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Legionnaires' disease, an acute respiratory infection associated with pneumonia, is estimated by the Centers for Disease Control and Prevention (CDC) to infect between 10,000 to 15,000 people annually in the United States. The disease is likely far more pervasive, as some studies have suggested, only 3% of sporadic cases of Legionnaires' disease are correctly diagnosed[1], and some sources estimate the number of cases annually to be as high as 100,000.[2] Nosocomial Legionnaires' disease is particularly virulent; for cases reported to the CDC during a recent ten year period, the mortality rate was 40 percent. *Legionella pneumophila*, cause of Legionnaires' disease, is frequently found in hot water plumbing systems in hospitals.[3] The role of *Legionella*-contaminated potable water distribution systems as a source of nosocomial legionnaires' disease has been well established.[1] Some studies indicate that up to 70 percent of all hospital plumbing systems are colonized with the *Legionella* bacteria.[4] Until an effective combination of routine testing and a safe and reliable disinfection process is implemented, outbreaks of Legionnaires' disease will continue to present a significant national health hazard.

Immunocompromised individuals in particular are at risk of infection, including patients with AIDS, cancer, organ transplant patients, those being treated with immunosuppressive drugs, as well as the elderly and smokers. *Legionella* accounted for 30% of the reported incidence of nosocomial pneumonia among patients who underwent head and neck surgery.[1] The portal of entry is the respiratory tract via inhalation of aerosols or by microaspiration of water contaminated with *Legionella*. Nosocomial *Legionella pneumonia* is an increasing concern for hospital infection control practitioners, epidemiologists, doctors, risk managers, engineers and facility managers.

Prevention of nosocomial *Legionella* infection is best effected by routine monitoring and testing of hospital water systems. Preventive monitoring even in the absence of any apparent contamination rather than the widely practiced current approach of post-outbreak investigation is best. Guidelines for such routine culturing of hospital plumbing systems have been formulated by such agencies as the Allegheny County Health Department, Pennsylvania, and former CDC official J. Donald Millar, MD. The Allegheny guidelines recommend an annual environmental survey of all hospitals, including those with no known cases of Legionellosis because hospital-acquired Legionellosis can easily be overlooked unless specialized laboratory tests are available.[1] Millar's approach also calls for routine testing to establish a baseline from which subsequent amplification of colonization can be detected. His stance on testing differs markedly from the current CDC position, which specifically does not recommend routine environmental testing and instead calls for treatment of water systems and sampling only after two people develop the disease from a suspected source. Millar has characterized the CDC policy as a virtual guarantee the US will continue to experience Legionellosis outbreaks. In his view, the effectiveness of treatment can only be assessed accurately if accompanied by routine testing.[5]

Several methods of disinfection have been used with varying degrees of success. They include superheating and flushing, hyperchlorination, and in recent years, the use of electronic copper-silver ionization systems.
The superheat and flush method, although effective on a short-term basis, can be problematic since

such treatments must be repeated frequently as colonization recurs rapidly. Furthermore, this method poses logistical problems as distal water sites must be flushed for an extended period of time and hot water temperatures must be monitored during the flushing. The inability of some hot water systems to produce and maintain the flushed water at 140° to 170°F can also be a limiting factor.[6]

Hyperchlorination also has significant disadvantages which include extensive pipe corrosion and carcinogenic chlorine byproducts. Also *Legionella*, can be chlorine resistant.[7] Measures undertaken to counteract the corrosive effects of hyperchlorination often cost more than the chlorination system itself. Furthermore, hyperchlorination merely suppresses the bacteria rather than killing it.[6]

Electronic copper-silver ionization, an innovative use of technology developed by *LIQUITECH, INC.*, Willowbrook, Illinois, has proven to be an efficacious means of disinfection. This method now used by many hospitals, offers the advantages of efficacy and sustained residual protection as opposed to superheat and flush and hyperchlorination. The continued control of *Legionella* by electronic ionization is due to the penetration of copper and silver ions into the biofilms of the water distribution system, killing the organisms.[6]

The growing practice of routinely testing water samples for colonization coupled with electronic copper-silver ionization has been proven to be the most effective method for control of *Legionella* in water distribution systems. As this combination of routine testing and electronic treatment of hospital water systems gains wider acceptance, the incidence of outbreaks of Legionnaires' disease will be reduced.

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