. Although difficult, keep pushing to get swimmers to shower (yes, a soap and water, back-end shower) before using the pool. Dirt, sweat, and fecal matter should go down the drain, not into your pool. Train staff to recognize risky behavior such as changing a child on public tables or chairs. Have them educate patrons about why this is a health risk.

STEP 9: Develop a bathroom break policy.

CDC hopes to heighten awareness about the transmission of recreational water illnesses (RWIs).

Parents will continue to want to see regular chlorine testing and appropriate disinfection following fecal accidents. Therefore, why not reduce fecal accidents by helping parents get their children to the bathroom by scheduling an hourly break for disinfectant testing and bathroom use? Staff should let patrons know that this break provides optimal timing for bathroom use. Additionally, to prevent transmission of germs, you should ensure that the bathrooms are clean, that they are stocked with toilet paper, and that they have

ample soap for hand washing. If parents ask, tell them this policy not only reduces fecal contamination but also should reduce the amount of urine in the pool that uses up disinfectant that could be killing germs.

STEP 10: Create a special policy for large groups of young children.

If you allow large groups of diaper/toddler-aged children in the pool (e.g. from daycare centers) consider:

- Requiring RWI orientation training for the care providers and make sure they understand that your pool, like most daycare centers, also excludes children ill with diarrhea.
- Keeping diaper/toddler-aged children in the pools specifically designated for them.

STEP 11: Post and distribute health information.

Consider providing signage in a conspicuous location before pool entry.

The sign might state:

- Don't swim when you have diarrhea.
- Don't swallow the pool water.
- Wash your hands with soap and water after using the restroom or changing diapers.
- Take your kids to the bathroom often.
- Change diapers in the bathroom and not at poolside.
- Wash your child thoroughly (especially the rear end) with soap and water before swimming.

Encourage swimmers to shower with soap and water before entering the pool. This could reduce the risk of pool contamination by removing invisible fecal matter from their bottoms. A quick rinsing over a swimsuit with cold water will not do much good. Facility staff, managers, and home pool staff should consider having hot water available in shower facilities used by swimmers. The recreational water sector is not the only group that needs to participate in the educational process. Parents have told us that they would like to receive this message from various sources before they arrive at the pool. Public health officials have already begun to educate swimmers by making prevention messages available to the general public.

STEP 12: Develop an outbreak/emergency response plan.

The best advice is to be prepared. If an outbreak does occur, are you ready?
Do you have a plan?

Most pool staff already have a risk management plan for injuries and drowning, but many do not have plans for managing a recreational water illness (RWI) outbreak.

- Develop a policy to follow in the event that you begin getting calls from the public, or the health department starts an investigation. Part of this plan should include a strategy to communicate with the local health department and media.
- Appoint a spokesperson to ensure that a consistent response is given to outside sources (callers, media, health department, and others), and that these sources have a clear contact person.
- Talk to your colleagues who have experience. It can be difficult if you are not ready to speak with reporters and an outbreak occurs.
- Collaborate with your local health department. This is always important, plus the investigation may indicate a source unrelated to the pool.
- Support the investigation. If the pool is the source of the outbreak, the investigation can often reveal how or why illness was transmitted. This information leads to better illness prevention strategies that can help everyone.

RESPONDING TO FECAL ACCIDENTS IN DISINFECTED SWIMMING VENUES

The 2001 CDC recommendations (1) for responding to fecal accidents in disinfected swimming venues (e.g., swimming pools) have been revised. Recommendations for responding to diarrheal fecal accidents, which are thought to represent a higher infectious-disease transmission risk than formed-stool accidents, are based on the potential presence of the chlorine-resistant parasitic protozoa of the genus *Cryptosporidium*. New data indicate that the recommended CT inactivation value (or contact time)* is higher than previously published (2), when inactivation is measured at a higher pH using an outbreak-associated *Cryptosporidium* isolate (3). Based on these data, the CT inactivation value used in CDC fecal accident recommendations for 99.9% inactivation of *Cryptosporidium* has been changed from 9,600 mg-min/L to 15,300 mg-min/L.† This change translates into longer swimming pool closures to ensure inactivation of *Cryptosporidium*.

