

Legionnaires' Disease – The Disease of Modern Plumbing Systems and Costly Litigation

By Tim Keane

Prior to the 1900's, before central building systems and hot water storage became common, there was little potential for *Legionella* colonization in building water systems. Potable water storage, heating and distribution systems in buildings provided the mechanism for the *Legionella* bacteria to grow to disease causing levels. Because of this Legionnaires' disease has been called – "The Disease of Modern Plumbing Systems".

What has been done to reduce the risk of Legionnaires' disease associated with building potable water systems?

Changes in construction codes, regulations, plumbing components and designs, as well as degrading municipal water infrastructures and efforts to conserve energy and water have resulted in dramatically increasing the potential for *Legionella* colonization in building water systems adding new meaning to the term, "The Disease of Modern Plumbing Systems".

Temperature is one method for controlling *Legionella*. *Legionella* guidelines recommend maintaining hot water return above 124°F and cold water below 68°F. *Legionella* however, has been found in systems with bulk temperatures much higher than 124°F due to design and circulation issues. The 2006 International Plumbing Code which applies to all new building construction, requires tempered water between 85°F and 110°F, be delivered to all public hand washing facilities. It also requires all showers and tubs maintain hot water temperature below 120°F. This is the first national code impacting hot water temperature in all buildings, not just healthcare facilities. Some municipal codes such as New York City also restrict hot water temperatures in all buildings to 120°F. These temperatures will reduce scalding risk but dramatically increase the risk for Legionnaires' disease outbreaks.

Biofilm is a major factor in *Legionella* growth. Factors promoting biofilm growth are; low/stagnant water flow, porous materials and plumbing components that are easily fouled. These building water plumbing components include; very low flow and laminar flow faucet aerators/restrictors, shower heads and hoses, infrared valves, thermostatic control valves and water hammer arrestors to name a few. Also components that allow cross flow between hot and cold systems such as leaking thermostatic shower mixing valves or janitor sink chemical mixing connections pose a risk as well.

Some hospital construction code changes have increased the potential for biofilm growth. Previously hospitals had two patients per room and one sink for an average of 0.5 sinks per patient. New hospitals have one patient per room and two sinks plus many sinks in hallways resulting in more than a four-fold increase in sinks per patients. Also hospitals are required to maintain private showers in wards where patients typically do not shower at all and are required to have shower hoses which trap stagnant water and are great breeders of bacteria.

Many healthcare and non-healthcare facilities have implemented *Legionella* risk reduction measures recommended by industry standards including; risk management programs, HAACP plans and *Legionella* testing to active disinfection and submicron filtration. Headlines about outbreaks in office buildings, hotels, resorts and apartment buildings are becoming more common. The inherent risks for *Legionella* colonization in plumbing systems are increasing. Those most at risk for Legionnaires' disease; elderly, smokers, cancer patients, diabetics, weakened immune systems etc. are just as likely to be found in an office building, apartment or hotel as a hospital and this has been reflected in outbreak statistics.

Building Managers must recognize that approximately 80% of Legionnaires' disease outbreaks are from potable water systems and many result in litigation. Negligence is defined as not implementing appropriate regulations and guidelines. While building plumbing and construction codes are increasing the risk of Legionella growth, new Legionella regulations, guidelines and standards are adding greater responsibility on the Building Manager for control of these deadly bacteria in plumbing systems. To reduce negligence risk Building Managers should implement recommended Legionella control regulations, guidelines and standards. One recent Legionnaires' disease outbreak in a building less than one year old ended with a lawsuit award of over \$5 million. A recent ASHRAE paper titled, "Increasing Litigation for Legionellosis Cases Associated With Buildings" cites a \$600 million class action suit and states that "High dollar jury awards have been recently handed down and large dollar out-of-court settlements are occurring more frequently".

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