

## How to Help Prevent Getting Sick at Pools, Spas, Hot Tubs and Waterparks

*By Bob G. Vincent*

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Swimming is a popular form of exercise across all age groups, according to U.S. [Bureau of Labor Statistics](#). Year-round pool swimming is generally accessible and affordable at a variety of public and private facilities. Similarly, hot tubs and spas are enjoyable, therapeutic features, and waterparks are a fun destination for families with young children. But what is your risk of contracting a waterborne illness in these treated recreational water facilities? How can you help prevent getting sick? Let's dive into the data.

### *Tracking Treated Recreational Water Outbreaks*

The [U.S. Centers for Disease Control and Prevention](#) (CDC) tracks outbreaks that occur in treated recreational water venues such as pools, spas, hot tubs and waterparks. Outbreaks in these environments can be caused either by pathogens (microbes that can cause disease) or, on a rare occasion, a chemical.

In the 15 years between 2000 and 2014, a total of 493 waterborne disease outbreaks associated with treated recreational waters were reported, resulting in over 27,219 cases of illness and eight deaths. The causes of 385 (78%) of the outbreaks were determined. Among those, 94% (363) of the outbreaks were caused by pathogens, resulting in at least 24,453 cases of illness, and 6% (22) of outbreaks were caused by chemicals (such as inadvertently produced chlorine gas and irritant disinfection by-products, such as chloramines), resulting in at least 1,028 cases of illness.



### *What Constitutes an Outbreak?*

*An outbreak associated with treated recreational water means a report of similar illnesses in two or more persons linked by location and time of exposure to pathogens or chemicals in the surrounding air of the treated water environment.*

## Outbreaks Caused by Pathogens

Among the outbreaks caused by pathogens, most in the period 2000-2014 (58%) were caused by *Cryptosporidium*, a chlorine-resistant parasite that causes diarrhea. *Legionella*, the bacterium that can cause [Legionnaires Disease](#) when it is *inhaled* in water droplets in contaminated water venues, caused 16% of the outbreaks. And 13% of the outbreaks were caused by *Pseudomonas*, the bacterium that causes swimmer's ear and "hot tub rash" by skin contact with contaminated water. Interestingly, both *Legionella* and *Pseudomonas* are susceptible to chlorine disinfection.<sup>1</sup> These pathogens can, however, "hide" from chlorine by embedding themselves in [biofilms](#), slimy impenetrable coatings found on wet surfaces, such as pool tiles.

What these CDC data show is that the leading causes of treated recreational water outbreaks are either: (a) pathogens that are able to "evade chlorine," because, as in the case of *Cryptosporidium*, they are resistant to the chemical disinfectant,<sup>2</sup> or alternatively, because they "hide out" in biofilms; or (b) pathogens that are vulnerable to chlorine, but able to thrive in recreational water because of inadequate levels of disinfectant.

A case in point to illustrate the latter scenario is the spring 2018 death of an elderly man from Legionnaire's Disease shortly after he visited a California hotel pool and hot tub. A [media report](#) noted that two days before the man's death, inspectors found *no detectable chlorine* in either the pool or hot tub. CDC reports at least six of the eight deaths associated with treated recreational water outbreaks in the 2000-2014 period were associated with *Legionella*!

A new, free American Chemistry Council video, [Preventing Unintended Chemical Injection](#), provides tips to pool operators on how to prevent chlorine gas exposures, which can occur when the water circulation pump is inoperative but acid and disinfectant continue to be fed into the pipelines.

## Outbreaks Caused by Chemicals

Of the 22 outbreaks caused by chemicals in the period 2000 - 2014, causes listed by CDC are "excess chlorine, disinfection by-product, or altered pool chemistry." Clearly, it is important to get the pool chemistry right! Too little chlorine, for example, can cause outbreaks from chlorine-susceptible pathogens. Fortunately, there is a wide margin of safety between recommended free chlorine levels (1 – 3 parts per million) in the pool and higher levels (>10 ppm) that could cause harm.

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<sup>1</sup> Both *Legionella* and *Pseudomonas* bacteria are also susceptible to bromine disinfection, though bromine use is not as common as chlorine use in treated recreational waters.

<sup>2</sup> To help destroy *Cryptosporidium*, UV radiation or ozone are effective additional disinfection technologies employed.

## *Take-aways for the Public*

Understanding the causes of the most common recreational waterborne outbreaks can help you prevent them:

- 1. Don't Swim or Let Your Children Swim with Diarrhea.** The parasite *Cryptosporidium* is spread through recreational waters via the fecal to oral route. What goes around comes around with *Cryptosporidium*. It's hard to avoid ingesting at least a little water at the pool. If that water is contaminated with even low levels of *Cryptosporidium* from someone who has contributed diarrhea to the pool, illness cases may result and multiply.
- 2. Check Inspection Scores for Pools and Other Aquatic Venues.** Chlorine-susceptible pathogens, such as *Legionella* and *Pseudomonas* should not be present in a well-managed pool with an adequate chlorine level. See if pool inspection scores are posted on the venue's website before patronizing an aquatic facility.
- 3. Conduct Your Own Pool Inspection.** Visitors to aquatic venues can perform their own check on the pool by using chlorine and pH test strips to ensure appropriate water chemistry on the day of their outing. A mini-inspection can be carried out as well to ensure that: pool tiles feel clean and are not slimy; the drain on the pool floor is visible at the deepest part of the pool (water is not cloudy); and the pool does not smell strongly of chemical. Remember that water theme park pools often operate on different treatment systems, so test each pool or water ride of interest separately.
- 4. Know Your Vulnerabilities.** If you know you are at increased risk of Legionnaires Disease, avoid the hot tub. Are you immunocompromised? Public recreational venues may not be a healthy option for you.

Armed with the facts about treated recreational water facilities, you can make smart decisions about where and whether you swim on any given day.

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