Memorandum to the File
Case Closure

Hospital Acquired Legionella Infection
Samuel S. Stratton VA Medical Center

MCI Number: 2006-036865-HI-0005.

The Department of Veterans Affairs Office of Inspector General's Office of Healthcare Inspections conducted an inspection to determine the validity of allegation that hospital acquired Legionnaire's Disease caused the death of a patient at the Samuel S. Stratton VA Medical Center, Albany, New York.

On September 20, 2006, the Inspector General's Hotline Division received an anonymous report alleging that three patients contracted Legionnaire's Disease, a type of pneumonia caused by the bacteria *Legionella pneumophila*, and that the source of the infection was the tap water at the medical center. The complainant further alleged that one patient died as a result of the infection.

Legionella bacteria are found naturally in the environment, usually in water. The bacteria grow best in warm water, like that found in cooling towers, hot water tanks, large plumbing systems, or parts of the air-conditioning systems of large buildings.[1] People most at risk of getting sick from the bacteria are older people (usually 65 years of age or older), as well as people who are smokers, or those who have a chronic lung disease. People who have weak immune systems from diseases such as cancer, diabetes, or kidney failure; or people who take drugs that weaken the immune system, especially corticosteroids[2], are also at higher risk. Though several *Legionella* species are known to cause pneumonia, *L. pneumophila* is the most common species, causing up to 90 percent of cases of legionellosis[3]. Nosocomial[4] infections are likely to occur via aspiration[5], from respiratory therapy equipment, or contaminated water. In addition, nosocomial transmission of the bacteria has been linked to the use of humidifiers, nebulizers, and items that were rinsed with contaminated tap water[6]. Confirmed cases of *Legionella* infection must be reported to the Centers for Disease Control and Prevention through the appropriate State Department of Health.

The medical center does not perform solid organ or bone marrow transplants. The medical center utilizes municipal water with a copper-silver ionization water treatment system that was installed in 1997. The copper-silver ionization water disinfection

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[1] http://www.cdc.gov/ncidod/dbmd/diseaseinfo/legionellosis_g.htm#4

[2] Corticosteroids are used to provide relief for inflamed areas of the body. They lessen swelling, redness, itching, and allergic reactions but can compromise the body's ability to fight infection.

[3] http://www.emedicine.com/med/topic1273.htm. Legionellosis is the term that collectively describes infections caused by bacteria in the *Legionella* family.

[4] Hospital acquired; an infection not present or incubating prior to admittance to a hospital.

[5] Drawing a foreign substance into the respiratory tract during inhalation.

[6] http://www.emedicine.com/med/topic1273.htm.

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method is designed to kill *Legionella* bacteria and is the only method that has been thoroughly evaluated[7]. Medical center personnel monitor the system monthly, and a private laboratory tests the system quarterly.

We reviewed pertinent documents, including patient medical records and water filtration maintenance and testing records, and conducted a telephone interview with Facility Management Service (FMS) and Infection Prevention personnel on October 6, 2006.

In the past 90 days, three veterans had laboratory tests positive for *L. Pneumophila*[8]. Two had not been at the medical center during their incubation periods[9] and so were determined to have contracted pneumonia in the community. The third was a 69 year old man who was admitted to the center on August 12, 2006, with oral and rectal bleeding. He was found to have idiopathic thrombocytopenic purpura and responded poorly to platelet transfusions, intravenous immunoglobulin, and high-dose intravenous corticosteroids. He underwent a splenectomy on August 21, had rapid resolution of thrombocytopenia, and clinician discharged the patient home on August 26. On August 30, he was seen for a scheduled follow-up appointment in the Hematology Clinic; at that time he had no complaints and was considered to be improving. Two days later, on September 1, he presented to the emergency room (ER) with fever, back pain, and a non-productive cough. He was found to be markedly hypoxemic and his chest x-ray, which had been normal prior to surgery, revealed bilateral infiltrates. He was admitted to the intensive care unit (ICU) and started on broad-spectrum antibiotics and underwent an elective intubation. A urinary antigen test for *Legionella* from admission returned positive and he was treated with levofloxacin. Blood cultures grew methicillin-sensitive *S. aureus*. Although he attained a degree of stability with intensive support, he ultimately had worsening hypoxemia and died on September 10. Autopsy revealed evidence of multi-system disease consistent with overwhelming sepsis.

Specimens submitted to the New York State Department of Health were analyzed by pulsed-field gel electrophoresis (PFGE) for DNA fingerprinting. The patient's tracheal aspirate and water samples from sinks in the ICU grew *Legionella pneumophila* serogroup 1 with indistinguishable PFGE fingerprinting patterns. Medical center Infection Prevention staff concluded that the patient acquired *Legionella* infection during his post-operative stay in the ICU, and that his presentation on September 1, was consistent with *Legionella*'s incubation period.

Results of Review

Upon notification of the patients' positive urinary antigen test on the day of admission, the center instituted a water restriction in the ICU and notified all providers to test all patients with pneumonia of unknown etiology for *L. pneumophila*. During the next five

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[7] Stout JE, Yu VL. Experiences of the first 16 hospitals using copper-silver ionization for Legionella control: implications for the evaluation of other disinfection modalities. Infect Control Hosp Epidemiol. 2003;24:563-8.

[8] Methods included testing for the presence of *Legionella* antigen in the urine and by culture of respiratory secretions.

[9] The incubation period for Legionnaires' disease is 2 to 10 days, most often 5 to 6 days;

days managers instituted a center wide ban on tap water use and provided bottled water for use. In addition, Infection Control specialists and other managers visited all inpatient wards and ambulatory care areas and explained the reason for the water ban. FMS managers conducted a thermal flush of the hospital potable water system in an effort to rid the system of *Legionella*, collecting samples prior to and following the flush for laboratory analysis. Managers identified a weakness in the water treatment system affecting the ICU, and consulted with experts both within VHA and in the public sector for further guidance and correction.

Conclusions

We concluded that medical center managers diligently pursued the possibility of hospital-acquired *Legionella* infection and correctly determined that one patient contracted the infection during his post-operative stay in the ICU. We also concluded that medical center personnel appropriately maintained and tested the hospital water treatment system, and that the measures instituted following positive identification of *L. pneumophila* exceeded both CDC and New York Department of Health guidelines. We noted that the medical center is actively engaged in measures to prevent recurrences, including a careful examination regarding specific aspects of plumbing in the ICU.

We substantiated that two other patients at the medical center recently had test results indicative of *Legionella* infection. However, both of those cases were clearly community-acquired infections, and there was no evidence implicating the hospital environment.

Further review of this case is not warranted, and we made no recommendations. The case can be closed without the issuance of a formal report.

Prepared by: _____ Date: _____
Jeanne Martin PharmD, CGP, FASCP
Associate Director, Boston OHI/OIG

Approved by: _____ Date: _____
Katherine Owens, MSN, RN
Director, Boston, OHI/OIG

Concurrence by: _____ Date: _____
Jerome Herbers, MD
Associate Director, Medical Assessment & Consultation, OHI/OIG