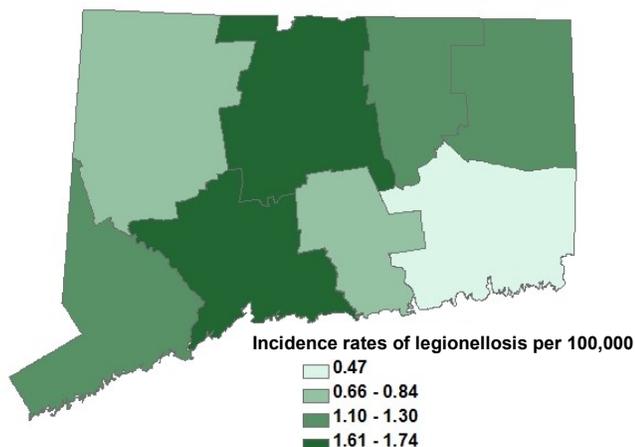# Connecticut Epidemiologist

Legionellosis in Connecticut, 2003-2012

Legionellosis is a bacterial illness with two distinct syndromes: 1) Legionnaires' disease, a serious, sometimes fatal pneumonia, and 2) Pontiac fever, a self-limited flu-like illness. Persons at highest risk for legionellosis are ≥ 50 years of age, current or former smokers, those with chronic lung disease, or those who are immunocompromised. In the United States, 8,000 – 18,000 legionellosis cases result in hospitalization each year with a 5-30% case-fatality rate (*1*).

In Connecticut, legionellosis is both physician and laboratory reportable to the Connecticut Department of Public Health (DPH) and the patient's local health department. Laboratory confirmation of infection is made through culture, urine antigen, or paired serology with a four-fold or greater rise in titer to *Legionella pneumophila* serogroup 1 (*2*). To identify possible common sources of exposure, DPH staff conducted follow-up on all confirmed legionellosis cases by calling the healthcare provider of record. Follow-up included questions concerning clinical illness, water exposures, overnight travel of at least one night away from home, and exposure to healthcare and long term care facilities (LTCF) in the ten days before onset of illness.

During 2003-2012, 488 confirmed cases were reported to the DPH, with a median of 53 (range 24-82) cases annually. In the same period, incidence increased from 0.78 cases per 100,000 population to 1.57 cases per

100,000 (Chi-squared test for trend, p<0.001). Rates of legionellosis varied by county, and by region over time (Figure 1 and 2). In 2010, 82 cases were reported to the DPH, the most since legionellosis became reportable in 1997. Of the confirmed cases, 2 were identified as Pontiac fever. The majority (97%) of cases were diagnosed using urine antigen testing.

Of the case-patients, 99% were hospitalized with a median annual fatality rate of 11% (range 2%-21%); the median age among fatalities was 67 years (range 33-100). Most case-patients (66%) were male, and 76% were persons aged ≥ 50 years. Onset of illness occurred during June-November for 376 (77%) cases (Figure 3, see page 14). During the 10 days before illness onset, 70 (14%) reported overnight travel, 52 (11%) reported at least some healthcare exposure, and 18 (4%) reported visiting or residing in a LTCF.

During 2003-2012, no Legionnaires' disease outbreaks were identified. An investigation into a possible outbreak was conducted in 2006, however, no epidemiologic links were found (*3*).

Figure 1. Average annual incidence of legionellosis by county, Connecticut, 2003-2012.

Incidence rates of legionellosis per 100,000
- 0.47
- 0.66 - 0.84
- 1.10 - 1.30
- 1.61 - 1.74

Figure 2. Legionellosis incidence by region by year, Connecticut, 2003-2012.

