



Legionellosis Report 2016

Bureau of Epidemiology

Legionellosis Report, Pennsylvania 2016

Author: Chandra Marriott, MPH

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Background

Legionellosis is a general term for any disease caused by *Legionella* bacteria. The bacterium is named after a 1976 outbreak among people who attended an American Legion convention. Some of the convention attendees developed a previously unrecognized type of pneumonia that became known as Legionnaires' disease (LD). A milder disease, also caused by *Legionella* bacteria, is called Pontiac fever.

Legionellosis symptoms include cough, shortness of breath, fever, muscle aches (myalgia) and headaches. The disease has two forms:

Legionnaires' disease is the more severe form of infection, which includes pneumonia and can lead to death. Symptoms begin two to 10 days after exposure to the bacteria.

Pontiac fever is a milder illness in which the patient does not have pneumonia. Pontiac fever is probably not a true infection but, rather, a reaction that can follow exposure to the bacteria. Symptoms begin five to 72 hours after exposure.

See the Pennsylvania Department of Health (PADOH) [Legionellosis Fact Sheet](#) for more info.

Case Definition

PADOH follows the Centers for Disease Control and Prevention (CDC) case definition for [Legionellosis/Legionnaires' Disease or Pontiac Fever \(*Legionella pneumophila*\)](#).

Suspected: A case with pneumonia or both fever and myalgia that meets at least one of the presumptive (suspected) laboratory criteria below

- By seroconversion: fourfold or greater rise in antibody titer to specific species or serogroups of *Legionella* other than *L. pneumophila* serogroup 1 (e.g., *L. micdadei*, *L. pneumophila* serogroup 6)
- By seroconversion: fourfold or greater rise in antibody titer to multiple species of *Legionella* using pooled antigen and validated reagents
- By the detection of specific *Legionella* antigen or staining of the organism in respiratory secretions, lung tissue or pleural fluid by direct fluorescent antibody (DFA) staining, Immunohistochemistry (IHC) or other similar method, using validated reagents
- By detection of *Legionella* species by a validated nucleic acid assay

Confirmed: A case with pneumonia or both fever and myalgia that meets at least one of the confirmatory laboratory criteria below

- By culture: isolation of any *Legionella* organism from respiratory secretions, lung tissue, pleural fluid or other normally sterile fluid
- By detection of *Legionella pneumophila* serogroup 1 antigen in urine using validated reagents
- By seroconversion: fourfold or greater rise in specific serum antibody titer to *Legionella pneumophila* serogroup 1 using validated reagents

Case Reporting

In Pennsylvania, clinical laboratories are required to report positive legionellosis test results to the Pennsylvania Department of Health by the next workday ([28 Pa. Code § 27.22](#)). In addition,

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clinicians are required to report cases of legionellosis within 24 hours of identification ([28 Pa. Code § 27.21a](#)). Reports are submitted electronically (either through electronic laboratory reporting or online key entry) through Pennsylvania’s electronic reportable disease surveillance system, PA-NEDSS ([33 Pa.B. 2439](#)).

In addition, legionellosis outbreaks identified by PADOH state health centers or Pennsylvania local health departments are to be reported to the Division of Infectious Disease Epidemiology, Bureau of Epidemiology, on the same day in which they are identified ([28 Pa. Code § 27.43a](#)).

Summary of 2016 Cases

Confirmed Cases by Month and Year

Pennsylvania had an average number of legionellosis cases in 2016 with a total of 371. In the previous five years, totals ranged from 300 to 502 cases. The five-year mean and median (calculated from 2011-2015 data) are 387.8 and 379 cases, respectively. As is typical, cases increased in the summer and early fall (Figure 1).

