Legionellosis Cluster Associated With Working at a Racetrack Facility in West Virginia, 2018

Jared R. Rispens, MD, REHS
Marisa Hast, PhD
Chris Edens, PhD
Troy Ritter, PhD, REHS
Jeffrey W. Mercante, PhD
Miriam Siegel, DrPH
Stephen B. Martin, MPH, PhD
Erica Thomasson, PhD
Albert E. Barskey, MPH
National Center for Environmental Health, National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention

Abstract **In October 2018, the Centers for Disease Control and Prevention was notified of a cluster of Legionnaires' disease cases in workers at a racetrack facility. The objective of the resulting investigation was to determine the extent of the outbreak and identify potential sources of exposure to halt transmission. Case-finding and interviews were conducted among symptomatic racetrack workers who were known to be at the facility within 14 days prior to symptom onset. An environmental assessment of the facility and surrounding area was conducted for sources of potential *Legionella* exposure. In total, 17 legionellosis cases were identified. The environmental assessment revealed a poorly maintained hot tub in the jockey locker room as the most likely source. Further investigation identified deficiencies in the facility's ventilation systems, which suggested a transmission mechanism for workers who never entered the locker room floor. Considering indirect exposure routes via air handling systems can be useful for source identification and case-finding in legionellosis outbreaks.**

Introduction

Legionella is a major cause of waterborne disease in the U.S. In 2018, nearly 10,000 cases of legionellosis were reported (Centers for Disease Control and Prevention [CDC], 2019; National Academies of Sciences, Engineering, and Medicine, 2020). Legionellosis comprises three distinct clinical syndromes: most commonly Legionnaires' disease (LD), a severe pneumonia that often requires hospitalization; less commonly Pontiac fever (PF), a milder nonspecific illness without pneumonia that often self-resolves; and rarely extrapulmonary legionellosis, a *Legionella* infection outside the lungs (Council of State and Territorial Epidemiologists [CSTE], 2009, 2019; Shah et al., 2019). The hospitalization rate for LD is approximately 95% and the case fatality rate averages 10%; PF does not usually require hospitalization and is rarely fatal (Shah et al., 2019). The attack rate for LD is low at <5%, while the attack rate for PF is believed to be much higher at >90% (Fraser et al., 1977; Glick et al., 1978).

Persons acquire *Legionella* when they inhale aerosolized water containing the bacteria. Although *Legionella* grows naturally in all freshwater environments, it does not typically reach levels that pose a health risk. Human-made water systems such as indoor plumbing, however, provide the opportunity for the bacteria to grow and spread when the systems are not adequately maintained. Devices, including hot tubs, cooling towers, and decorative fountains, can aerosolize water containing *Legionella*; humans then inhale the bacteria (Garrison et al., 2016). A properly designed and implemented water management program can control conditions to be less conducive to *Legionella* growth, which in turn reduces the risk of transmission to building occupants (ASHRAE, 2018; CDC, 2018).

In October 2018, the West Virginia Bureau for Public Health (WV BPH) notified the Centers for Disease Control and Prevention (CDC) of one *Legionella* urinary antigen test (UAT) positive result in an individual who worked at a racetrack and casino facility. Following an investigation by WV BPH and the Hancock County Health Department, five additional LD cases were identified among facility workers with symptom onset within a 1-month period. After a request for assistance from WV BPH, CDC sent a team of epidemiologists, environmental and occupational health specialists, and a laboratorian to assist the local health department in their investigation. The objective of the investigation was to identify the source of the outbreak and to prevent further infections.

