



LEGIONELLOSIS OUTBREAK AT A FITNESS CENTER

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INTRODUCTION

Legionella pneumophila is a common cause of infections in both hospital and community settings.^{1,2,3} Infections can manifest clinically as Legionnaires' disease, a potentially fatal pneumonia, and Pontiac fever, a self-limited febrile illness³. It is not transmissible person-to-person. People, who are older, smoke, have other medical conditions or weak immune systems are more likely to develop infection⁴. *Legionella* ideally grow in warm water (between 95° and 115°F) that is not well disinfected, and are often associated with water sources such as pools, steam rooms, hot tubs, showers or large plumbing systems^{1,5,6}. In a majority of Legionnaires' and Pontiac fever cases, a source is never found⁷. Both clinical manifestations can occur as clusters or isolated cases.

BACKGROUND

On August 10, 2009, Los Angeles County (LAC) Department of Public Health (DPH), Acute Communicable Disease Control Program (ACDC), began an investigation of two cases of Legionnaire's disease due to *L. pneumophila* serogroup 1a (Lp1a), with onsets of pneumonia symptoms in July within two days of each other. Both cases were patrons of a local fitness center. Routine follow up demonstrated that both individuals had visited the spa, pool, and showers of the fitness center during the disease incubation period in early July.

METHODS

A case was defined as a patron who visited the facility between July 1, 2009 and July 14, 2009, with clinical symptoms including fever/chills and at least one other symptom of headache, myalgias, malaise, abdominal pain, diarrhea or cough, and a positive laboratory test for *Legionella*. Laboratory tests could include culture or direct fluorescent antibody of respiratory secretions, fourfold rise in serum antibody titer, or urine antigen. This definition was intended to capture both pneumonia and Pontiac fever.

Heightened surveillance for additional cases was performed. A health alert message was sent via email to 20 acute care hospitals in the vicinity of the gym, requesting increased surveillance for community acquired pneumonia. All recently reported cases of legionellosis in LAC were reviewed for connection to this facility.

Retrospective case finding also occurred by surveying a sample of fitness center patrons; electronic attendance data were used to select a random sample of facility patrons over the age of 59 who visited the center during the two-week exposure period in early July. Since legionellosis can present with a range of symptoms from mild Pontiac fever to more severe Legionnaire's we decided to broadly base our case finding on Pontiac fever symptoms. Using an attack rate of 95% for Pontiac fever, a standard power calculation was done with Epi Info™ Version 6 Statcalc to determine an appropriate sample size to detect additional cases of legionellosis. SAS® 9.3 software was used to assign a random number to each patron and the lowest 100 numbers were chosen to survey. A clinical survey was designed and administered over the telephone between September 1 and September 15, 2009. Two attempts were made to reach patrons. Patrons who indicated they had fever or respiratory symptoms beginning July 1, 2009 were mailed test kits to collect urine for Lp1a antigen testing. Urine test kits were mailed to seven people reporting symptoms and four additional family members based on patron request.

A joint inspection of the fitness center was conducted by ACDC and Environmental Health's cross-connections, environmental hygiene, and recreational water programs. Water samples were taken from the spa, pool, steam room, and shower and tested by the LAC Public Health Laboratory. Chlorine and pH levels were tested. Pool and spa chlorination log books were reviewed.



RESULTS

The two index cases were the only cases identified. No recently reported legionellosis cases in LAC appeared to have an affiliation with this outbreak. Active retrospective surveillance did not identify any additional cases of either Legionnaire's disease or Pontiac fever associated with the fitness center.

Both index cases were over 60 years old, with multiple pre-existing medical conditions, and were hospitalized as a result of their infections (Table 1). Both cases had good outcomes after their hospitalizations.

Index cases	Visited fitness center	Onset symptoms	Hospitalized	Age	Chronic medical conditions or health behavior
Case 1	7/8	7/15	7/21-7/25	64	Hypertension, gout, hepatitis B, smoker
Case 2	7/10	7/17	7/18-7/24	68	Chronic kidney disease, diabetes, hypertension, hyperlipidemia, coronary artery disease, smoker

A total of 33,728 visits from 10,730 patrons were made to the facility during the defined exposure period; 562 (5.2%) of these patrons were over age 59. Sample size calculations indicated 47 interviews were sufficient to detect cases of Pontiac fever at a 90% confidence level. The questionnaire was administered to a total of 55 people. Of the interviewees, 40-63% used the aquatic facilities regularly (Table 2.) Seven people had symptoms and submitted urine samples; all were negative for Lp1a.

<u>Facilities used regularly</u>	<u>Percent (n=55)</u>
Pool	40% (22)
Spa	35% (19)
Steam room	30% (16)
Showers	63% (35)

All six environmental swab and water samples were negative for *Legionella* species by culture. Discussion with staff and pool and spa records confirmed that the pool and spa had been closed in mid-July due to low chlorine levels. During this investigation the spa was again closed temporarily, due to low chlorine levels as documented on the day of inspection.

There were no cross connection violations. Backflow devices were installed in the proper locations. The pool, spa, steam boiler, irrigation, meter protection and fire system were functioning properly. Cooling towers were not used at this facility or at other nearby businesses. The roof mounted air-handling units were inspected and no significant findings were observed.

DISCUSSION

Legionnaire's disease is rare, but given the high attack rate in outbreaks of Pontiac fever, a small sample size is sufficient to determine with high confidence that no infections are present in the population. By surveying only individuals at high risk for exposure and infection, as selected by age and exposure dates, the investigation team increased confidence that no other legionellosis infections occurred.

Although the source of the outbreak could not be confirmed, both cases were exposed to the facility's pool and spa which were both closed due to inadequate chlorination levels shortly following the exposure. Since no further cases were identified, all environmental specimens were negative, and problems with chlorination of the spa were addressed, the fitness center was allowed to continue operations due to lack of evidence of ongoing risk to the public.



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RESOURCE

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