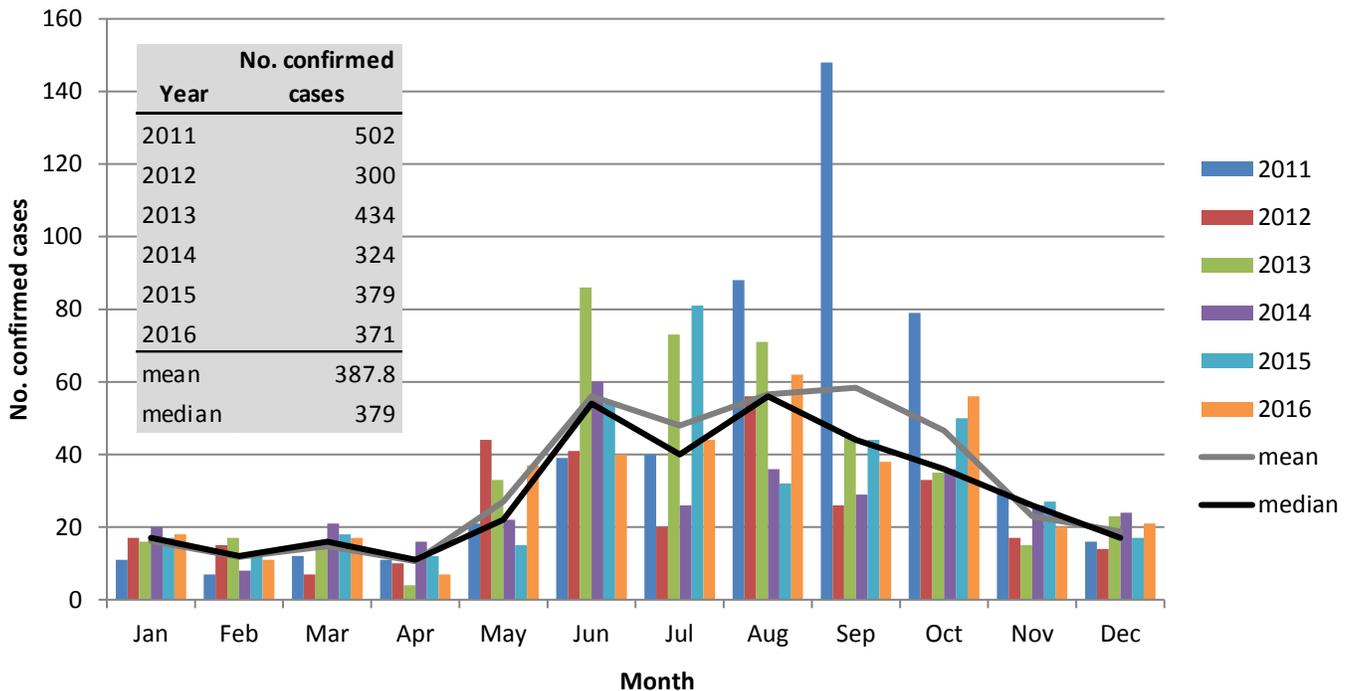


Figure 1. Confirmed Legionellosis Cases by Month and Year, 2011-2016. mean and median calculated from 2011-2015 data (source: PA-NEDSS MMWR dataset).

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Confirmed Cases by Pennsylvania Region and Week of 2016