Methods

Outbreak Case Definitions

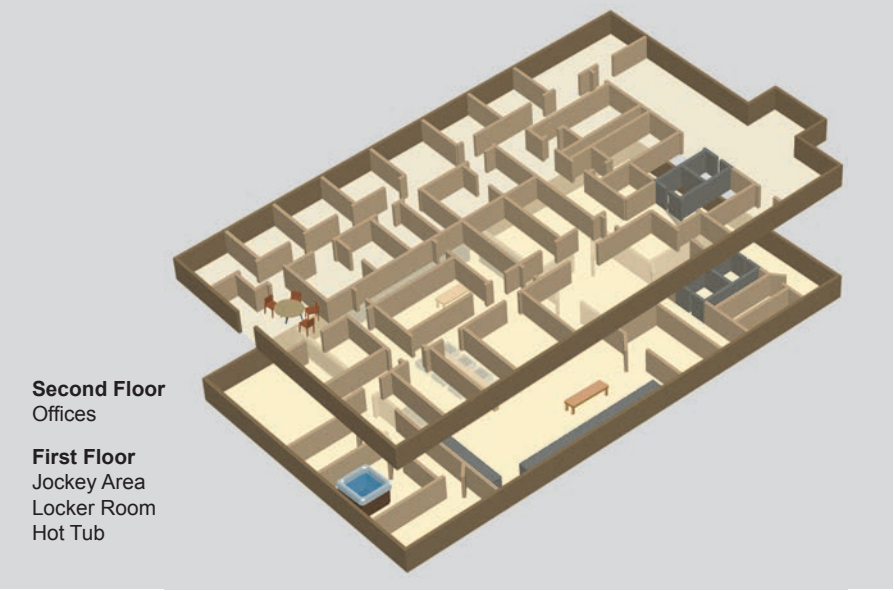
Our case definitions included confirmed LD (pneumonia with a positive UAT), suspected LD (pneumonia without a UAT completed/reported), confirmed PF (self-limited, nonspecific flu-like symptoms with a positive UAT), and suspected PF (self-limited, nonspecific flu-like symptoms without a UAT completed/reported) among workers with exposure to the racetrack facility within 14 days prior to symptom onset. Workers with a negative UAT were excluded.

Case-Finding

The state health department issued a CDC Epidemic Information Exchange (Epi-X) noti-

FIGURE **1**

Floor Plan of First and Second Floors of Outbreak Location



fication and statewide health alert requesting a review by health officials of cases that presented during the months of September and October 2018. Semistructured interviews and medical chart reviews were conducted for the six workers with confirmed LD initially reported to CDC by the Hancock County Health Department. Racetrack absentee records and word-of-mouth referrals identified additional racetrack workers suspected of being ill; among this population, 37 semistructured interviews were conducted. These racetrack workers included management and office personnel, maintenance and janitorial staff, jockeys, valets (jockey assistants), and vending machine technicians.

Case Interviews

The interviews consisted of a series of open-ended questions about demographic characteristics and job title, activities during the exposure period (September through October), symptoms of recent illness, and medical history prior to illness onset. Interviews were conducted in person or by phone in English or Spanish. Interviewees were asked to describe their activities and locations visited at the racetrack facility during the period, including but not limited to use of water facilities in the building (e.g., showers, sinks, hot tub, steam room). Workers were asked whether they experienced any symptoms of illness, and those who reported illness during the outbreak period were asked additional targeted questions about the presence of symptoms characteristic of LD and PF, history of medical treatment received, and any existing comorbidities such as smoking.

Environmental Assessment

To identify the source of the outbreak, our investigation began by searching for aerosolizing devices within the geographic area where patients were known to spend time. An initial investigation and review by the local health department revealed that all six LD patients worked at the racetrack facility, primarily in the trackside clubhouse. No additional common exposures were identified. The racetrack facility consisted of three main building complexes: the grandstand, trackside clubhouse, and hotel casino. The trackside clubhouse building housed a jockey locker room on the first floor and office space for racetrack management staff on the second floor (Figure 1), with race-day entertainment spaces on the third, fourth, and fifth floors.

The initial environmental survey of the racetrack and surrounding area found multiple potential sources of aerosolized water: the premises' plumbing system, including plumbing fixtures; a hot tub in the jockey locker room; the heating, ventilation, and air conditioning (HVAC) system in the clubhouse building; a decorative fountain in the racetrack hotel/casino building; and nearby cooling towers on adjacent properties. A ventilation engineer conducted airflow analyses of the clubhouse HVAC system. A DegreeC Breeze Air Flow Pattern Visualization Fog Generator (Degree Controls, Inc.) was used to reveal airflow patterns at various points in the building's active and passive ventilation pathways.

Publicly available aerial and satellite imagery was reviewed to locate nearby structures that resembled cooling towers. Two compatible structures were identified within a 1-mile radius of the racetrack. After contacting the potential owners and confirming the presence of both towers, site visits were conducted to inspect the equipment, review maintenance practices, and assess the risk for *Legionella* growth and aerosolization.

