

## Managing *Legionella* Bacteria in Building Water Systems: Q&A with Dr. Joe Cotruvo

*By the Water Quality & Health Council  
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Last month, more than 450 researchers, regulators, healthcare providers, and others [met in Baltimore, Maryland](#), to discuss opportunities and challenges to manage public health risks associated with *Legionella* bacteria in building water systems. According to the Centers for Disease Control and Prevention (CDC), the leading cause of U.S. drinking water-related outbreaks, and the only one associated with deaths, remains inhalation of *Legionella* bacteria (legionellosis).<sup>1</sup>



The WQ&HC has written [extensively](#) about *Legionella* bacteria over the years. One of our members, Dr. Joan Rose, is chairing an ongoing [National Academies' study](#) of *Legionella* management in water systems. In this article, we are delighted to share the responses of Dr. Joe Cotruvo, Co-Chair of the [Legionella Conference 2018](#), to five questions we asked about that important event.

*Why are you passionate about addressing Legionella in building water systems?*

As an ex-EPAer, I still want to contribute to protecting public health, especially via drinking water. Waterborne legionellosis is an example of the “Law of Unintended Consequences” from urbanization, built environments, and plumbing. Water-linked legionellosis is the most significant waterborne disease in the U.S. and probably other

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<sup>1</sup> *Legionella pneumophila* bacteria are ubiquitous in the environment, and can cause a form of potentially deadly pneumonia (lung inflammation) called Legionnaires' disease 2 to 10 days following exposure, typically beginning with headache, fever, and muscle pain and leading to a cough, shortness of breath, chest pain, and other severe symptoms. *Legionella* also causes a milder form of a respiratory illness with flu-like symptoms called Pontiac fever; <https://www.cdc.gov/legionella/>. Neither illness is directly associated with the ingestion of drinking water, but are typically associated with the inhalation of aerosols via hot water plumbing (e.g., showering) in which favorable temperature, [biofilms](#), and corrosion can support their (re)growth and proliferation in building water systems.

developed countries—not cholera, cryptosporidiosis, or norovirus. Outbreaks from treatment- and fecal-related deficiencies have been declining since the implementation of the Safe Drinking Water Act in the late 1970s and near-universal use of filtration, disinfection, and compliance monitoring. But the frequency of distribution system-related outbreaks has been increasing. Legionellosis got its name from the infamous 1976 Legionnaires convention in Philadelphia, Pennsylvania. So, legionellosis is not new, just recently recognized, and more needs to be done to reduce water-related risks. At-risk populations include the elderly, hospital and convalescent home residents—especially those who are immunocompromised—and smokers. Sources of *Legionella* infections are typically hot tubs, hospitals, cooling towers, hotels, and indoor water features like decorative fountains.

*What were your main goals in organizing the Legionella 2018 conference?*



*Dr. Joe Cotruvo addresses the conference  
Photo: NSF International/Karen Jackson*

The need for a management conference had been “gestating” for 4 years, and finally came to fruition when I collaborated with NSF International, and because of support from the National Science Foundation and several other sponsors. The basic goals are to save lives through education on what is known about the drinking water-based spread of legionellosis and available remediation methods, and to reduce public health risks. The conference provided practical information for all stakeholders; for example, EPA, CDC, and CMS [Center for Medicare and Medicaid Services] were well represented.

I think EPA feels that they have limited Safe Drinking Water Act regulatory authority because legionellosis occurs past the water meter. State protection policies vary widely due to a lack of national guidance, and in this respect, national leadership is more important than regulatory authority. The risks are clear. Existing regulations can impede corrective actions because they seem to require that hospitals wishing to install supplemental disinfection to protect their patients become, in effect, public water systems subject to unfamiliar regulatory requirements.

*What are some of the top challenges and tools for managing Legionella?*

*Legionella* bacteria seeding and regrowth occurs in biofilms in plumbing or other warm water environments—especially building hot water systems—because they grow best at about 25 to 50°C. They can also survive and are amplified in amoebas living in biofilms. A corrosion link is likely as in recent Flint, Michigan, outbreaks. In addition to available analytical technologies for *Legionella* bacteria detection, comprehensive management approaches are necessary to assess plumbing system design deficiencies and determine appropriate monitoring, management, and remediation approaches, as well as long-term surveillance. Disinfection remains a key feature of *Legionella* management. Apart from thermal and other “shock treatments,” the most

commonly used disinfection processes include addition of chlorine, chloramines, chlorine dioxide, and copper/silver generation. The applicability of chloramines, which involves the combination of chlorine and ammonia, may be surprising because they are not potent, fast-acting disinfectants; however, speed of disinfection is not significant because “contact times” in plumbing tend to be long.

*What areas of consensus (and disagreement) emerged at the workshop?*

Legionellosis is a dangerous disease and there is significant waterborne inhalation by higher risk people in some environments. Preventive and remediation measures should be applied routinely in those locations. Monitoring and remediation technologies are available. National consistency is essential because population risk should not be a function of the state where the facility happens to be located. There is an ongoing debate on whether enforceable standards are needed or are guidelines sufficient? For example, Germany employs monitoring, screening, and remediation standards that are practical, but not actually risk-based. A process for developing consensus-based guidance for states has been initiated by ASDWA [Association of State Drinking Water Administrators] as a follow-up to this conference.

*What do you see as the next steps in managing the health risks of Legionella exposure?*

Audience reaction was strongly positive, with several participants saying that the conference should have occurred sooner. We are expanding the coverage and dissemination of the conference’s content with formal proceedings and journal publications. Three no-cost, follow-up webinars are being planned with the Water Research Foundation for September, October, and November of 2018 on monitoring and analysis, remediation technologies, and water safety and management plans and guidelines, respectively. There is also the possibility of another conference to share new scientific information, case studies, and guidelines.

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