- Fairfield and Litchfield County
- Hartford and New Haven County
- Middlesex and New London County
- Tolland and Windham County
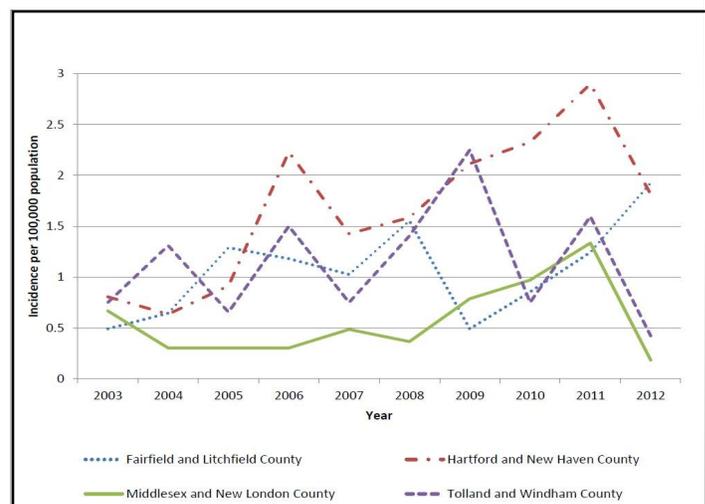
Reported by

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Editorial

In 2003-2012, the increase in the number of legionellosis cases in Connecticut over time is consistent with national data that show an increase in the incidence of legionellosis reported to the Centers for Disease Control and Prevention from 2000 to 2009 (0.39 cases per 100,000 population to 1.15 cases per 100,000 population respectively) (*1*). Factors that may be contributing to the increase include an increasing number of persons aged $\geq$ 50 years and persons at increased risk for infection, improved diagnosis and reporting, and increased use of *Legionella* urine antigen testing. Studies have found that the risk of legionellosis increases with increased wet, warm, and humid weather (*4)*.

Urine antigen tests are easy to perform and provide timely, accurate results for detecting *L. pneumophila* serogroup 1, estimated to cause approximately 90% of all reported cases of legionellosis in the U.S. (*5*). In contrast, culture of respiratory secretions on selective media can detect all species of *Legionella* but has a lengthy turnaround time and requires skilled laboratory personnel. During 2008-2012, only 5 (<2%) legionellosis cases reported to DPH were diagnosed through culture. Given the diversity of *Legionella* species capable of producing illness, a negative urine antigen test in a patient with community associated pneumonia should not necessarily rule out a diagnosis of Legionnaires' disease unless a culture of respiratory secretions is also negative. Culture is also recommended for strain identification in the event of an outbreak or for suspect cases of health-care associated Legionnaires' disease.

Figure 3. Legionellosis cases by month of onset, Connecticut, January 1, 2011-June 30, 2012.
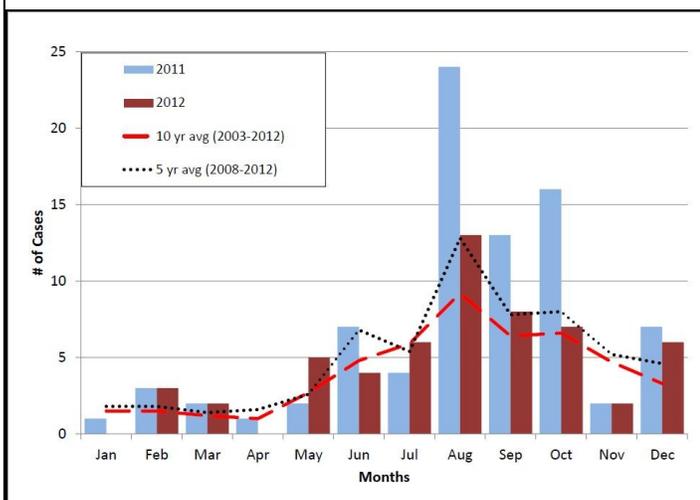
Surveillance for legionellosis is necessary to assess the epidemiology of this disease in Connecticut, and identify potential outbreaks. The rise in reported legionellosis cases reinforces the need for health-care providers to test adults with severe community-acquired pneumonia or health-care associated pneumonia for Legionnaires' disease, and report cases to the DPH.