Laboratory Testing

To assess the risks for *Legionella* in the clubhouse and grandstand buildings, an environmental sampling plan was devised to survey the premises' plumbing system and hot tub. A total of 17 biofilm swabs and 1-L bulk water samples were collected from plumbing fixtures throughout multiple floors of the clubhouse, including from the incoming water main, two conventional hot water heaters, one shower, four faucets, and one hot tub. Additionally, pH, temperature, and free and total chlorine (Cl) were measured at each sampled location and at several locations in the adjacent grandstand building. All samples were shipped to the CDC *Legionella* laboratory for processing and *Legionella* culture testing according to previously published procedures (Kozak et al., 2013).

Results

Case Characteristics

A total of 17 confirmed and suspected cases of legionellosis were identified where patients had occupational exposure to the racetrack clubhouse. This total included the original six laboratory-confirmed LD cases, four additional

suspected LD cases, and seven suspected PF cases. The average patient age was 51 years and 71% were male (Table 1). Median age was 59 years (range 39–67 years) among confirmed or suspected LD cases and 52 years (range 18–61 years) among PF cases. Sex did not differ by case designation. Four LD patients and three PF patients had a self-reported current or prior history of smoking (50% of patients reporting), and two LD patients and one PF patient reported a history of respiratory problems. Additional comorbidities reported included high blood pressure, diabetes, thyroid complaints, sleep apnea, and gastric ulcers.

Onset of symptoms ranged from September 26–October 28, 2018 (Figure 2). Symptom onset for all but one case occurred prior to the racetrack's voluntary closure on October 24, 2018, and onset for this case was within 14 days (maximum incubation period) of the closure. The most commonly reported symptoms included fever, cough, chills, and fatigue (Table 2). Gastrointestinal symptoms, headache, myalgia, sweating, and dizziness were reported at lower rates. In total, nine patients (eight LD and one PF) reported seeking medical care and six LD patients were hospitalized. No lower respiratory specimens were available.

Of the 17 patients, six reported spending time exclusively on the facility's second floor (i.e., office space), eight reported spending time exclusively on the first floor (i.e., jockey locker room), and the remaining three spent time on both floors. By case designation, five LD patients (50%) and six PF patients (86%) reported some exposure to the first floor, and the remaining five LD patients (50%) and one PF patient (14%) reported exposure to the second floor only. The number of permanent office workers with primary exposure to the second floor was estimated to be 16, providing an attack rate of 31% (5/16) among this group of workers. The number of racetrack workers with occasional exposure to the second floor, however, is not known and therefore the attack rate among all workers with exposure to this floor cannot be calculated. Likewise, the number of racetrack workers with any exposure to the first floor is unknown and as such, an attack rate for this floor cannot be calculated.

TABLE **1**

Characteristics of Individuals With Confirmed and Suspected Legionellosis by Diagnosis

Characteristic	Diagnosis		Total (*n* = 17) # (%)
	LD (*n* = 10)* # (%)	PF (*n* = 7)* # (%)	
Age (years)			
<30	0 (0)	3 (42)	3 (18)
30–49	1 (10)	0 (0)	1 (6)
≥50	9 (90)	4 (58)	13 (76)
Sex			
Male	7 (70)	5 (71)	12 (71)
Female	3 (30)	2 (29)	5 (29)
History of smoking			
Yes	4 (40)	3 (42)	7 (41)
No	5 (50)	2 (29)	7 (41)
Not reported	1 (10)	2 (29)	3 (18)
History of respiratory issues			
Yes	2 (20)	1 (14)	3 (18)
No	8 (80)	6 (86)	14 (82)
Sought medical care			
Yes	8 (80)	1 (14)	9 (53)
No	2 (20)	6 (86)	8 (47)
Hospitalized			
Yes	6 (60)	0 (0)	6 (35)
No	4 (40)	7 (100)	11 (65)

LD = Legionnaires' disease; PF = Pontiac fever.
*Includes both confirmed and suspected cases.

Environmental Assessment

Cooling tower identification and assessment revealed two cooling towers owned by separate entities, Company A and Company B, bordering the racetrack property. Company A's cooling tower was noted to be dirty and in poor physical condition, with multiple leaks from cracked metal gratings. Company A had no operation records and reported adding chemicals only once/week. The water temperature measured 48 °F (close to ambient temperature) and the main fan was not energized, eliminating a mechanism for aerosols to be dispersed. Company A's tower, therefore, was determined to pose low to no risk for aerosolization of *Legionella*, and thus no water samples were collected. Company B's cooling tower was well-maintained, with an expansive basin roughly 200-ft long. Company B contracted with a nationally recognized servicer for maintenance of the tower and provided documentation of a water management plan. Due to its maintenance and optimal condition, no environmental samples were collected and Company B's cooling tower was determined to pose low to no risk for aerosolization of *Legionella*.

