Key Findings and Public Health Messages

- The California Department of Public Health (CDPH) received reports of 725 cases of legionellosis with estimated symptom onset dates from 2001 through 2008. This corresponds to an average annual incidence rate of 0.25 cases per 100,000 Californians.
- Legionellosis incidence rates increased by 175.0 percent from 2001 (0.16 per 100,000) to 2008 (0.44 per 100,000).
- During the surveillance period, 69 (9.5 percent) reported cases died with legionellosis.
- Average legionellosis incidence rates during the surveillance period increased with increasing age and were highest among adults 75 to 84 years of age (1.22 per 100,000).
- Average incidence rates for the surveillance period were 1.8 times higher in Southern California (0.30 per 100,000) compared to Northern California (0.17 per 100,000).
- One nosocomial outbreak of legionellosis involving 18 cases was reported in Southern California in 2002.
- Further study may help determine if increased legionellosis incidence rates in California represent a true increase in disease activity, detection, reporting, or some combination thereof.

Background

Legionella is an important respiratory bacterial pathogen in the United States (US), causing between 8,000 and 18,000 cases of community-acquired pneumonias requiring hospitalization each year[1]. Inhaling or aspirating contaminated water aerosols are the leading sources of infection. *Legionellae* are ubiquitous in manmade and fresh-water environments where they replicate within free-living amoebae. Warm temperatures and biofilms support bacterial growth, and hot-water and air-circulation systems, hot tubs, and decorative fountains have been implicated exposure sources in community-based outbreaks. *L. pneumophila* serogroup 1 is the most frequently identified serogroup among reported cases. Most cases are now diagnosed by urine antigen, which is highly specific for *L. pneumophila* serogroup 1, so that disease caused by other serogroups or species is less likely to be diagnosed.

Legionellosis is associated with two clinically and epidemiologically distinct syndromes. Pontiac fever is a generally self-limited, nonpneumonic, influenza-like illness whereas Legionnaires' disease is a common cause of serious bacterial pneumonia. The vast majority of reported legionellosis cases are Legionnaires' disease. Although most cases occur sporadically, outbreaks have been identified in nosocomial and community-based settings. Since its addition to national outbreak surveillance in 2001, *Legionella* has been the most commonly reported pathogen associated with drinking water outbreaks. Persons at increased risk for legionellosis include those of advanced age and deficient immune status. There is no national *Healthy People 2010* target objective for legionellosis.

We describe here the epidemiology of legionellosis in California from 2001 through 2008. Data for 2008 are provisional and may differ from data in future publications. For a complete discussion of the definitions, methods, and limitations associated with this report, please refer to Technical Notes[2].

California reporting requirements and surveillance case definitions

California Code of Regulations, Title 17, requires health care providers to report suspected cases of legionellosis to their local health department within one working day of identification or immediately by telephone if an outbreak is suspected. In late 2006,

revised regulations required clinical and reference laboratories to notify the local health department when laboratory testing yielded evidence suggestive of *Legionella* within one working day after the health care provider has been notified.

Local health officers are required by regulation to report to CDPH cases of legionellosis. CDPH officially counted cases that satisfied the Centers for Disease Control and Prevention (CDC) surveillance case definition. During the surveillance period, CDC defined a confirmed case as one with clinically compatible illness and either culture isolation of any *Legionella* organism from respiratory secretions, lung tissue, pleural fluid, or other normally sterile fluid; detection of *L. pneumophila* serogroup 1 antigen in urine; or at least a four-fold increase in serum antibody titer for *L. pneumophila* serogroup 1. From 2001 through 2004, CDC criteria also included detection of *L. pneumophila* serogroup 1 by direct fluorescent antibody staining.

Epidemiology of legionellosis in California

CDPH received reports of 725 cases of legionellosis with estimated symptom onset dates from 2001 through 2008. This corresponded to an average incidence rate of 0.25 cases per 100,000 Californians. Legionellosis incidence rates increased by 175.0 percent from 2001 (0.16 to 100,000) to 2008 (0.44 per 100,000) ($p < 0.001$) [Figure 1]. During the surveillance period, 69 (9.5 percent) cases were reported to have died with legionellosis.

