

Changing Occurrence of *Vibrio* Infection, Connecticut, 1996-2014

Vibrios are gram-negative bacteria that occur naturally in warm marine environments and estuaries. Approximately 12 species of *Vibrio* are pathogenic to humans, including the well-characterized *V. cholerae*, which causes cholera (1). Several halophilic non-cholera *Vibrio* species cause human illness (vibriosis), including gastrointestinal and skin infections and sepsis, through exposure to seawater or consumption of raw/undercooked seafood, usually shellfish. The most common species causing vibriosis is *V. parahaemolyticus*, which causes about 4,500 gastrointestinal infections in the United States annually (2).

Surveillance data collected in the United States during the past 10 years show an increase in *Vibrio* infections (3). Approximately 50% of domestically acquired infections are transmitted through food, most often oysters (4). *Vibrio* infections are seasonal; nationally, approximately 70% of cases occur between May and October when water temperatures are warmer (1). High seawater temperatures and salinity allow *Vibrio* organisms to flourish. In 2012, an outbreak involving *V. parahaemolyticus* serotype O4:K12 was linked to shellfish harvested from Oyster Bay Harbor, New York (5). Before 2012, shellfish from the Atlantic coast was rarely associated with infections from this species and serotype.

In 1996, the Connecticut Foodborne Diseases Active Surveillance Network (FoodNet) began collecting data for *Vibrio* infections. During 1996–2014, Connecticut FoodNet identified 294 *Vibrio* cases (Table 1). The majority of *Vibrio* case-patients were male (64.3%) and white (72.4%); the median age was 53 years (range 2-92). Of the 294 cases, 22.8% involved hospitalization; 4 deaths were reported. International travel was reported by 3.4% of cases. Overall, less than 10% of *Vibrio* cases in Connecticut were outbreak-associated; the majority of outbreak-related cases (85.7%) occurred in 2013.

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Greater than one-half (59.9%) of *Vibrio* infections were caused by *V. parahaemolyticus*. Cases due to *V. parahaemolyticus* generally increased more each year than cases due to other species until 2014, when they sharply decreased (Figure 1). The second most common species isolated was *V. alginolyticus* (16.7%). Although there was an increase in *V. alginolyticus* during much of this period, the case count has been stable since 2009.

Vibrio isolates were most commonly collected from stool (54.4%), followed by wounds (25.5%). Other frequent isolation sites included blood and ear. The coastal counties of Fairfield and New Haven reported the highest proportion of cases (38.8% vs. 21.8% respectively), with Windham County reporting the fewest (2.4%). In Connecticut, *Vibrio* cases exhibited typical patterns of seasonality; most cases (71.4%) occurred during July–September, with the peak seen during July (29.9%). Although the majority of cases were reported during summer months when oysters are harvested, cases were reported during all seasons.

A fitted model of incident *Vibrio* cases showed an average annual increase of 13.7% from 1996 until 2014, when there was a 65.0% decrease in *Vibrio* cases compared to the expected findings based on the trend observed in previous years.

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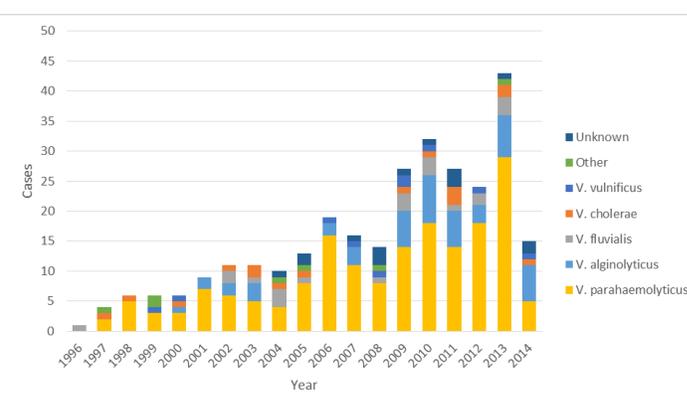
Editorial

The number of *Vibrio* cases in Connecticut has increased since the mid-1990s when FoodNet active laboratory surveillance began. The majority of cases can be attributed to *V. parahaemolyticus*, especially

