

Minimising the risk of cryptosporidiosis in public swimming pools and spa pools

This fact sheet provides pool operators with information on minimising the risk of cryptosporidiosis, a diarrhoeal disease caused by the protozoan parasite *Cryptosporidium*. It occurs in humans and in a range of domestic and wild animals.

What are the symptoms?

The main symptom of cryptosporidiosis is watery diarrhoea and stomach cramps. Fever, vomiting and loss of appetite occur less commonly.

The incubation period (the time between infection and symptoms occurring) is usually about seven days (likely range 1-12 days). Most healthy people will recover within 3-7 days, although symptoms can persist for up to 30 days.

Infection may be life-threatening in severely immunocompromised individuals. Although the infection itself cannot be effectively treated, the symptoms can be managed.



How is it spread?

Cryptosporidium is highly infectious and transmitted by the faecal oral route. It can be transmitted person to person, animal to person and directly by ingesting contaminated water or food. It must be swallowed to cause infection. The risk of infection is greatest for person to person contact, particularly in the same household.

People with cryptosporidiosis can pass it on to others as soon as symptoms develop and for up to two weeks after symptoms have ceased. Pools are of significant concern because they represent a potential source of outbreaks affecting many people. *Cryptosporidium* can only grow inside humans and animals, but it can survive in the environment, including in pools, for a long period of time.

How can people get infected by swimming in a pool?

Individuals who are infected with *Cryptosporidium* may contaminate pools by carrying the parasite on their body into the water or by contaminating the water because of accidental excretion.

Cryptosporidium can be shed by infected individuals for up to 14 days after symptoms cease. Swimmers can become infected by swallowing a very small amount of pool water that contains *Cryptosporidium*.

Unlike most other microorganisms, *Cryptosporidium* is not easily destroyed by chlorine at the normal operating concentrations found in pools. Higher concentrations of chlorine will kill it but will temporarily render the water unsuitable for swimmers.



How can the spread of *Cryptosporidium* be prevented in pools?

The best way to stop *Cryptosporidium* from spreading is to prevent its introduction into pools by promoting and ensuring good bather hygiene.

For more information, swimmers, parents/carers and pool operators and staff should refer to appendix A.

Pool operation and maintenance procedures

Public pool owners, operators and managers must ensure filtration, disinfection and water quality parameters are maintained as per the prescribed requirements of the South Australian Public Health (General) Regulations 2013 (the General Regulations).

Faecal incident response

A faecal release incident in a public swimming pool or spa pool can pose a risk to the health of bathers. If a faecal incident occurs, please refer to the public health fact sheet '[Faecal and vomit release incidents – public pool response strategies](#)'.

Cryptosporidium incident response

A *Cryptosporidium* incident response may be required by the relevant public health authority (usually the local council) if:

- > *Cryptosporidium* is detected in a public pool.
- > an individual with cryptosporidiosis utilises a public pool during the infectious period.
- > a public pool is implicated in a case or cases of cryptosporidiosis.

Under these circumstances SA Health will notify the relevant public health authority and will provide advice on the necessary course of action. This may result in the pool being immediately closed and decontaminated or drained, cleaned, and disinfected.

There are varying levels of response to *Cryptosporidium* incidents associated with public swimming pools and these are determined based on several factors.

These factors include:

- > the number of cases involved.
- > whether persons with cryptosporidiosis have used the pool while infectious.

The procedures and responses are broadly defined in the following three tiers of response.

1. The pool equipment, water quality, and maintenance records may be inspected by the relevant public health authority to assess compliance with the requirements of the General Regulations and associated standard (normal response if a single case used a pool during their incubation period).
2. The pool may be required to be closed to the public to undergo a precautionary decontamination procedure as outlined in Appendix B of this document.
3. An additional level of response may be required in some circumstances. This may require the pool to be closed to the public, drained, cleaned, and disinfected. The appropriate level of response may vary based on individual circumstances. Specific procedures will be advised by an environmental health officer at the relevant public health authority.

The course of action will vary in response to individual circumstances. Follow up microbiological water testing may be required to verify the absence of *Cryptosporidium*.

Routine water testing

Testing swimming pool water for *Cryptosporidium* involves large sample volumes, is expensive and does not determine whether any *Cryptosporidium* that found is alive or able to cause infections.

It does not provide the necessary information for making operating decisions and consequently, routine pool water sampling is not recommended.

Testing is generally only performed in association with large outbreaks of illness for the purposes of confirming the presence of *Cryptosporidium* or the effectiveness of remedial measures.

APPENDIX A – Steps to prevent *Cryptosporidium* contamination in public swimming pools and spa pools

Pool operators should:

- > ensure public pools are operated as per the mandatory requirements of the General Regulations.
- > not use untreated water to fill or top up pools.
- > provide signage at conspicuous locations such as at the pool entrance and in toilet and change room facilities (corflute posters are available from your local council or SA Health).
- > provide safe, clean, and easily accessible nappy changing facilities and prohibit nappy changing poolside.
- > inspect the facility frequently.
- > promote the hygienic principles outlined below to swimmers, staff, clubs, schools, and groups using the pool.

