

Investigation of a Possible Outbreak of Legionnaires' Disease—Connecticut, 2006

Legionnaires' disease or legionellosis is a type of bacterial pneumonia caused by *Legionella pneumophila*. The disease first acquired its name in 1976 when there was an outbreak of pneumonia among attendees of an American Legion convention in Philadelphia. This bacteria was present before 1976, but had not been recognized until that point (1).

Annually, an estimated 8,000 to 18,000 people develop legionellosis. Many infections however, are not identified and therefore not reported. Although onset of illness can occur at any time of year, more illness is reported during summer and early fall.

In Connecticut, Legionnaires disease became a reportable disease in 1997. Since then, annual reported cases have ranged from 15-48 with an upward trend in recent years that also demonstrates monthly/seasonal variation (Figure 1, see page 22).

BACKGROUND

On September 26 and October 3, the Connecticut Department of Public Health (DPH) was informed of two residents of a coastal town in New Haven County diagnosed with legionellosis (cases 1 and 2). Both persons had been admitted to the same local hospital on the same day and lived within one mile of each other. One of the patients died (case 1). Subsequently, two more cases were reported (cases 3 and 4) with possible links to at least one of the first two cases. Given the concern for a potential common exposure among all of these cases, the DPH invited CDC to assist with the epidemiologic investigation and to identify and test possible environmental sources of infection.

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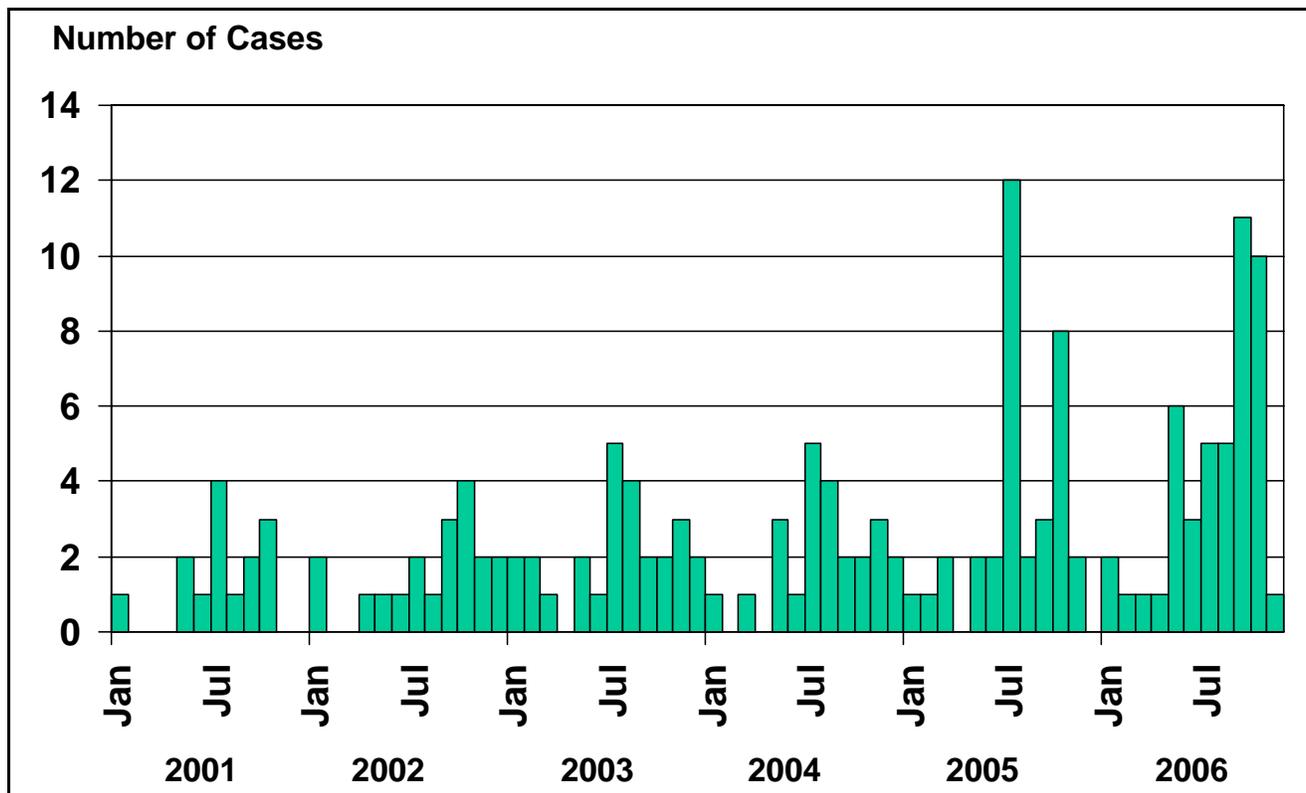
A case of Legionnaires' disease was defined as radiographically-confirmed pneumonia diagnosed in a Connecticut resident with laboratory-confirmation of *Legionella* infection between September 1 and October 8, 2006. Laboratory confirmation included any of the following: detection of *L. pneumophila* serogroup 1 antigens in urine by radioimmunoassay or enzyme-linked immunosorbent assay, isolation of *Legionella* from respiratory secretions, or a 4-fold increase in serologic titers. If culture techniques were available at a particular hospital, culture of respiratory specimens from urine antigen positive patients was encouraged. When available, clinical isolates of *Legionella* were speciated, serogrouped, and sub-typed as previously described (2).