Table. Characteristics of Incident *Vibrio* Cases in Connecticut, 1996-2014

Characteristic	Frequency (%)*
Species	
<i>V. parahaemolyticus</i>	176 (59.9)
<i>V. alginolyticus</i>	49 (16.7)
<i>V. fluvialis</i>	21 (7.1)
<i>V. cholerae</i>	16 (5.4)
<i>V. vulnificus</i>	10 (3.4)
Other	7 (2.4)
Unknown	15 (5.1)
Specimen collection site	
Stool	160 (54.4)
Wound	75 (25.5)
Blood	21 (7.1)
Ear	16 (5.4)
Other	20 (6.8)
Unknown	2 (0.7)
Seasonality of infections	
Jan-Mar	20 (6.8)
Apr-June	33 (11.2)
Jul-Sept	210 (71.4)
Oct-Dec	31 (10.5)
Sex	
Male	189 (64.3)
Female	105 (35.7)
Median age (range)	
	53 (2-92)
Hospitalized	
	67 (22.8)
Race/Ethnicity	
White	213 (72.4)
Black	6 (2.0)
Hispanic	20 (6.8)
Asian	7 (2.4)
Unknown	48 (16.3)
County	
Fairfield	114 (38.8)
New Haven	64 (21.8)
Hartford	47 (16.0)
New London	22 (7.5)
Middlesex	18 (6.1)
Litchfield	12 (4.1)
Tolland	10 (3.4)
Windham	7 (2.4)
International travel**	
	10 (3.4)
Outbreak associated**	
	21 (7.1)
Total	294

Figure. Reported Cases of *Vibrio* by Species in Connecticut, 1996-2014 (n=294)



in 2013 when a multi-state outbreak associated with eating raw shellfish from Atlantic Coast harvest areas occurred (6). In response to this outbreak, the Connecticut Department of Agriculture (DOAG), initiated a recall of shellstock and closure of harvesting areas in Norwalk and Westport, Connecticut in August 2013 (7). In 2014, the DOAG implemented a more stringent *Vibrio parahaemolyticus* Control Plan (8). The timing of this initiative coincided with the decline in *Vibrio* infections observed during 2014, the most substantial change in any year. Additional years of surveillance are needed to determine if the new regulations were a factor in the observed decline.

In Connecticut, *V. alginolyticus* and *V. vulnificus* are commonly isolated from wounds and other sources, while *V. parahaemolyticus* and *V. fluvialis* are more likely to be found in stool, causing gastrointestinal illness. Overall, the number of persons with gastrointestinal *Vibrio* infection is likely many-fold higher than reported because most clinical laboratories do not routinely test stool specimens for *Vibrio* species (9). Healthcare providers should consider *Vibrio* infection in patients with diarrhea and a history of consuming raw or undercooked shellfish. Laboratory testing for *Vibrio* must be specifically requested.

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Lyme Disease — Connecticut, 2014

Lyme disease (LD) is a bacterial disease caused by *Borrelia burgdorferi*. In Connecticut, LD is transmitted through the bite of infected blacklegged ticks. Symptoms may include flu-like fever and fatigue, a bull's eye rash, or symptoms involving the nervous system, joints, or heart. In 1991, LD became a nationally notifiable disease with a standardized surveillance case definition, and has since become the most commonly reported vector-borne disease in the United States (1,2).

Lyme disease reporting is required by healthcare providers, and laboratories with electronic reporting capabilities to the Connecticut Department of Public Health (DPH). Healthcare providers should use the [Reportable Disease Confidential Case Report Form PD-23](#) to report all confirmed and suspect LD cases. Laboratory reports do not include the clinical information necessary to determine case status. Follow-up is conducted on all positive laboratory reports meeting the national surveillance case definition (NSCD). Supplemental reporting forms are mailed to the ordering provider with a request to complete and return to the DPH via mail or fax.

The NSCD was used to classify cases (1). Confirmed cases included those reported with erythema migrans (EM) ≥ 5 cm, or systemic manifestations of LD and positive laboratory results; a positive enzyme immune assay and positive Western blot IgM, positive Western blot IgG, or positive culture. Probable cases were reports of positive serology and were physician-diagnosed as

having LD, but lacked symptoms necessary for confirmed case classification. Suspect cases were those with a positive laboratory result that met the NSCD and no clinical information. Confirmed and probable cases were included in this analysis.

In 2014, the DPH received 5,154 LD reports. Of these, 1,284 (25%) were initiated through physician-based surveillance and included 689 (54%) confirmed and 48 (4%) probable cases. There were 3,870 (75%) reports initiated through laboratory-based surveillance with 1,016 (26%) confirmed and 593 (15%) probable cases reported (Figure 1). Surveillance method was not recorded for 3 reports. The remaining 2,808 (55%) reports included 2,626 (94%) suspect cases. Of the suspect cases, 364 (14%) were received through physician-based surveillance and 2,259 (86%) through laboratory surveillance.