All bathers should:

- > not use the pool if suffering from diarrhoea and for fourteen days after symptoms have ceased.
- > use the toilet regularly.
- > shower themselves and their children with soap and rinse well with water before entering the pool and after defecating.
- > avoid drinking or deliberately putting pool water in the mouth.
- > wash hands thoroughly with soap and running water.
- > not use pool water to wash hands.
- > not enter the pool if bathers are visibly soiled.

Parents / carers of infants and toddlers should:

- > change babies' nappies in a bathroom (not poolside) and wash hands thoroughly afterwards.
- > minimise accidents by assisting young children to make frequent visits to the toilet.
- > ensure infants who are not toilet trained wear waterproof tight-fitting pants over swimmers or nappies to better contain faecal matter.

Persons with incontinence should:

- > visit the toilet prior to entering the pool and periodically whilst using the pool.
- > wear incontinence pads and water-proof undergarments with bathers.

Pool staff and management should:

- > report illnesses to management and not swim for fourteen days after symptoms have ceased if they have diarrhoea.
- > develop and implement a faecal and vomit incident response policy, and train employees to implement the response when a release incident occurs (see: ['Faecal and vomit release Incidents – public pool response strategies'](#)).
- > monitor the area for faecal incidents and other behaviours that may put others at risk (e.g., changing nappies at poolside).

APPENDIX B – Precautionary decontamination

When it is suspected that a swimming pool or spa pool may be contaminated with *Cryptosporidium* the following procedures can be used to ensure the appropriate CT value (free chlorine concentration (mg/L* x time (minutes))) is achieved. This will inactivate 99.9% of *Cryptosporidium* in the water. Different combinations of concentration and time that will achieve a CT value of 15,300 or 31,500 (as necessary) are detailed in the tables below.

*mg/L = ppm

Note: Chlorine stabiliser (cyanuric acid) significantly slows the rate at which free chlorine inactivates or kills microorganisms such as *Cryptosporidium*. It is therefore important to achieve a greater CT in swimming pools that contain cyanuric acid.

As there is no inactivation data for the use of bromine on *Cryptosporidium*, pools using bromine as the primary disinfectant must use chlorine in response to a *Cryptosporidium* incident.

Pools that do not use chlorine stabiliser (cyanuric acid)

A chlorine CT value of 15,300 or higher is required to destroy *Cryptosporidium*.

| Free chlorine concentration (mg/L) | Time (minutes) | CT (15,300) |
|------------------------------------|----------------|-------------|
| 40 | 382.5 | 15,300 |
| 30 | 510 | 15,300 |
| 25 | 612 | 15,300 |
| 20 | 765 | 15,300 |
| 15 | 1020 | 15,300 |
| 10 | 1530 | 15,300 |

Pools that use chlorine stabiliser (cyanuric acid)

A chlorine CT value of 31,500 or higher is required to destroy *Cryptosporidium*.

| Free chlorine concentration (mg/L) | Time (minutes) | CT (15,300) |
|------------------------------------|----------------|-------------|
| 40 | 787.5 | 31,500 |
| 30 | 1050 | 31,500 |
| 25 | 1260 | 31,500 |
| 20 | 1575 | 31,500 |
| 15 | 2100 | 31,500 |
| 10 | 3150 | 31,500 |

Precautionary decontamination procedure:

1. Close the pool to swimmers. If any other pools share the same circulation and/or filtration system, patrons must also exit those pools.
2. Determine a target free chlorine concentration and time combination to achieve the CT (concentration x time) necessary to kill *Cryptosporidium* (see above).
3. Raise the free chlorine to the determined target concentration.
4. Maintain the pH at 7.5 or less.
5. Continue to operate pumps, filtration and any secondary disinfection systems throughout the process to ensure disinfection of the entire system.
6. Manually check the concentration of free chlorine and pH. Record levels at the beginning, during (at least hourly, but ideally every 30 minutes), and end of the process to ensure the minimum CT value is achieved, and to ensure the accuracy of automatic dosing equipment (see Appendix C).
7. Backwash the filter after reaching the CT inactivation value. Ensure the effluent is discharged directly to sewer. Do not return the backwash through the filter. Where appropriate, replace the filter media.
8. Before the pool is reopened for use, test the water to ensure that the total concentration of chlorine in the pool is below 10mg/L (ideally below 5mg/L). Sodium thiosulphate may be added to neutralise excess chlorine.
9. Make sure to sufficiently clean, disinfect, or dispose of any materials, tools, equipment, or surfaces that have had contact with contaminated water, or that have been directly contaminated.
10. Record the incident, action taken and test results in the template provided (Appendix C) and provide a copy of the completed template to the relevant authority.
11. Allow patrons to return to the pool.

OFFICIAL

For more information

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