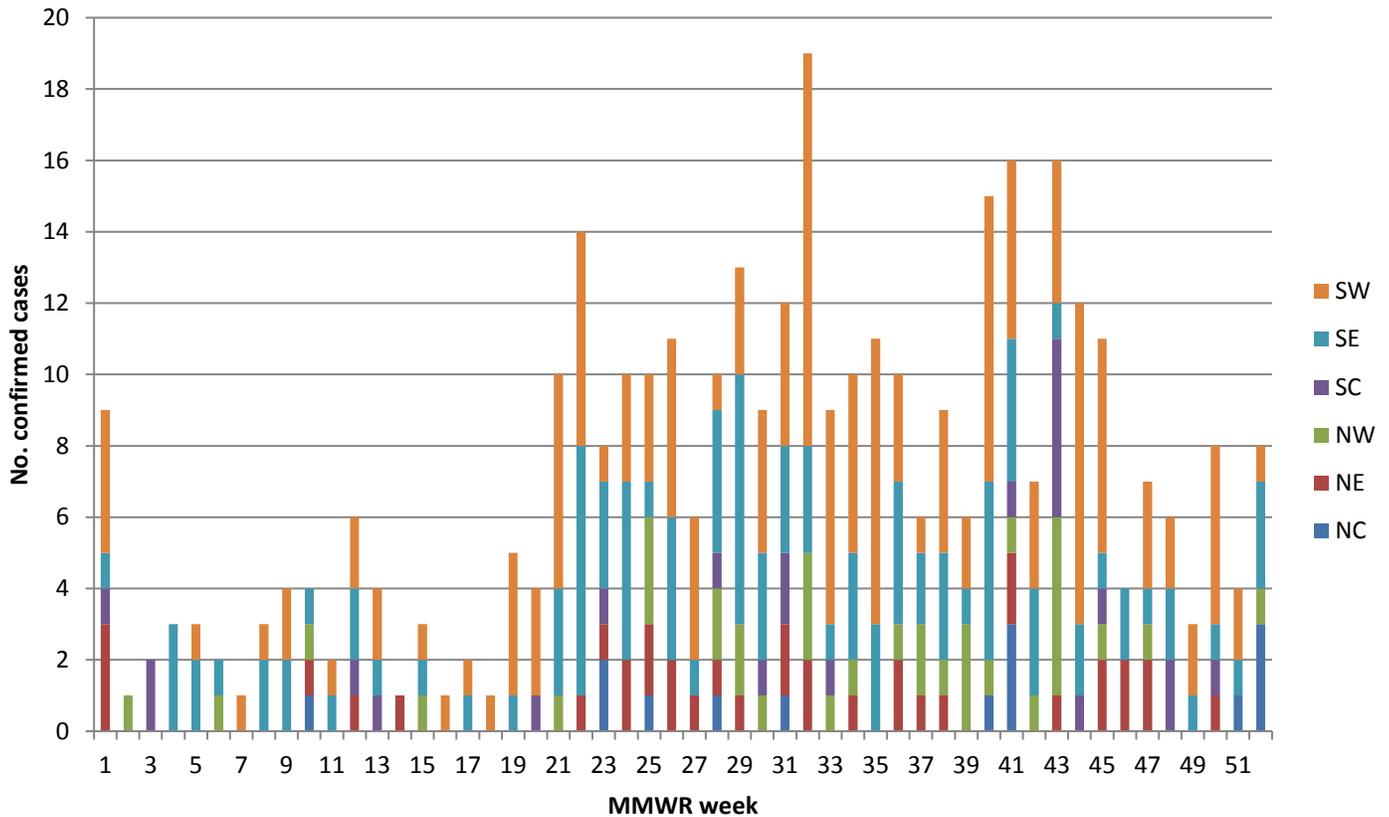


Figure 2. Confirmed Legionellosis Investigations by Pennsylvania Region and Week, 2016 (source: PA-NEDSS MMWR dataset).

The [MMWR week](#) is the week of the epidemiologic year for which the National Notifiable Diseases Surveillance System (NNDSS) disease report is assigned by PADOH for the purposes of MMWR disease incidence reporting and publishing. Values for MMWR week range from 1 to 53, although most years consist of 52 weeks.

Figure 2 illustrates the increase in cases in summer and fall. It is also evident that a large proportion of cases occur in the southwest region of the state.

Outbreaks

Six legionellosis outbreaks, comprised of 28 cases, were identified and investigated in 2016. This is in comparison to between one and six outbreaks per year in 2011 to 2015. The 2016 outbreaks occurred in four counties. Two were health care-associated, two were in group housing, one was linked to a hotel hot tub, and the other outbreak was suspected to be associated with a cooling tower.