During the surveillance period, average legionellosis incidence rates increased with increasing age and were highest among adults 75 to 84 years of age (1.22 per 100,000). Incidence rates increased from 2001 to 2008 in all persons over 14 years of age [Figure 2] but was most pronounced among the elderly. The ratio of male to female cases was 1.7:1.0. Incidence rates by race/ethnicity were not calculated due to the substantial portion of missing data (13.7 percent). However, legionellosis cases with complete data reported White non-Hispanic race/ethnicity more frequently than would be expected based on the demographic profile of California [Figure 3].

Average incidence rates for the surveillance period were 1.8 times higher in Southern California (0.30 per 100,000) compared to Northern California (0.17 per 100,000). From 2001 to 2008, incidence rates

Figure 1. California legionellosis case counts and incidence rates

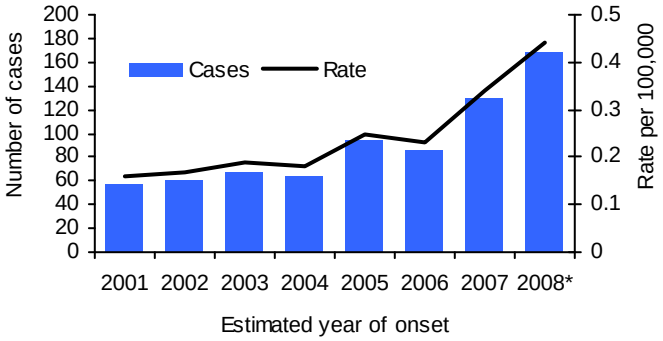


Figure 2. California legionellosis incidence rates by age and time period

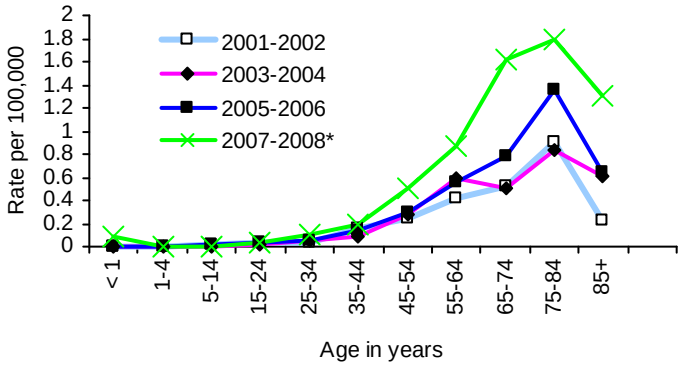
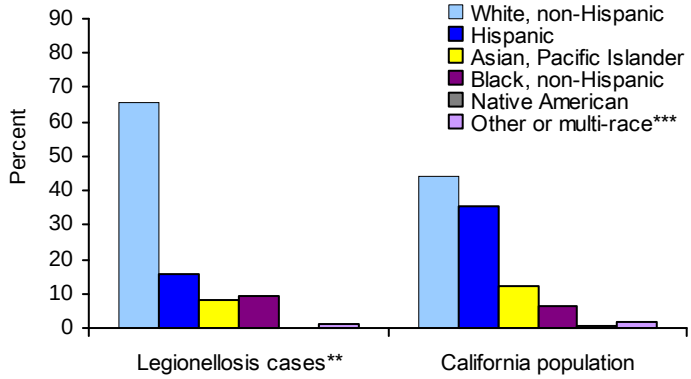


Figure 3. California legionellosis cases and population by race/ethnicity 2001 - 2008*



