



Legionella – An Environmental Issue and Concern

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The discovery and identification of Legionella bacteria followed an outbreak of illness reported to the Pennsylvania health authority that resulted in 34 deaths among 231 afflicted people. The outbreak occurred in 1976 around a Philadelphia hotel that was host to an American Legion Convention – thus, the illness became known as Legionnaires' disease (LD).

Legionnaires' disease is a form of pneumonia and the microorganism responsible for the disease is a naturally occurring water bacterium. Legionella is found in lakes, streams, rivers, ground waters and even some soils. It can escape water plant chlorination treatment and is thus found in domestic (potable) water plumbing and other (commercial, industrial, process, HVAC, etc.) water-use systems. In many of these systems it finds favorable conditions to pose disease risk.

Outbreaks of legionellosis are often blamed on the air conditioning (cooling tower) systems of large buildings and commercial or industrial complexes. However, it is just as well established that another common habitat for the disease-producing bacteria is within the hot water and potable plumbing systems of these same facility buildings. New research shows residential hot water pipes can also be a source of the bacteria (and disease). A recent EPA-sponsored study conducted environmental Legionella sampling on the residential (home) water systems of twenty-one Legionnaires' disease (case) patients and linked five of the water systems to the disease bacteria.

Several conditions and factors must occur for Legionella to cause disease – there is a need for sufficient quantity and/or virulent form of the bacteria made transmittable to a susceptible host. Transmission occurs when a host inhales tiny water droplets (mists or aerosols) containing Legionella or aspirates such laden sources of water during the drinking (swallowing) process. This provides entry of the infectious Legionella into the deeper parts of the lungs where they take over and promote the pneumonia.

Legionella grow well and amplify in warm water environments and systems that provide favorable conditions for bacterial growth and the formation of biofilm. The optimum temperature range for growth is 90 to 105 degrees Fahrenheit. The subsequent use or release of water from such systems harboring Legionella, i.e., through faucets, shower sprays, humidifying, aerosolizing (misting) devices or other operational spray or drift mechanisms of the system, may transmit the potential disease-causing bacteria to susceptible hosts.

Fortunately, less than 5 to 6 percent of the general population is considered to be susceptible hosts or at greatest risk to contract Legionnaires' disease upon exposure to the bacteria. People considered at high risk include the elderly, the very young and those with underlying health problems such as chronic obstructive pulmonary disease (COPD), diabetes, congestive heart failure and sickle cell anemia. Patients taking corticosteroids or other immunosuppressant drugs, undergoing cancer therapy or organ transplantation, or that have conditions or diseases which impair the immune system (such as AIDS), asthma or other chronic illnesses are particularly vulnerable.

Nosocomial (hospital acquired) cases of Legionnaires' disease are a natural concern within the healthcare community. The potable hot water plumbing systems present a favorable habitat for Legionella and pose an associated disease risk to the large "at risk" population within a healthcare facility. Thus, there is a major emphasis on the risk assessment, control and management of these systems and their associated water disseminating equipment or systems.

Accordingly, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) issued a new standard that became effective January 1, 2001. The standard (EC1.7) requires each JCAHO accredited facility to have in place a management program to "reduce the potential for organizational-acquired illness." It holds the healthcare facility responsible for "managing pathogenic biological agents in cooling towers, domestic hot water, and other aerosolizing water systems" – i.e., Legionella among others.

It is estimated that Legionella is responsible for 15,000 to 30,000 of the 600,000 pneumonia cases in the U.S. each year requiring hospitalization. Specialized laboratory tests are necessary to confirm Legionnaires' disease and unfortunately, may not be available in many hospitals. Therefore, the disease remains largely undiagnosed or diagnosed without confirmation and subsequently goes unreported. Legionella is and should be considered an environmental health issue.

The Association of Water Technologies (AWT) has recently released an update to their comprehensive document on Legionella and Legionnaires disease. It is available as a free download from their Web site at www.awt.org.

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