References

1. Hicks L, Garrison L, Nelson G, Hampton L. Legionellosis--- United States, 2000-2009. MMWR. 2011; 60(32):1083-1086.
2. CDC. 2012 Nationally Notifiable Diseases and Conditions and Current Case Definitions: http://wwwn.cdc.gov/NNDSS/script/ ConditionList.aspx?Type=0&Yr=2012. Accessed 10/10/2013.
3. Investigation of a Possible Outbreak of Legionnaires' Disease— Connecticut, 2006. Connecticut Epidemiologist. 2006 26(6): 21-23.
4. Hicks, L, Rose C, Fields B, et al. Increased Rainfall is Associated with Increased Risk for Legionellosis, Epidemiology and Infection (2007); 135:811-817.
5. Fields, B. S, Benson, R. F, and Besser R. B. Legionella and Legionnaires' Disease: 25 Years of Investigation. 2002. Clinical Microbiology Reviews, Vol. 15, No. 3, 506–526.

Lyme Disease — Connecticut, 2012

In 1987, Lyme disease was added to the list of reportable diseases in Connecticut. In 1991, Lyme disease became a nationally notifiable disease with a national surveillance case definition (NSCD) (*1*). Lyme disease has since become the most commonly reported vector-borne disease in the United States (*2*).

Surveillance in Connecticut has changed over time and has included physician-based methods, and laboratory-based methods (Figure 1) (*3*). Currently, Lyme disease reporting is required by physicians, and by laboratories with electronic reporting capabilities to the Connecticut Department of Public Health (DPH). Because laboratory reports do not include all the

Figure 1: Lyme disease cases by surveillance method, Connecticut, 1991-2012.
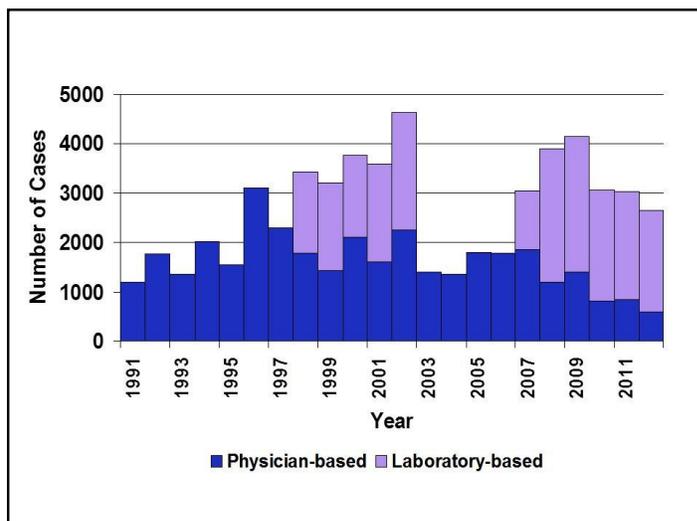
information necessary to determine case status, follow-up is conducted on all positive laboratory reports meeting the NSCD. Follow-up involves mailing supplemental reporting forms to the ordering physician with a request to complete all missing information and return to the DPH via mail or fax.

Confirmed cases included those reported with erythema migrans (EM) $\geq$ 5 cm, or systemic manifestations of Lyme disease without EM and positive laboratory results; a positive enzyme immune assay and positive Western blot IgM, positive Western blot IgG, or positive culture. Probable cases were those with a positive serology and were physician-diagnosed as having Lyme disease, but did not have symptoms necessary for confirmed case classification or no symptom information was provided on the report form. Suspect cases were those with a laboratory result that met the NSCD and no reported clinical information. Confirmed and probable cases were included in the national surveillance data.

In 2012, the DPH received 5,696 Lyme disease reports. Of these, 864 (15%) were initiated through physician-based surveillance and included 558 (65%) confirmed and 48 (6%) probable cases. There were 4,795 (84%) reports initiated through laboratory-based surveillance, with 1,098 (23%) confirmed and 956 (20%) probable cases reported. The surveillance method was not recorded for 37 reports. The remaining 3,036 (53%) reports did not meet the NSCD for a confirmed or probable case and included 2,929 (96%) suspect cases. Of the suspect cases, 190 (6%) were received through physician-based surveillance and 2,739 (93%) through laboratory-based surveillance.