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Incidence Rates by County

The highest rates of legionellosis were on the western side of Pennsylvania, as is typical. Several counties with small populations had high incidence rates due to just one or two cases. Allegheny County had 90 cases, the most of any county in Pennsylvania. Philadelphia had the second highest number of cases at 34. Fifteen counties had no cases at all (Figure 3).

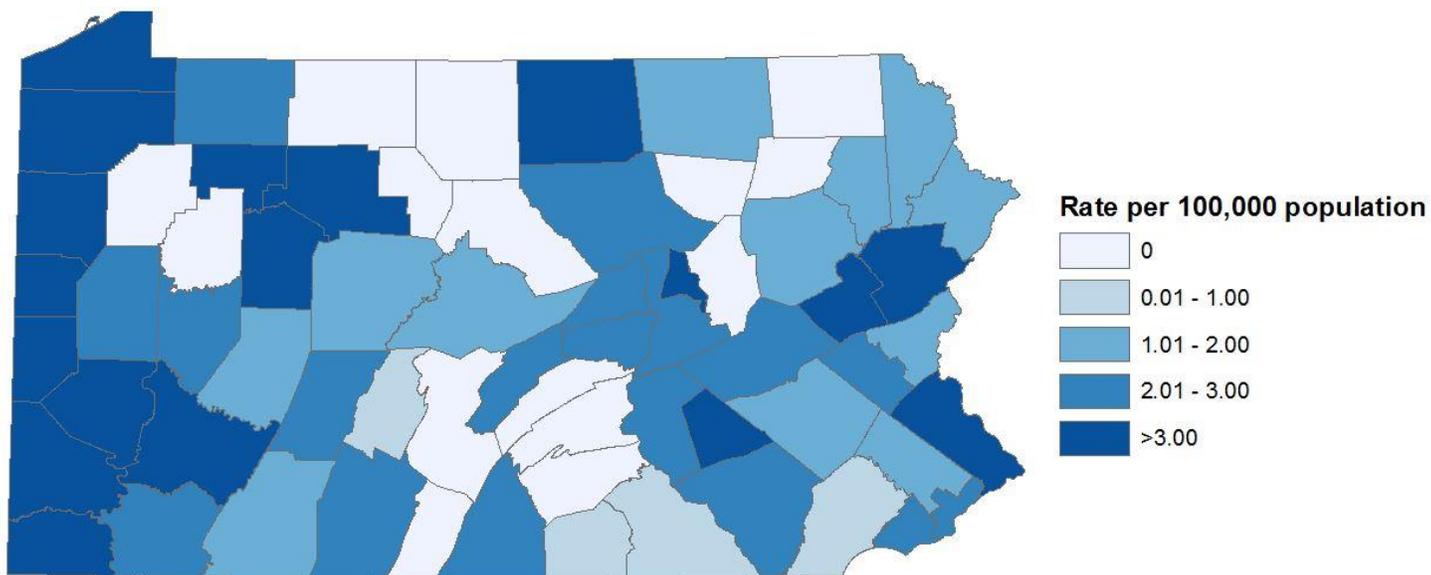


Figure 3. Legionellosis Rates by County, 2016. County population figures, used as the denominator for rate calculations, were obtained from 2010 U.S. Census population data. Numerator data were obtained from the PA-NEDSS MMWR dataset.

Appendices

Appendix A: Case Investigations

When a legionellosis report is entered in PA-NEDSS, a community health nurse (CHN) in the patient's home jurisdiction initiates an investigation. The CHN typically first contacts the health care provider or hospital infection control practitioner to verify test results, learn the patient's clinical signs and symptoms (including if the patient was diagnosed with pneumonia), and to find out if the patient is well enough to be interviewed or if there is a proxy who can speak for the patient. Next, the CHN calls the patient or proxy to confirm symptoms, identify the onset date, and inquire about risk factors in the 10 days prior to onset such as health care exposures, hotel stays and exposures to aerosolized water. The CHN documents the symptoms, risk factors and other information in PA-NEDSS, closes the investigation, and sends a case report form to the Centers for Disease Control and Prevention.

