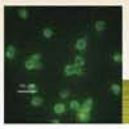

GUEST COLUMN

POOLS / AQUATICS

Fighting the Germs

Technology to fight recreational water illness

TERRY ARKO

Recreational water illness (RWI) has been a hot topic this past year. It's got many directors and managers of commercial aquatic facilities asking themselves, How can I destroy bugs and keep them out of my pool?

In the fight against these stealthy germs, industry professionals use several approaches based on research, health department regulations and current Centers for Disease Control and Prevention (CDC) recommendations. One of the most effective tools to prevent the spread of swimmer sickness is still good old-fashioned chlorine sanitizer.

In fact, chlorine has a long history of effectively destroying water invaders. In London during the 1800s, there were more than 25,000 deaths in less than a decade due to cholera from raw sewage in the River Thames. In 1855, London became the first city to treat sewage with the disinfectant chlorine. As a result, the cases of cholera were reduced to nearly zero. The use of chlorine for drinking water in the United States reduced the cases of cholera from 25,000 in 1900 to only 20 in 1960.

Because of its proven ability to disinfect, chlorine started to become popular for swimming pool use in the 1920s. In 2000, *Life* magazine called the use of chlorine as a disinfectant in water "one of the most important inventions of the last thousand years."

When chlorine sanitizer is used against contaminants in pool water, there are varying contact time (CT) values, depending on the type of pathogenic (disease-causing) microorganism.

For example, giardia has a CT value of 45 minutes at 1 ppm of chlorine. That means that a giardia protozoa is inactivated in 45 minutes of contact with pool water carrying a 1-ppm residual of chlorine.

The problem child of pathogenic microorganisms is cryptosporidium (crypto), which has a CT value of 9,600 minutes, or 6.7 days. That means it remains active for a week or longer in normally chlorinated pools.

Recent studies conducted by the Environmental Protection Agency (EPA) have shown that the average adult swimmer swallows up to an ounce of water when swimming. Children usually swallow twice as much as adults. With the possibility of billions of chlorine-resistant crypto cysts present in pool water, it is easy to see how swimmers can become infected. This is especially true in pools with a high bather load.

Because crypto is extremely chlorine-resistant and has a size of 4 to 6 micron, it is very difficult to deal with. The majority of public facilities still use sand filters that only filter down to 25 micron. Many residential pools use diatomaceous earth (D.E.) filters that can pick up under 4 micron. This may appear to be a solution, and you might think that crypto would not be a problem in pools using a D.E. system. However, studies have shown that the crypto cysts actually have the ability to elongate and press through filtration media in a viable state.

Existing preventive measures for crypto hardly seem effective. Current approaches include ensuring that swimmers shower before getting in the pool and keeping sick swimmers out of the water.

Hyperchlorination methods are recommended by health departments to deal with the suspicion of possible crypto in pools. The hyperchlorination method is typically 20 to 30 ppm for eight to 12 hours. This method may vary depending on local health regulations. However, the CDC reported in 2004 that there was not conclusive evidence to prove complete eradication of crypto using this recommended method.

New approaches

Ozone is becoming popular as a possible backup means for eradicating crypto. Ozone kills bacteria and crypto cysts 3,125 times faster than chlorine.

Ultraviolet (UV) light is another system quickly gaining popularity. After an outbreak at a splash park in New York last summer, the state of New York mandated the use of UV on all public splash-park facilities. However, high turbidity of the water can be a problem that could cause UV systems to become ineffective against crypto. For this reason, health departments also regulate turbidity levels in public pools.

The biggest problem with many public facilities is that they rely only on chlorine and use sand filtration. Thus, to effectively deal with crypto, expensive upgrades such as ozonators and UV units need to be installed. Many private and publicly funded aquatic facilities simply don't have the budget to make such vast improvements.

Regular dilution of water is another means of reducing illness risk. This is already practiced on public pools in Europe, where there are requirements that an entire pool be diluted with fresh water over a month's time. Some other standards suggest adding 30 liters a day of fresh water for every swimmer in the pool.

Enhanced filtration

Another viable method that any aquatic facility or pool can begin using immediately is enhanced filtration. The CDC and many aquatic experts have long recommended filter enhancement with the use of specialty clarifiers. The technology uses two opposing biopolymers that quickly and effectively entrap microorganisms such as algae, E. coli and crypto.

This method has been soundly proven through an independent university study conducted at Auburn University and presented at The World Aquatic Health Conference in 2005. The study showed very stable flocs of crypto were able to form and be held in simulated sand filters. According to another presentation in 2006, there was a 99.99 percent removal of crypto from pool water using sand filtration treated with the two-stage polymer.

Apply the layered approach

RWIs, especially crypto, continue to be a major challenge for pool professionals. Multiple technology layers will most likely be the key to providing safe and disease-free swimming pools. These layers include a residual of chlorine sanitizer, ozone or UV, regular dilution of pool water and enhanced filtration of microorganisms using a polymer system that is approved for this purpose. **RM**

PHOTOS COURTESY OF SPORTS CLUB LA ORANGE COUNTY

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