Legal Briefs

Bruce T. Clark, J.D.

Cryptosporidiosis: A Recreational Water Threat That Hasn't Gone Away

Editor's note: The Journal *recognizes the importance of providing readers with practical and relevant legal information through Legal Briefs columns. In every other issue of the* Journal, *this information is presented by one or more of several insightful and dedicated columnists: Bill Marler, Denis Stearns, Drew Falkenstein, Patti Waller, and David W. Babcock, all of the law firm Marler Clark.*

The attorneys at Seattle-based Marler Clark, LLP, PS (www.marlerclark.com) have developed a nationally known practice in the field of food safety. Marler Clark represents people who have been seriously injured, or the families of those who have died, after becoming ill with foodborne illness during outbreaks traced to restaurants, grocery chains, and other food suppliers. The attorneys have litigated thousands of food contamination cases throughout the United States, many of them high-profile, including the Jack in the Box and Odwalla E. coli *outbreaks; the Malt-O-Meal, Sun Orchard, and Chili's* Salmonella *outbreaks; the Senor Felix* Shigella *outbreak; and the Subway and Chi-Chi's hepatitis A outbreaks.*

Bruce T. Clark, the author of this month's Legal Briefs, has an extensive background in civil litigation, including personal injury, product liability, and professional malpractice actions. After nearly 15 years of defense work, Mr. Clark joined his present law partners in forming Marler Clark, a practice devoted to representing injured persons, and has represented thousands of plaintiffs in litigation involving a wide variety of foodborne and other pathogens such as E. coli, Salmonella, *hepatitis A,* Shigella, *and* Cryptosporidium *in most of the states in the country.*

Cryptosporidiosis, or "crypto," took a long time to appear on the public health radar. Although it was first described in 1907, another 70 years passed before the first human case of cryptosporidiosis was reported. Since 1976, however, two signal events have propelled crypto into the spotlight. First, the 1980s saw a significant increase in crypto infections occurring in AIDS patients, resulting in significant morbidity and mortality. Then, in 1993, the citizens of Milwaukee, Wisconsin, suffered what would become the single largest waterborne outbreak on record when the city's water supply became contaminated with *Cryptosporidium parvum* (*C. parvum*), the parasite that causes cryptosporidiosis. More than 400,000 people were infected, and dozens of imumunocompromised individuals likely died when Milwaukee's municipal water system became contaminated.

While the Milwaukee crypto outbreak prompted a renewed effort to protect public water supplies from the microscopic parasite, periodic waterborne outbreaks due to *C. parvum* contamination continue to occur. Many are linked to swimming pools and other recreational water settings. A combination of lack of awareness and failure to employ currently available water-sanitizing technologies make future crypto outbreaks inevitable.

Why Is Crypto So Tough to Eradicate?

Cryptosporidium parvum is a protozoan parasite found in humans, other mammals, birds, fish, and reptiles. It has a complex life cycle; its infectious stage is the spherical oocyst. The incubation period ranges from 1 to 14 days, but a week is typical. The clinical symptoms of cryptosporidiosis typically include non-bloody diarrhea, abdominal cramps, and loss of appetite. A low-grade fever, nausea, and vomiting are also common. The infectious dose is low, fewer than 50 organisms, while an infected person can shed millions of oocysts a day in their stool. Infected people shed oocysts for an average of seven days after symptoms resolve. In healthy people, symptoms usually last one to two weeks with symptoms waxing and waning during that period.

One of the defining qualities of *C. parvum,* and a major reason it is so hard to control, is its size: 4 to 6 microns. For perspective, there are about 25,000 microns in an inch. The other critical quality is its resistance to chlorine. While chlorine can kill oocysts, it takes higher levels and more time than is possible for pool sanitizing systems. The result is a durable, microscopic parasite that necessitates a high level of filtration—ultrafiltration can remove particles to 1 micron—and a water-sanitizing system such as ozonation or UV light.

The risk of a crypto outbreak is magnified in recreational-water settings where the water is recirculated. In the absence of control, the proliferation of the infectious oocysts in recycled water is increased.

The Bane of Recreational Water Facilities

Between 1991 and 2000, *C. parvum* was identified as the causal agent in 38 percent of (40 of 106) reported recreational water outbreaks and 9 percent of (11 of 130) reported drinking water–associated outbreaks.[1] It is no surprise that crypto outbreaks peak in late summer and disproportionately affect young children. While any swimming in shallow fresh water increases risk for *C. parvum* exposure,[2] a spray park or other similar public recreational water facility provides an ideal setting for a crypto outbreak.

