



An Emerging Threat

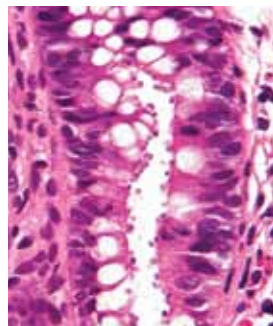
UV treatment systems offer solution for increasing incidence of parasitic infection

The majority of recreational water illnesses are associated with treated water venues, like pools.

By Diane L. Arnott

Outbreaks of illness associated with recreational water in the U.S. continue to rise, according to a June 2015 Morbidity and Mortality Weekly Report from the Centers for Disease Control and Prevention (CDC). The report covers illness outbreaks across the U.S., identifying source (treated versus untreated water) and etiology, or cause. The numbers presented are likely just the tip of the iceberg, however, as they are generally regarded as an underestimate of actual illness. The latest data set, covering 2011 to 2012, included 90 outbreaks resulting in at least 1,788 cases of illness, 95 hospitalizations and one death. The majority (77%) of these cases were associated with treated water, meaning venues like swimming pools and spas.

Illness from treated water can result from exposure to pathogens, treatment chemicals or associated chemicals volatilized into the surrounding air. From 2011 to 2012, 52% of illness outbreaks were caused by *Cryptosporidium*. Considering cases occurring in prime pool season (June, July and August), this protozoan is the cause of more than



Cryptosporidium is a leading cause of recreational water illness.

90% of outbreaks. The report concluded that since 1988, when the first cryptosporidiosis outbreak associated with treated recreational water was recorded, the number of outbreaks has increased significantly. Halogens, and chlorine in particular, have been the mainstay of recreational water treatment for decades, even though it is widely known that *Cryptosporidium* is an extremely chlorine-tolerant organism that can survive in water at CDC-recommended chlorine and pH levels for more than 10 days.

Furthermore, another 10% of outbreaks are suspected or confirmed to be associated with pool chemicals. In addition to being the source of some pathogens (due to fecal accidents or diarrhea), swimmers also introduce organics to the water, such as urine and sweat. These secretions largely consist of water, ammonia and urea, so when they react with chlorine, chloramines form, reducing indoor pool air quality and causing eye, nose and throat irritation.

A New Era of Treatment

In late 2014, CDC introduced the Model Aquatic Health

Code (MAHC), comprehensive science-based best practices intended to help government agencies develop enforceable codes to reduce the risk of illness and injury at public, treated recreational water venues. It is the outcome of a seven-year effort to address the public health threat of *Cryptosporidium* in treated recreational water. It incorporates the latest scientifically validated treatment technologies, which include ultraviolet (UV) light or ozone for secondary disinfection. Although the MAHC only addresses public aquatic facilities, its principles also can apply to private or backyard facilities.

UV Light for Recreational Water

UV disinfection is a chemical-free method for neutralizing pathogens that has been successfully deployed in swimming pools for years. UV disinfection is a complementary, effective method of inactivating a range of waterborne pathogens, including *Cryptosporidium*. UV systems also can significantly reduce microbial

counts by destroying at least 99.99% of bacteria in the influent stream, when installed post-filtration. UV can simultaneously reduce chloramines and other chloro-organics as the water passes through the treatment chamber.

The use of UV disinfection for pools is particularly suitable for swimmers who are sensitive to the usual swimming pool disinfectants, such as chlorine. UV is not designed to replace chlorine, but through elimination of the need for periodic "shocking," well-maintained pools can see significant reductions in chlorine usage.

Benefits of UV disinfection include:

- Reduction in chemical dosing and costs;
- Protection against contamination of swimming pool filter media;
- Instantaneous water disinfection;
- Low power consumption; and
- Cost-effective swimming pool treatment.

A properly sized UV system is designed to meet a minimum of 3-log reduction of

pathogenic microorganisms. The system size is determined by pool type (commercial or residential), pool size and number of swimmers. The flow rate is calculated from pool volume and turnover time.

A typical UV installation would be post-filter and ahead of any chemical injection equipment.

A properly applied UV system can help control chloramines, increase swimmer comfort and health, eliminate the need for dilution and super-chlorination, reduce corrosion, and protect against *Cryptosporidium* and *Giardia*.

Finally, there is a trend in pool design to a more holistic approach, taking into consideration healthier life choices and emphasis on family time. The addition of UV treatment to pool water is an environmentally friendly approach that can enhance the pool experience. In short, it achieves safer and clearer water than chlorine alone. **WQP**

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