

On the Lookout for

Legionella

PHOTO: JANICE HANEY CARR

By Marianne Metzger

Proper testing & maintenance help prevent deadly *Legionella* outbreaks

L*egionella* occurs naturally in the environment and is most commonly found in water. These bacteria thrive in warmer environments, so they are often found in hot tubs, hot water tanks, cooling towers, larger plumbing systems and decorative fountains.

Legionella presents the biggest health risk in water when it becomes aerosolized and is inhaled. This can happen with air conditioners, showers and hot tubs that are not properly sanitized. Choking on water containing these organisms also can aerosolize them and allow them to be inhaled into the lungs.

Inhaling these bacteria can result in Legionnaires' disease, which has symptoms similar to pneumonia. According to the U.S. Centers for Disease Control & Prevention (CDC), 8,000 to 18,000 people are hospitalized each year with the disease, but many cases go unreported or misdiagnosed. Legionnaires' is treated with antibiotics and typically requires hospitalization, depending on the severity of the case.

Most healthy individuals do not become sick after exposure. Those with a higher risk of becoming sick include the elderly, smokers (both current and former), those with compromised immune systems and those with lung diseases such as chronic obstructive pulmonary disease and emphysema. Symptoms of Legionnaires' include chills, high fever, cough, body aches and headaches—all similar to the flu—and can occur two to 14 days after exposure.

Legionella also is associated with a milder infection called Pontiac fever. This disease has a higher level of

infection, with 90% of those exposed developing symptoms—only 10% of those exposed to Legionnaires' develop symptoms. Pontiac fever is less severe, and symptoms last only three to five days.

Guidelines & Regulations

Legionella is regulated under the Safe Drinking Water Act as a treatment technique, which means water supplies must employ the treatment technique required if they are using a surface water source or they are under the influence of surface water. Most surface water contains some small level of *Legionella* bacteria. The U.S. Environmental Protection Agency (EPA) does not set a specific limit for *Legionella*, but it believes if water supplies control *Giardia* and *Cryptosporidium*, *Legionella* also will be controlled.

Legionella can cause problems in buildings with older plumbing. A particular problem in maintaining a building's water system can be the piping system. Some older buildings have what are referred to as dead legs, which allow water to sit and become stagnant, providing an opportunity for scale and biofilm to grow. This creates the ideal conditions for *Legionella*. Biofilm can act as a protective barrier for bacteria and microorganisms like *Legionella* and is resistant to common disinfectants like chlorine.

Legionella is a major concern in buildings like nursing homes and hospitals, because the population may be more susceptible to it. The combination of poor plumbing, low chlorine residual and a susceptible population can be a recipe for disaster. Recent studies suggest residential water systems may be an underappreciated

source for *Legionella*, however, so it is not just a problem that can plague hospitals and nursing facilities.

While there are no federal regulations, state health departments, professional organizations and trade groups have recommended guidelines for routine *Legionella* monitoring. States including New York, Texas and Maryland have specific recommendations, and, in some cases, required monitoring, to head off potential infections. Some counties even regulate monitoring, including Los Angeles County in California and Allegheny County in Pennsylvania, which have their own sets of recommendations and requirements. The Allegheny County Health Department, for example, recommends annual environmental testing. If 30% of the sample points are positive, then disinfection should be considered, in addition to active clinical testing. A recent review indicated that the additional monitoring in Allegheny County has led to a significant decrease in the number of cases of *Legionella* that originate in hospitals.

CDC specifically recommends routine *Legionella* testing in all U.S. hospitals that perform bone marrow or organ transplants. The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) also has published a comprehensive set of guidelines on the prevention of *Legionella* in building water supplies.

Testing Options

A variety of testing methods can be employed to detect *Legionella*. The two most widely used methods are the CDC culture method and polymerase chain reaction (PCR).

Legionella can be difficult to

isolate, so CDC established the Environmental *Legionella* Isolation Techniques Evaluation (ELITE) program to allow labs to test their *Legionella* isolation techniques against standardized samples. CDC issues a certificate of proficiency to labs that have successfully participated in the program, which is only for the culture in the particular media it will grow in. The ELITE program does not evaluate rapid tests like PCR. The culture method can take some time—typical incubation takes 10 to 14 days.

The PCR test looks for DNA that is specific to *Legionella*. While it is not as widely accepted as the culture method, it does offer quick results, usually within 24 hours. This is an excellent screening test when time is critical, such as when determining the source of an outbreak or ensuring that treatment has been effective.

Contamination Prevention

The ASHRAE guidelines make some specific recommendations for maintaining temperature within hot and cold potable water systems to prevent growth. When *Legionella* is suspected, it can be controlled with high temperatures by flushing the distribution pipe and fixtures with water at 160°F to 170°F. Flushing with water that hot presents the danger of scalding, so it may not be practical for every facility.

When flushing with hot water is not practical, ASHRAE recommends using chlorine to flush the lines. The guidelines go on to make additional recommendations about other water systems within a building that may present *Legionella* risks, including heated spas, swimming pools, fire sprinklers, eye wash stations and cooling towers. Other disinfectants that can be used and are being evaluated for decontamination of *Legionella* include silver copper ionization, chlorine dioxide, hydrogen peroxide, ozone and ultraviolet light.

Legionella will always be a concern in water supplies, because it can be deadly. As with all microbiological contaminants, we need to take a common sense approach. Test to determine the likeliness of its presence, and, if present, take corrective measures. While EPA does not regulate *Legionella* under the Safe Drinking Water Act, it is regulated as a treatment technique under the Surface Water Treatment Rule. This means that if water supplies employ the proper treatment technique

required to treat *Cryptosporidium* or *Giardia*, *Legionella* also will be removed. EPA also has established a Maximum Contaminant Level Goal for *Legionella* of zero organisms for drinking water, but this is an unenforceable level. These bacteria are something to look out for in

residential homes, where plumbing could present an issue with dead legs and loops where they can grow. It is good to point this out to homeowners and educate them about the potential for bacteria issues, especially if there are at-risk individuals living in the home. *wqp*

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