Such facilities host lots of young children and diapered infants, providing opportunities for fecal accidents. The presence of spray increases the opportunity for water ingestion and helps disseminate *C. parvum* oocysts. High-volume usage can allow previously infected people to continue the infectious cycle. Given the poor public recognition of crypto symptoms, the likelihood that an infected person will be promptly diagnosed and will avoid behavior that could lead to transmission of the parasite is low.

The Drinking-Water/ Recreational-Water Divide

The Safe Drinking Water Act (SDWA) of 1974, amended in 1986 and 1996, contains the regulations for public drinking-water systems.[3] *Cryptosporidium* was not originally listed as a contaminant under the Safe Drinking Water Act; however, in 1994 the U.S. Environmental Protection Agency (U.S. EPA) proposed the Interim Enhanced Surface Water Treatment Rule (IESWTR), which established a goal of zeroing out *Cryptosporidium* concentration in drinking water. The SDWA Amendments of 1996 required the U.S. EPA to promulgate the IESWTR by November 1998. In December 1998, U.S. EPA issued the final IESWTR.[4] The rule included the initial goal of zeroing out *Cryptosporidium* concentration levels in surface water and also required that 99 percent of *Cryptosporidium* be removed by systems already required to filter by federal law.

While substantial regulatory efforts have been directed at drinking water, there has not been a corresponding effort to regulate public recreational-water facilities.

Anatomy of an Outbreak

Seneca Lake State Park, located in upstate New York, opened a new spray park facility in 2002. This "state-of-the-art" facility had more than 100 water jets and was a popular regional draw in the heat of the summer. In 2005 the spray park became the source of a large outbreak of cryptosporidiosis, and as is often the case in waterborne outbreaks, health officials were slow to recognize that a problem was under way, possibly because of the relatively nonspecific nature of cryptosporidiosis symptoms. Although the spray park was closed on August 17, 2005, by September the New York Department of Health had reported nearly 4,000 cases in 35 New York counties, with over 600 confirmed cases with symptom onset dating back to June.

An apparent irony of this outbreak is that while the Seneca Lake facility was of recent vintage, there appears to have been little to no consideration of *C. parvum* control in its design. Investigators found *C. parvum* oocysts present in two underground water tanks that recycle water within the spray park. In addition to using recycled water, the facility lacked the high-level filtration and water-sanitizing systems necessary to limit proliferation of *Cryptosporidium*. Many victims of the outbreak visited the park several times during the outbreak period and suffered re-infection with crypto while remaining oblivious to the nature of their gastrointestinal problem. State health investigators believe the original vector for crypto in this setting was an infected patron.

Keeping Recreational Water Safe

The Seneca Lake State Park outbreak highlighted the lack of state regulations concerning water quality in spray parks. Since the outbreak, the Seneca Lake Spray Park has undergone a major overhaul of water filtration and sanitizing systems, and has reopened. The outbreak triggered adoption of comprehensive new regulations that address the design, operation, sanitation, and water quality of spray and splash parks.

The best defense against a waterborne outbreak in recreational-water facilities is a combination of information—for patrons and for management—about the risks of fecal contamination and the use of available technologies to guard against bacterial, viral, and parasitic contamination. Prevention requires both recognition of the problem and the assumption that it will occur. Today, it is possible to prevent an outbreak like the Seneca Lake Spray Park crypto outbreak and to preserve the joy of summer water fun.

Disclaimer: Legal Briefs is published for informational purposes only; none of the information is intended to be, nor is, formal legal advice. NEHA and the *Journal of Environmental Health* are not liable or responsible for actions taken on the basis of the information contained in these columns.

References

1. Hlavsa et al., "Cryptosporidiosis Surveillance—United States 1999–2002," *54(SS01) MMWR* 1-8 (2005).
2. Centers for Disease Control and Prevention, Division of Parasitic Diseases. (2004, 2005). Fact Sheet: *Cryptosporidium* Infection, Cryptosporidiosis. Retrieved April 6, 2007, from http://www.cdc.gov/ncidod/dpd/parasites/cryptosporidiosis/factsht_cryptosporidiosis.htm.
3. *See* http://www.epa.gov/safewater/sdwa/ for a history of the SWDA and its amendments.
4. *See* http://www.epa.gov/safewater/mdbp/ieswtr.html.