Of the 1,656 confirmed cases, 717 (43%) patients had EM only, 847 (51%) had one or more systemic manifestations only, and 92 (6%) had both EM and

systemic manifestations of Lyme disease. Of the systemic Lyme disease cases without EM, arthritic symptoms occurred in 718 (85%), neurologic manifestations in 198 (23%), and cardiac complications in 10 (1%). Cases may have had multiple systemic symptoms.

The statewide incidence for all cases was 74.4 cases per 100,000 population. Windham and New London counties reported the highest county rates (Figure 2). Adults aged 60-69 years had the highest incidence with 91.8 cases per 100,000 population. Young adults aged 10-19 years had the second highest rate with 90.6 cases per 100,000 population. The lowest incidence occurred among those aged 20-29 years (54.7 cases per 100,000 population); 54% were male. Of cases with known onset dates, 45% occurred during the summer months of June, July, and August.

Since 2007, when electronic laboratory reporting was implemented, the number of physician-based reports has declined (Figure 1). During this period, the number of EM cases has also declined, while the number of Lyme disease cases involving systemic manifestations only has remained stable (Figure 3)

Reported by

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Editorial

Public health surveillance is one of the tools that infectious disease epidemiologists use to monitor the occurrence of diseases of public health importance and assess the effectiveness of control measures. In the United States, the system for reportable diseases works

Figure 2. Number of confirmed and probable Lyme disease (cases) and rates* by county, Connecticut, 2012.

Litchfield 33.2 (63)
Hartford 15.7 (140)
Tolland 82.5 (126)
Windham 100.5 (119)
New Haven 24.3 (210)
Middlesex 54.3 (90)
New London 93.0 (255)
Fairfield 24.0 (220)

*Incidence was determined using the 2010 Census data.
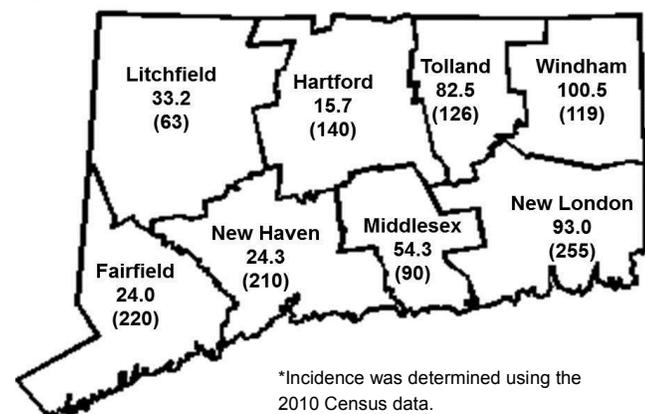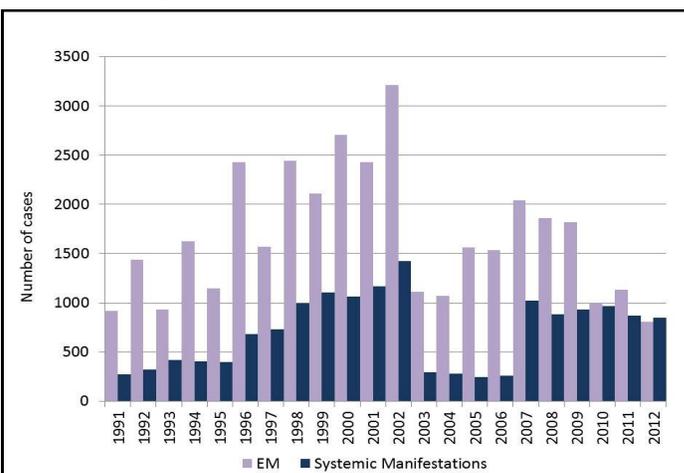
Figure 3. Number of Lyme disease cases with EM and systemic manifestations only by year, Connecticut, 1991-2012.

best for diseases that are either rare in occurrence, involve hospitalized patients, or for which there are definitive diagnostic laboratory tests. The system works less well for diseases that are common, diagnosed in outpatient settings, and for which there are no definitive diagnostic laboratory tests. The under-reporting of these diseases, including Lyme disease, is common.

