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Legionnaires' Disease in an Oil Platform Worker — Alaska, 2008

Introduction

On May 23, 2008, the Section of Epidemiology (SOE) was notified of a probable case of Legionnaires' disease (Box) in a person who worked for an oil company (Company A) on an Alaska oil platform (Platform A) from April 7 to May 11. No other workers were reported to be ill. We began an immediate investigation.

Case Report

The patient was a 45-year-old white male who smoked one pack per day of cigarettes and had no history of immunosuppression, cancer, diabetes, or renal/hepatic failure. He did not travel off the oil platform between April 7 and May 11. He was first evaluated at an out-of-state emergency department on May 16 for cough, fever, chills, myalgia, diarrhea and worsening shortness of breath that started on May 11. On physical examination, his temperature was 99.8 °F, pulse 103, respiratory rate 44, and oxygen saturation of 89% on room air. A computed tomography scan of his chest demonstrated right lower lobe and middle lobe consolidation with diffuse bilateral infiltrates. He was treated with moxifloxacin and ceftriaxone. Following transportation to an out-of-state hospital, he was given vancomycin and azithromycin, and was placed on mechanical ventilation in the intensive care unit with diagnoses of respiratory failure, pan-lobar pneumonia, dehydration, sepsis/septic shock, and adult respiratory distress syndrome. Two urine antigen tests were positive for *Legionella pneumophila* serogroup 1 (LP1) on May 17 and May 19. Cultures from bronchoalveolar lavage on May 17 were negative. During hospitalization, he developed acute tubular necrosis, atrial fibrillation, hypotension, hyperkalemia, polyneuropathy, metabolic acidosis, and septic shock. He was transferred to another hospital on June 1 and put on dialysis. He was extubated on June 30 and subsequently transferred to a rehabilitation unit.

Investigation

On May 24, an investigative team from SOE and the Alaska Department of Environmental Conservation traveled to the platform to perform case finding and conduct a preliminary environmental assessment and sampling.

Epidemiologic Investigation

Epidemiologists interviewed all 27 individuals working on Platform A at the time of the visit in person and nine additional workers later by phone to identify other possible cases. The case definition for suspected Legionnaires' disease was fever, myalgia, cough and clinical or radiographic pneumonia with onset between March 15 and May 24, 2008. No additional suspected cases were identified. Company A and SOE staff provided educational information to Platform A workers.

Environmental Investigation

Platform A had living quarters, a kitchen, offices, and workshops. A Class B Public Water System existed with service from two 850 barrel potable water tanks. The platform tanks received water from a groundwater source which was hauled to Platform A by ship and pumped into the tanks.

The DEC sanitarian collected samples from 13 different Platform A sites. All collected specimens were submitted to the Centers for Disease Control and Prevention (CDC) laboratory in Atlanta. Five parallel samples collected by the company's industrial hygienist were submitted to Laboratory A. The onshore water company that provides water to Platform A collected samples June 16–17, which were processed by Laboratory B. Company A's industrial hygienist collected additional samples on June 10, which were processed by Laboratory B. Numerous samples were positive for *Legionella* from potable water sources (Table 1). Company A was highly

cooperative with state health officials and promptly chlorinated potential exposure points.

Table 1: Environmental Sampling Results

Laboratory, Date Collected*	No. of Samples	No. + for <i>Legionella</i> **	Source of Positive Samples
CDC, May 24	13	7	Bathroom sinks and showers
Lab A, May 24	5	0	
Lab B, June 16–17	10	0	
Lab B, June 10	91	58	Bathroom sinks and showers, break room sinks, water heaters

*Laboratory methods varied so results cannot be directly compared.

**Species identified include *L. pneumophila* 1, 3, and 4, *L. rubrilucens* and other unspesiated *Legionella*. Concentrations of LP1 identified by Lab B in 6 samples ranged from <1 to 60 colony forming units per ml.

Discussion

Legionella bacteria are ubiquitous in natural environments. Thus, it is not uncommon to identify this organism in many work and home environments, and most people exposed do not become ill. Potable water systems, whirlpool spas and cooling towers provide the ideal conditions for transmission, i.e., heat and aerosolization. For disease to develop, individuals must inhale sufficient numbers of virulent organisms to overwhelm their natural resistance. The majority of reported cases are sporadic. Hospitalization is common and the case-fatality ratio of documented cases is 5–40%.^{1,3}

Because exposure can occur from any suitable environmental source during the incubation period, investigations around a single case are often not done. This investigation was warranted because the exposure occurred on an oil platform—an isolated environment where workers can come into contact with a limited number of potential *Legionella* sources. The current investigation identified no additional cases; however, environmental testing identified 65 samples that were positive for *Legionella*, including six that were positive for LP1, which is most commonly associated with disease.^{1,2}

Box. Legionnaires' Disease Summary

Legionnaires' disease is characterized by fever, myalgia, cough, and clinical or radiographic pneumonia.

Risk factors: increasing age, travel, exposure to whirlpool spas, recent repairs on domestic plumbing, renal or hepatic failure, diabetes, cancer, smoking, and immune system disorders

Incubation period: 2–14 days

Diagnosis: Urinary antigen and culture of respiratory secretions on selective media are the preferred diagnostic tests

Treatment: Macrolide therapy

Recommendations

1. Alaska providers should consider Legionnaires' disease in their differential diagnosis for patients with rapidly progressing pneumonias, especially in older adult smokers.
2. Report all suspect or confirmed legionellosis cases by calling SOE at 907-269-8000 during business hours or 800-478-0084 after hours.

References

1. Centers for Disease Control and Prevention. Legionellosis Fact Sheet. Available at: <http://www.cdc.gov/legionella/top10.htm>
2. Heyman, DL, ed. 2004. Control of Communicable Disease in Man, 18th ed. American Public Health Association.
3. American Society for Heating, Refrigerating and Air-Conditioning Engineers. 1998. Legionellosis Position Paper.