Three days a week, the legionellosis surveillance coordinator reviews the newly completed investigations. The investigations are checked for completeness and correctness, and the surveillance coordinator verifies that a case report form (CRF) was sent to CDC. If a patient had a health care exposure, the surveillance coordinator verifies that education and appropriate recommendations were provided to the health care facility. If a patient had an exposure in a jurisdiction other than the patient's home jurisdiction, the surveillance coordinator shares the exposure information with the jurisdiction where it occurred.

Appendix B: Follow-up for Health Care-associated Cases

If a patient was exposed in a health care facility, the CHN follows the guidance below.

1. Verify that case meets confirmed [case definition](#).
2. Determine if the case is a definite or possible nosocomial case of legionellosis, as defined on the CDC legionellosis [CRF](#).
 - a) Definite: Patient was hospitalized or a resident of a long-term care facility for the entire 10 days prior to onset.
 - b) Possible: Patient had exposure to a health care facility for a portion of the 10 days prior to onset.
3. Inquire about potential sources in the facility that may have exposed the patient to *Legionella*, including but not limited to: decorative fountains, respiratory therapy equipment, humidifiers, pools, hot tub, showering, potable water, ice, cooling towers or evaporative condensers, nearby bodies of water, any recent construction, plumbing repairs, water main breaks/repairs, etc.
4. Determine if the facility has a recent history of other confirmed legionellosis cases.
5. For **definite** nosocomial cases:
 - a) Determine if the affected building has an existing *Legionella* prevention or monitoring program. Find out if there are high risk units (e.g., vent units) or facility characteristics suggesting patients are at an increased risk of contracting legionellosis.
 - b) Provide facility with education regarding legionellosis.
 - c) Recommend prevention measures be instituted immediately, focusing on unit where the case-patient stayed. Prevention measures include restrictions on showering, providing bottled water for drinking, cleaning ice machines and ensuring sterile water is used for medical devices.

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- d) Recommend water distribution system control measures be initiated immediately using either thermal eradication or shock chlorination.
 - e) Recommend environmental *Legionella* testing by a CDC-certified [ELITE](#) lab.
 - f) Recommend facility begin surveillance for patients having suspected or confirmed health care-acquired pneumonia (HCAP) and report any clusters of such cases immediately to Pennsylvania Department of Health.
 - g) Recommend facility search retrospectively for additional cases of HCAP in the facility during the past six months and provide a line list of suspected cases by unit, date and organism (if identified).
 - h) Continue periodic follow-up with the facility ICN for four months from last case onset to get updates and determine if there is evidence of ongoing transmission.
6. For **possible** nosocomial cases:
- a) Provide facility with education regarding legionellosis.
 - b) Recommend environmental *Legionella* testing by a CDC-certified [ELITE](#) lab.
 - c) Recommend facility maintain a heightened level of awareness for patients with suspected or confirmed HCAP and report any clusters of such cases immediately to Pennsylvania Department of Health.
 - d) If environmental testing is conducted at the facility and samples are **positive** for *Legionella*, follow steps under #5 for definite cases.

Appendix C: Outbreak Surveillance

The legionellosis surveillance coordinator reviews the risk factor data three times a week. A computer program pulls all risk factor data for investigations opened within the past year. Risk factors from all open and newly completed investigations are flagged for review. If two or more cases from the past year report a common risk factor, all investigations are reviewed. After considering the extent of exposure (duration, potential sources of *Legionella* at the facility, etc.), an outbreak investigation might be initiated. For example, if two patients spent a day or more in the same health care facility, an outbreak investigation would be warranted. However, if two patients reported spending a brief time (a matter of hours) in a common building, an investigation would not likely be started. On the other hand, if the common building had a decorative fountain or if three patients reported spending time there, an outbreak investigation would be conducted.