Surveillance has shown Connecticut to have one of the highest rates of Lyme disease in the country. On average since 1998, the DPH has reported about 3,000 cases annually to the Centers for Disease Control and Prevention (CDC). Recently, the CDC estimated that there are approximately 10 times more people diagnosed with Lyme disease than the yearly reported number (*4*). Using the CDC estimate, approximately 30,000 people are diagnosed with Lyme disease each year in Connecticut.

In 2010, the DPH initiated a centralized data repository system called the Connecticut Electronic Disease Surveillance System (CTEDSS), a web-based application that allows data sharing between the DPH and laboratories, hospitals, and local health departments. Process improvements have significantly reduced staff resources needed for Lyme disease surveillance. The DPH is working to expand electronic laboratory reporting by other laboratories and for other diseases.

The downward trend in physician-based reporting and the reporting of EM cases since 2007 may reflect physician reporting fatigue after nearly 30 years of reporting. In 2012, the DPH received 3.3% fewer reports of Lyme disease overall, 12.6% fewer that met the NSCD for a confirmed or probable case, and 17.6% fewer confirmed cases when compared to the previous year. The number of electronically reported positive laboratory results increased by 3.6%; however, reporting through physician-based surveillance decreased by 31.3%. In addition, fewer responses to follow-up requests for clinical information resulted in a 3.8% increase in reports initiated through laboratory surveillance that were classified as suspect, and a 10.3% decrease in the number of reports classified as confirmed. The proportion of probable cases remained the same.

Electronic health information systems are expected to improve the timeliness and completeness of disease reporting from health care providers. The American Recovery and Reinvestment Act, requires physicians to maintain qualified electronic health records (*5*). This endeavor began in 2009 and has a goal of certified electronic health records for each person in the United States by 2014. It is expected that by 2019, 90% of all healthcare records in the U.S. will be in electronic format.

Development and implementation of statewide electronic health information systems in thousands of medical offices are complex and expensive tasks. With public health access to electronic medical records related to reportable diseases, health care providers will no longer need to respond separately to requests for routine information needed for reportable disease monitoring. This should save significant effort on the part of physicians and health departments, and simultaneously resolve gaps in reporting. Data collection is anticipated to be most improved for diseases, such as Lyme disease, that are common and diagnosed primarily in the outpatient setting. This has the potential to provide a more effective and sustainable way to assess the number of people diagnosed with Lyme disease every year.

For questions concerning Lyme disease reporting or to order the most current version of the PD-23, please contact the Epidemiology and Emerging Infections Program at (860) 509-7994. Electronic fillable PDFs are also available at www.ct.gov/dph. Select "Forms" from the top navigation bar, and Reportable Disease Forms and Instructions.

References

1. CDC. National Notifiable Disease Surveillance System (NNDSS), Case definitions for Lyme disease. http://wwwn.cdc.gov/NNDSS/script/conditionsummary.aspx?CondID=100 Accessed 9/18/2013.
2. CDC. Surveillance for Lyme disease – United States, 1992 - 2006. MMWR 2008;57(SS10);1-9.
3. Ertel S-H, Nelson RS, Cartter ML. Effect of surveillance method on reported characteristics of Lyme disease, Connecticut, 1996-2007. Emerg Infect Dis. 2012 Feb, date cited 9/11/2013: http://wwwnc.cdc.gov/eid/article/18/2/10-1219_article.htm
4. CDC. Press release: CDC provides estimate of Americans diagnosed with Lyme disease each year. 2013, Aug., date cited 10/15/2013: http://www.cdc.gov/media/releases/2013/p0819-lyme-disease.html
5. American Recovery and Reinvestment Act. Date cited 9/11/2013: http://www.gpo.gov/fdsys/pkg/BILLS-111hr1enr/pdf/BILLS-111hr1enr.pdf