Fecal Contamination of Pool Water -- Preventing Disease Transmission

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Fecal contamination of pool water can cause serious illnesses. Ingestion of contaminated water while swimming, inhalation of water vapor above the pool surface, and body contact with pathogenic organisms and absorption through the skin while swimming can result in transmission of a variety of diseases. Some pathogens may cause mild gastrointestinal discomfort, while others, if not recognized or if left untreated, can become life threatening.

In addition to human fecal matter intentionally or accidentally being deposited in the pool by swimmers, fecal contamination of pool water can result from a wide variety of sources including animal, rodent, and bird droppings. Contaminated ground water, reservoirs, or wells, particularly in agricultural areas, where fertilizer or animal wastes have tainted the water used to fill or add water to the pool can be the source of contamination., as can rain and storm water run-off into the pool after flooding. Fecal matter can be tracked into the pool area on shoes that are not removed prior to walking on a pool deck. Fertilizers or grass can be blown into the pool from the adjoining landscaping. Although a serious design error, cross connections between the pool circulation and sewage systems do exist.

To lessen the likelihood of fecal contamination, pool operators should remind swimmers to use the toilet before entering the pool, and not to use the pool if they are suffering from an illness that causes diarrhea. Although
somewhat unenforceable in large public pool and waterpark settings, encourage swimmers to take a hot, soapy shower in the nude, prior to entering the pool. Swimsuit diapers, which have been shown in studies to be more effective than cloth or disposable diapers or tight fitting rubber pants, should be worn by infants and young children who are not yet toilet trained, and by adults who have difficulty with bowel control. Spectators and pool employees should be reminded to remove their street shoes when walking on the pool deck.

In addition, do not allow pets to swim in the pool, and try to prevent wild animals, birds and ducks from using the pool as a watering hole. Good pool and deck design will prevent gray water, waste water or sewage from draining or backing up into the pool. Maintain adequate sanitation and oxidation levels above 750 mV, filter pool water continuously 24-hours per day, make sure the water is balanced, and keep the water chemistry within acceptable parameters. If total coliform, standard plate count or other bacteriological water analysis test results come back from the laboratory positive, find the source of contamination as quickly as possible before disease is transmitted through the pool water to large numbers of patrons.

Plan for the inevitable. Know what to do before a fecal accident occurs in your pool. As a result of several articles that have appeared in environmental health journals and aquatic publications, recent Cryptosporidium outbreaks at a few swimming pools and waterparks, and concern about the growing percentage of the population with compromised immune systems to whom a
serious infection could be life threatening; many state and county health
departments have revised their fecal contamination procedures. Although
procedural guidelines vary from enforcement agency to agency, most of the
new regulations include periods of pool closure up to 24 hours, constant
filtration, and maintenance of elevated sanitizer and ORP levels.

Unfortunately, fecal accidents occur frequently at some public swimming
pools, and compliance with the new guidelines has been disruptive and costly.
But, given the potential treat to the public health, enforcing agencies are erring
on the side of caution until more reliable data are available.
Sample Guideline for Fecal Contamination of Pool Water

If a fecal accident occurs:

- Have all swimmers exit the pool immediately, and close the pool for 24 hours or a minimum of 3 to 4 complete turnovers.
- Remove the fecal matter from the pool, and dispose of the fecal matter to a sanitary sewer.
- Disinfect the pool vacuum or skimmer net used to remove the fecal matter with a solution of 20 parts of water to 1 part 12% -15% sodium hypochlorite.
- Gather representative samples of pool water for bacteriological analysis. If using the membrane filtration technique for testing total Coliforms, fewer than 1 colony per 100 milliliters should develop over the 24 hour period. Currently, there are no rapid result tests for Cryptosporidium protozoa.
- Raise the free chlorine level (or equivalent sanitizer-oxidizer) in the pool to at least 20 ppm, and maintain the 20 ppm level for at least 9 hours in order to achieve a 10,000 CT value, and ORP levels in the range of 900 mV.
- You may choose to completely drain the water from small volume wading pools and spas with rapid (30 minute to 2 hour) turnover periods, after the fourth turnover. All interior pool surfaces must be disinfected with a 20 parts of water to 1 part 12% -15% sodium hypochlorite solution.
- After 3 to 4 turnovers, backwash sand filters, or dis assemble and clean diatomaceous earth or cartridge filters according to manufacturers recommended procedures. Disinfect the filter media or elements with a
solution of 20 parts of water to 1 part of 10-15% sodium hypochlorite prior to reopening the pool

• Do not allow swimmers back into the pool until tests show the water is free from contamination.
Bibliography


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