Appendix D: Outbreak Investigations

PADOH investigations of legionellosis outbreaks follow the general protocols outlined below.

Outbreaks associated with buildings

- Health care facility (HCF) outbreaks: HCFs are usually familiar with *Legionella* and have the capability to do in-house environmental testing, so PADOH serves primarily as a consultant.
 - PADOH provides guidance and consultation.
 - The HCF conducts environmental testing, focusing on areas where patients spent time. On occasion, the facility hires a private contractor to do testing.
 - If any environmental samples are positive for *Legionella*, the HCF may conduct their own remediation, or they may hire a private contractor to do it.
 - The HCF conducts enhanced prospective clinical surveillance and notifies PADOH of any additional cases of legionellosis.

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- Non-health care facility outbreaks: Non-health care facilities may be completely unfamiliar with *Legionella* and require extensive education.
 - Provide education and guidance.
 - Assess potential sources such as decorative fountains, hot tubs, cooling towers, etc. and immediately discontinue use of any that are non-essential.
 - Environmental testing may be conducted by PADOH, the Pennsylvania Department of Environmental Protection (PADEP) and/or a private contractor.
 - If any environmental samples are positive for *Legionella*, the facility hires a private contractor to conduct remediation and follow-up testing.
 - Post an Epi-X Call for Cases if potentially exposed persons live in other states.
 - Monitor PA-NEDSS for additional cases.

Community outbreaks

- Assess potential sources such as cooling towers, decorative fountains, etc. PADOH and/or PADEP will contact parties responsible for the potential sources.
- PADOH, PADEP, and/or a private contractor may conduct environmental testing.
- If any environmental samples are positive for *Legionella*, the responsible party hires a private contractor for remediation.

Appendix E: Additional Resources

The following CDC resources are shared with facilities when appropriate:

- [Environmental Investigation Tools](#): This page provides tools to assist in the environmental component of legionellosis outbreak investigations ([Legionella Environmental Assessment Form](#), [CDC Sampling Procedure and Potential Sampling Sites](#), [Sample Data Sheet](#), and [Environmental Investigation Videos](#)). These may be useful to health care facilities that are conducting their own environmental sampling and testing.
- [Developing a Water Management Program to Reduce Legionella Growth and Spread in Buildings: A Practical Guide to Implementing Industry Standards](#): Many buildings need a water management program to reduce the risk for *Legionella* growing and spreading within their water system and devices. This toolkit is designed to help people understand which buildings and devices need a *Legionella* water management program to reduce the risk for Legionnaires' disease, what makes a good program, and how to develop it.
- [Water System Maintenance](#): The key to preventing Legionnaires' disease is to prevent *Legionella* colonization in water systems. This page offers information for routine maintenance of building and recreational water systems for the prevention of disease.
- [Disinfection of Hot Tubs Contaminated with Legionella](#): Learn about best practices for how to remediate hot tubs.
- [Legionnaires' Disease: A problem for health care facilities](#): CDC outbreak investigations show that effective water management programs – actions that reduce the risk of *Legionella* growing and spreading in building water systems – can help prevent problems that lead to LD. Health care facility leaders should be aware that LD is a risk in their facility and that they can take action to prevent infections.

Other useful resources:

- [ASHRAE Guideline 12-2000: Minimizing the Risk of Legionellosis Associated with Building Water Systems 2000](#): This guideline provides information on the ecology of *Legionella* and guidance to minimize and remediate colonization in building water systems.

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- [ASHRAE Standard 188: Legionellosis: Risk Management for Building Water Systems \(ANSI approved\)](#): This standard, first published in 2015, establishes minimum risk management requirements for building water systems to prevent legionellosis.
- [Frequently Asked Questions on ASHRAE Standard 188: Legionellosis: Risk Management for Building Water Systems](#): Get answers to frequently asked questions about ASHRAE Standard 188, which outlines a minimum legionellosis risk management program for buildings.