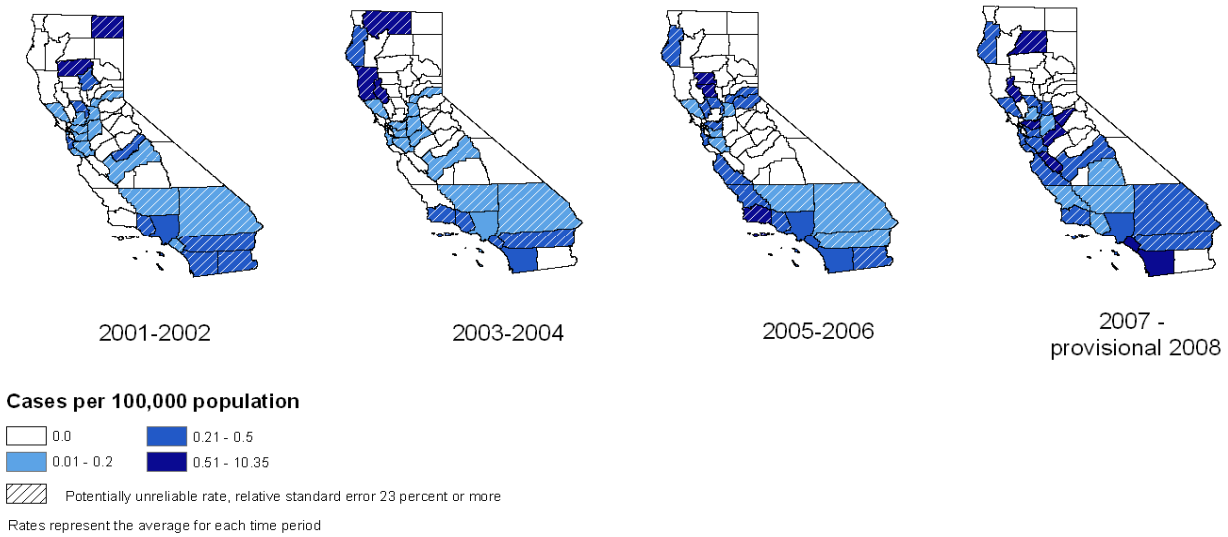
Notes for Figures 1-3

*2008 data are provisional

**Unknowns were excluded

***Includes cases who identified 'other' as their race and Californians ('population') who identified more than one race

Figure 4. California county-specific legionellosis incidence rates



increased by 135.0 percent in Southern California (from 0.20 to 0.47 per 100,000) and by 141.7 percent in Northern California (from 0.12 to 0.29 per 100,000). The Central Coast, San Joaquin Valley, and South Coast regions reported the greatest overall increases [Figure 4].

One nosocomial outbreak of legionellosis involving 18 cases was reported in a Southern California acute care hospital in 2002 and was attributed to colonization of the potable water system.

Comment

During the surveillance period, the highest annual number of legionellosis cases (168) was reported in 2008. California has experienced a significant increase in reported legionellosis incidence rates from 2001 to 2008 An abrupt increase in reported legionellosis cases from 2002 through 2005 has also been noted nationally[3,4]. Expanded regulatory requirements for laboratory-based reporting may partially explain the increases in California in 2007 and 2008. However, increases in national legionellosis incidence rates were not clearly associated with changes in either diagnostic or physician or laboratory reporting practices. Further study is needed to determine if increased rates in California represent an increase in disease activity, detection, reporting, or some combination thereof.

References and resources

[1] Marston BJ, Plouffe JF, File TM JR et al.; Community-Based Pneumonia Incidence Study Group. Incidence of community-acquired pneumonia requiring hospitalization: results of a population-based active surveillance study in Ohio. Arch Intern Med 1997;157:1709-18.

[2]Epidemiologic Summaries of Selected General Communicable Diseases in California, 2001-2008: Technical Notes
http://www.cdph.ca.gov/data/statistics/Documents/technicalnotes-episummary-aug2409.pdf

[3] Neil K, Berkelman R. Increasing incidence of legionellosis in the United States, 1990-2005: changing epidemiologic trends. Clin infect Dis 2008;47:591-9.

[4] Ng V, Tang P, Fisman DN. Our evolving understanding of legionellosis epidemiology: learning to count. Clin Infect Dis 2008;47:600-2.

Centers for Disease Control and Prevention
http://www.cdc.gov/legionella/index.htm

Last updated: 8/17/2009

Prepared by Kate Cummings, MPH, Jon Rosenberg, MD, and Duc Vugia, MD, MPH, Infectious Diseases Branch