Of the 1,705 confirmed cases, 862 (51%) had EM only, 727 (43%) had one or more systemic manifestations only, and 116 (7%) had both EM and systemic manifestations of LD (Figure 2, see page 16). Of the systemic LD cases not associated with EM, arthritic symptoms occurred in 581 (80%), neurologic manifestations (Bell's palsy, encephalitis, radiculoneuropathy, lymphocytic meningitis) in 179 (25%), and 2nd or 3rd degree atrioventricular (AV) block in 15 (2%). Cases may have had multiple systemic symptoms.

For all cases, the statewide incidence was 65.6 cases per 100,000 population. Of cases with reported county of residence, Tolland County reported the highest incidence (Figure 2, see page 16). Adults aged 50 years or greater reported the highest incidences (aged 50-59 = 75.9, aged 60-69 = 100.0,

Figure 1. Number of confirmed and probable Lyme disease cases by surveillance method, Connecticut, 1991-2014

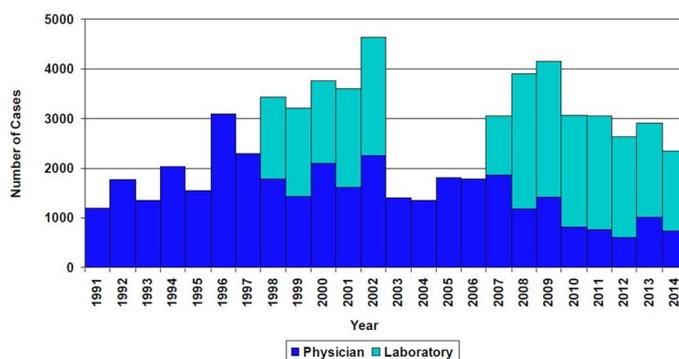
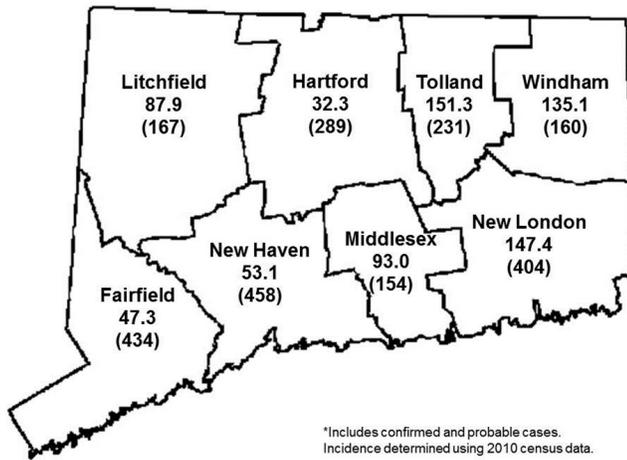


Figure 2. Number of confirmed and probable Lyme disease (cases) and rates* by county, Connecticut, 2014



aged 70+ = 99.4 cases per 100,000 population). Children aged 0-9 had a rate of 71.5 cases per 100,000 population. The lowest incidence occurred among those aged 30-39 years (39.9); 57% were male. Of cases with known onset dates, 69% occurred during June-August.

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Editorial

In 2014, the majority (54%) of reports received through physician-based surveillance resulted in a case. However, this represents a substantial decrease when compared to the previous two surveillance years; 2013 (75%) and 2012 (70%). The majority (58%) of laboratory reports resulted in identification of suspect cases, an increase when compared to 2013 (51%). Of reports that resulted in a confirmed case, physician-based surveillance identified 94% compared to 63% identified through laboratory-based surveillance.

Because of recent reports of sudden cardiac deaths associated with Lyme carditis (3), in 2014 the DPH added Myocarditis as a symptom on LD reporting forms. A total of 10 reports of myocarditis were received of which 7 were initiated through laboratory-based surveillance and 3 through physician-based surveillance. Of the 10 reports, 9 did not have EM, and were classified as confirmed (6), probable (2), or did not meet case criteria (1); 3 also had 2nd or 3rd degree AV block. The DPH will continue to monitor myocarditis in LD patients, and urges healthcare providers to report their findings.

Healthcare providers are urged to report all patients with LD by completing the most current version of the PD-23, or the follow-up Supplemental Lyme Disease Laboratory Case Report form when it is received. All information requested on these forms must be completed, including patient street address, city, state, date of birth, race, ethnicity, clinical, and laboratory information.

Report forms can be mailed to the Connecticut Department of Public Health, 410 Capitol Ave, MS#11EPI, Hartford, CT 06134. Please write “Confidential” on the outside of any report correspondence. In lieu of mailing reports, reports may also be faxed to the DPH at 860-509-7910. For questions concerning LD 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.

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