Swimming pool operators should check existing guidelines from local or state regulatory agencies before using these recommendations, because CDC recommendations do not replace existing state or local regulations or guidelines. The CDC revised fecal accident response recommendations are available at http://www.cdc.gov/healthyswimming/pdf/fecal_accident_response_recommendations_for_pool_staff.pdf.

References

1. [CDC. Responding to fecal accidents in disinfected swimming venues. MMWR 2001;50:416--7.](#)
2. Korich DG, Mead JR, Madore MS, Sinclair NA, Sterling CR. Effects of ozone, chlorine dioxide, chlorine, and monochloramine on *Cryptosporidium parvum* oocyst viability. *Appl Environ Microbiol* 1990;56:1423--8.
3. Shields JM, Arrowood MJ, Hill VR, Beach MJ. Inactivation of *Cryptosporidium parvum* under chlorinated recreational water conditions. *J Water Health* 2008. In Press.

* The CT number refers to the concentration (C) of free chlorine in milligrams per liter (parts per million) multiplied by time (T) in minutes at a specific pH and temperature.

† At pH 7.2--7.5, 77°F (25°C).

WATER SAMPLES- COLLECTION OF POOL FILTER BACKWASH AND POOL WATER

Water samples can be tested for pathogens such as *Cryptosporidium*. These samples can then potentially be linked to clinical isolates from individuals who visited a recreational water venue associated with cluster of cases. Collecting a sample of the backwash from a pool filter is ideal because it increases the chances of detecting the parasite if it was present during the previous filter run.

Water samples for testing need to be submitted to CDC through the New Mexico Scientific Laboratory Divisions Environmental Microbiology section. This activity must be coordinated with the New Mexico Environment Department's Pool Program Manger and the New Mexico Department of Health in the event of a suspected or confirmed outbreak ONLY.

Collect backwash samples before the pool is hyperchlorinated. To collect a backwash sample and submit it to CDC for testing, please follow the steps below:

1. Work with the pool operator to locate the port or site where backwash can be hand collected.
2. Have the pool operator begin the filter backwash cycle.
3. After the effluent becomes murky and turbid, collect 1L of filter backwash in a clean container.
4. Add 50 mg of sodium thiosulfate/L of backwash water to deactivate any chlorine in the water.
5. If sodium thiosulfate is unavailable, send the backwash to CDC as soon as possible instead of waiting to obtain and add sodium thiosulfate.
6. Refrigerate the sample until it is shipped.
7. Ship the sample with cold packs. DO NOT FREEZE the samples.

Collect pool water samples before the pool is hyperchlorinated. To collect a pool water sample and submit it to CDC for testing, please follow the steps below:

1. If possible, collect at least 20L of pool water in a clean container. Collapsible containers (i.e., "cubitainers") are useful for this.
2. Add 50 mg of sodium thiosulfate/L to deactivate any chlorine in the water.
3. If sodium thiosulfate is unavailable, send the water to CDC as soon as possible instead of waiting to obtain and add sodium thiosulfate.
4. Refrigerate the sample until it is shipped.
5. Ship the sample with cold packs. DO NOT FREEZE the samples.

WATER CONTAMINATION RESPONSE LOG

Person Conducting Contamination Response						
Supervisor on Duty						
Date (mm/dd/yyyy) of Incident Response						
Time of Incident Response						
Water Feature or Area Contaminated						
Number of People in Water						
Type/Form of Contamination in Water: Fecal Accident (Formed Stool or Diarrhea), Vomit, Blood						
Time that Water Feature was Closed						
Stabilizer Used in Water Feature (Yes/No)						
	Water Quality Measurements					
	Level at Closur e	1	2	3	4	Level Prior to Reopening
Free Residual Chlorine (1-4 are measurements spread evenly thru the closure time)						
pH (1-4 are measurements spread evenly thru the closure time)						
Date (mm/dd/yyyy) that Water Feature was Reopened						
Time that Water Feature was Reopened						
Total Contact Time (Time from when disinfectant reached desired level to when disinfectant levels were reduced prior to opening)						
Remediation Procedure(s) Used and Comments/Notes						