As part of active case finding efforts, staff from DPH contacted all hospital-based and commercial laboratories in the state to identify any additional cases not yet reported and to informally survey type of testing performed at each laboratory for legionellosis. No new cases were found as part of this surveillance. Furthermore, hospitals were requested to call the department directly to report any new cases.

Hypothesis Generation

The families of the first two patients were interviewed to determine their daily activities and the areas they frequented or visited in the two

Figure 1. Reported cases of Legionnaires' Disease in Connecticut by Month of Onset, January 1, 2001-November 17, 2006.



weeks before onset of symptoms of Legionnaires' disease. Neither patient could be interviewed in person since one was still intubated (case-patient 2) and the other had died. Similar interviews were conducted with case-patients 3 and 4.

A questionnaire was developed based on the initial interviews of all four patients and/or their families as well as the detailed survey of the neighborhood in which both patients resided. The questionnaire consisted of questions about specific places that the four patients lived and frequented (either for work or part of their daily routine) as well as other questions aimed at understanding their daily movements to determine where any of the patients might have overlapped. In addition, all other cases of Legionnaires' disease reported to DPH between September 1 and October 9, 2006 were interviewed using a similar standardized questionnaire. Where applicable, the movements of cases were mapped to determine proximity to the residences or workplaces of the first four case-patients.

Environmental investigation

The neighborhood surrounding the residences of both of the New Haven County town residents was

surveyed for potential sources of transmission of *Legionella*. The workplaces of case-patient 1 and case-patient 3 were also visited since they worked in the same town 20 minutes away from case patient's 1 and 2 town of residence. An assessment of case-patient 1's workplace had been performed before this visit by an industrial hygienist. During that assessment, a single environmental sample was collected from the inside of tubing connected to the condensate pump from the evaporator coil for an above the ceiling mounted air conditioning unit. This sample was then transported to the state public health laboratory. The sample was processed according to CDC recommended procedures for the isolation and identification of *Legionella* from environmental samples.

RESULTS

Epidemiologic investigation

Case finding

Between September 1 and the beginning of this investigation on October 8, 10 cases of

Legionnaires' disease were reported to DPH in addition to the four cases considered to be part of this cluster. All patients were diagnosed by urinary antigen testing. No epidemiologic links were identified between any of these 10 additional cases and any of the first four cases.

The expanded questionnaire was administered to all four patients or their families between October 10 and 11. Based on their responses, no potential common exposure was identified for any of the four cases during their incubation periods. No additional cases with epidemiologic links to any of the four patients have been identified to date.

Legionella was isolated from the first patient of this cluster who died from his illness. This isolate was sent to CDC for further typing and was confirmed to be *L. pneumophila* type 1 with monoclonal antibody pattern 1, 2, 5, 7 (Benidorm type strain).

Environmental investigation

On October 9, a visual survey of the areas surrounding the residences of case-patients 1 and 2 was performed. This survey included driving and walking around the neighborhoods looking for mechanical air-handling equipment, including cooling towers (rooftop and ground level structures). Although an outdoor fountain and several cooling tower type structures were identified, none was in a location plausible to have accounted for exposure of more than 1 case. Thus, no additional environmental sampling was done. No *Legionella* was isolated from the sample collected from case-patient 1's workplace during a previous assessment.

EDITORIAL

Despite extensive questioning of all case patients and/or their proxies reported to DPH between September 1 and October 8, investigators were unable to identify any epidemiologic links among the four cases that pointed to a specific aerosol-generating device capable of transmitting *Legionella* that would warrant any environmental testing. All four of these cases appear to be sporadic in nature.

Connecticut continues to see a statewide increase in the number of legionellosis cases reported with

49 cases reported in 2006 to date; this is an increase over any previous year. Although it is unclear whether this increase represents a true increase in disease transmission, increased use of diagnostic tests, improved reporting of cases, or some combination of these factors, other states in the northeast are seeing similar overall trends with peaks in the same months in the same years (e.g., July 2005, September 2006). Connecticut and its neighboring states are discussing possible explanations for these observations. In the meantime, Connecticut continues regular surveillance for Legionnaires' disease.

Recommendations

1. New cases reported through October 31, 2006 should be administered the expanded questionnaire to determine if any potential epidemiologic links to the initial cluster exists. Regular surveillance for legionellosis should be resumed after that date.
2. Hospitals should be encouraged to obtain respiratory specimens for culture in all patients diagnosed with legionellosis by urinary antigen assay.
3. Environmental testing should only be recommended if two or more cases are found to have a plausible and common aerosol-generating exposure during their incubation period.

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2. Joly, J. R., R. M. McKinney, et al. Development of a standardized sub grouping scheme for *Legionella pneumophila* serogroup 1 using monoclonal antibodies. 1986. *J Clin Microbiol* 23(4):768-71.)

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