

Outbreak of Legionnaires' Disease among Hospital Employees — Northwest Kansas, July 2014



Background

On July 21, 2014 at 3:34 pm, the Kansas Department of Health and Environment's Infectious Disease Epidemiology and Response section (KDHE) was notified by a critical access hospital infection preventionist of two hospital employees diagnosed with Legionnaire's disease (legionellosis). One individual became ill on June 23, 2014, and the second became ill on July 13, 2014. The County Health Department (CHD) was notified and an outbreak investigation was immediately initiated to determine the cause and scope of illness and to recommend prevention and control measures.

Methods

Epidemiologic Investigation

Ill persons were interviewed by the local health department with a standard legionellosis case investigation questionnaire. All hospital employees were notified of the investigation by letter. This letter provided general information about legionellosis and urged hospital employees to

contact the hospital’s infection preventionist or director of nursing if they subsequently experienced symptoms of legionellosis.

KDHE conducted active surveillance to identify additional cases of legionellosis. Death records for residents of the county were reviewed. Hospitals in neighboring jurisdictions were contacted to determine whether additional, possibly undiagnosed, cases may have been seen in their emergency department or directly admitted.

A case was defined as pneumonia with laboratory evidence of *Legionella pneumophila* infection in an individual with exposure to the hospital between June 13, 2014 and July 31, 2014.

Laboratory Analysis

Urine specimens from ill persons were tested by antigen assay for *Legionella pneumophila*. Testing occurred at both a hospital laboratory and a private laboratory.

Environmental Assessment

Environmental water samples were collected at the hospital and tested for *Legionella* spp. at Aerobiology Laboratory Associates Incorporated in Golden, Colorado. This laboratory is a participant in the Environmental Legionella Isolation Techniques Evaluation (ELITE) Program and is certified through the Centers for Disease Control and Prevention (CDC) to test for *Legionella* in water using culture methods.

Sampling locations were selected based on epidemiological knowledge of past outbreaks of Legionnaires’ disease, possible sources of exposure for the ill employees, and recommendations from subject matter experts at Aerobiology and at the CDC (Table 1).

Table 1. Environmental sampling sources and sample types

Environmental Sample Source	Sample Type
Kitchen sprayer (pre-flush)	1000 mL water
Kitchen sprayer (post-flush)	1000 mL water
Freezer window condensation	Swab
Water from light bulb in cooler	40 mL water
Rooftop unit #11 (condensation from inside)	Swab
Rooftop unit #11 (pipe condensation)	Swab
Air handling unit #4 (condensation from inside)	Swab
Air handling unit #4 (condensation from outside)	Swab
Sprinkler system	1000 mL water
Air handler (multi-zone)	40 mL water
Air conditioning vent at cash registers	Swab

Results

Epidemiologic Investigation

Two confirmed cases of legionellosis were identified among hospital employees; one in a 73-year-old female and the other in a 66-year-old male. Onset of symptoms occurred on June 23, 2014, and July 13, 2014. Both patients experienced fever, cough, fatigue, diarrhea, and pneumonia, and were diagnosed with Legionnaire's disease. Both patients were hospitalized in the intensive care unit. Neither person reported recent travel history, using a hot tub or swimming pool, exposure to a decorative fountain or water feature, or visiting a water park or amusement park. Both individuals worked full-time in the hospital prior to becoming ill. No additional ill persons were identified through surveillance or hospital and death record review.

Laboratory Analysis

The two ill individuals tested positive by urinary antigen assay for *Legionella pneumophila*.

Environmental Assessment

All environmental samples were negative for *Legionella pneumophila*.

Discussion

This outbreak of Legionnaires' disease occurred among employees of a hospital in Northwest Kansas. Two individuals with Legionnaires' disease became ill between June 23, 2014, and July 13, 2014. No additional cases of Legionnaires' disease or Pontiac fever were identified, and no environmental samples tested positive.

Legionellosis is an illness caused by infection with *Legionella* bacteria. Legionellosis is associated with two clinically distinct illnesses, Legionnaires' disease and Pontiac fever. Legionnaires' disease can cause a clinical syndrome similar to pneumonia caused by other microorganisms and is characterized by fever, muscle aches, chills, cough, and shortness of breath. Pontiac fever is a milder infection caused by the same bacteria, with symptoms similar to Legionnaires' disease but without pneumonia¹.

Legionella bacteria are found naturally in the environment and grow in warm water; people become infected by breathing in water or mist that has been contaminated with *Legionella* bacteria. Legionellosis is not spread person-to-person. When legionellae are present in the environment or in a water system, the risk of infection in humans can be dependent on various factors including aerosolization of the bacteria, environmental conditions that may affect the

ability of the organism to grow, and an individual's susceptibility to infection². Many people receive low-level exposure to *Legionella* in the environment without becoming ill. Persons who are smokers, elderly, or immunocompromised are more likely to contract legionellosis than others. An estimated 8,000 to 18,000 people are hospitalized with Legionnaires' disease annually in the United States¹.

Outbreaks of legionellosis have been linked to water systems in hospital buildings, cooling towers for air conditioning systems, decorative water features, and other sources of mist such as hot tubs or whirlpool spas. Hospital-associated outbreaks have occurred in hospitalized patients as well as among hospital visitors and employees^{1,2}.

Testing of environmental samples for *Legionella* can be conducted at laboratories participating in the Environmental Legionella Isolation Techniques Evaluation (ELITE) Program through the Centers for Disease Control and Prevention (CDC), which certifies that a laboratory is able to isolate *Legionella* in water samples using culture methods³. Testing environmental samples for *Legionella* is appropriate in situations such as tracing an outbreak or evaluating a water treatment protocol. However, routine testing for *Legionella* in a building water system is not generally recommended². Levels of bacteria in a water system may fluctuate over time, and *Legionella* contamination may be present even when laboratory results are negative^{2,3}.

As the result of this outbreak investigation, KDHE and CHD recommended that the hospital continue to test any individuals with pneumonia of unknown etiology for *Legionella pneumophila* and that the hospital contact an environmental engineer with a specialty in *Legionella* remediation for consultation to ensure development of an effective testing schema and remediation plan. *Legionella* remediation requires consultation with a contractor or company specializing in that particular field. Successful remediation requires a thorough examination of the water system in question and should always be site-specific³. Routine environmental sampling for *Legionella* was not recommended to the hospital by KDHE and CHD, as such testing of building water systems for *Legionella* may not be an effective method of determining the risk of transmission to humans².

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¹ Centers for Disease Control and Prevention. *Legionella (Legionnaires' Disease and Pontiac Fever)*. Accessed October 2014 at <http://www.cdc.gov/legionella/index.html>.

² American Society of Heating, Refrigerating and Air-Conditioning Engineers. *Minimizing the Risk of Legionellosis Associated with Building Water Systems*. ASHRAE Guideline 12-2000. February 2000.

³ Centers for Disease Control and Prevention. *Environmental Legionella Isolation Techniques Evaluation (ELITE) Program*. Accessed October 2014 at <https://wwwn.cdc.gov/elite/Public/EliteHome.aspx>.