Investigation of the premises' hot water plumbing system in the clubhouse found water temperatures ranging from 127 °F in first-floor hot water heaters to 108 °F at taps on the fifth floor. Temperature measurements in the grandstand building exhibited less variation, with temperatures ranging from 120 °F in first-floor hot water heaters to 114 °F in first-floor offices. Free and total Cl measurements varied in both the clubhouse

FIGURE **2**

Epidemic Curve of Legionellosis Cases During Outbreak

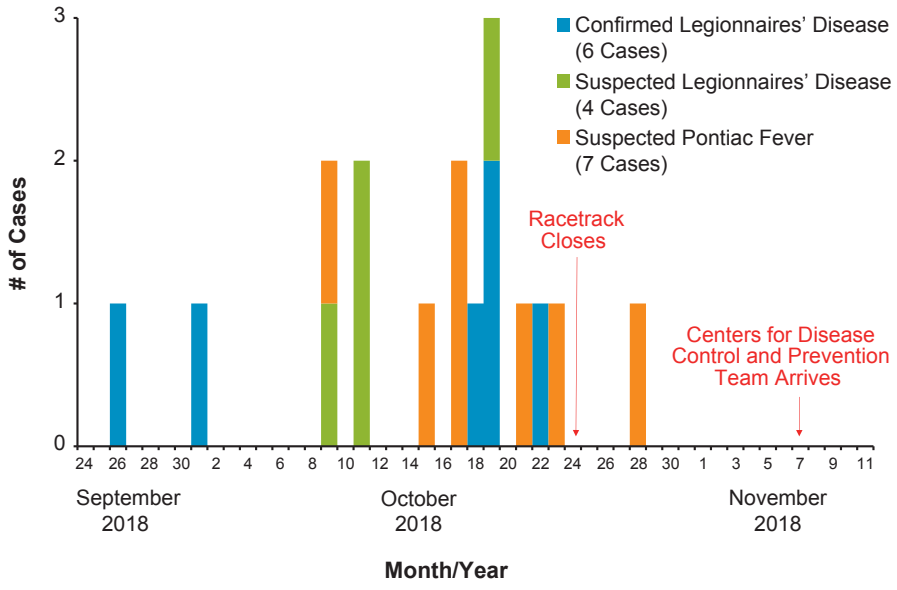


TABLE **2**

Symptoms Reported for Confirmed and Suspected Legionellosis Cases

Symptom	Diagnosis		Total (*n* = 17) # (%)
	LD (*n* = 10)* # (%)	PF (*n* = 7)* # (%)	
Fever	7 (70)	4 (57)	11 (65)
Cough	7 (70)	3 (43)	10 (59)
Chills	7 (70)	3 (43)	10 (59)
Fatigue/weakness	6 (60)	2 (29)	8 (47)
Gastrointestinal**	4 (40)	4 (58)	8 (47)
Headache	3 (30)	2 (29)	5 (29)
Myalgia	2 (20)	1 (14)	3 (18)
Hot/sweats	1 (10)	1 (14)	2 (12)
Light-headed/dizzy	1 (10)	0 (0)	1 (6)

LD = Legionnaires' disease; PF = Pontiac fever.
*Includes both confirmed and suspected cases.
**Symptoms include nausea, vomiting, diarrhea, upset stomach, or loss of appetite.

(free Cl = 0.1–0.3 ppm; total Cl = 0.1–0.4 ppm) and the grandstand (free Cl = 0–0.25 ppm; total Cl = 0–0.3 ppm) and were highest at the incoming water main in both buildings (clubhouse free/total Cl = 1.4/1.5 ppm; grandstand free/total Cl = 0.6/0.6 ppm). The temperature and Cl levels could have been influenced by the lack of water flow resulting from the closure of the buildings on October 24, 2018. All 12 bulk water and swab samples taken from the premises' plumbing system within the clubhouse building and processed at the CDC's *Legionella* laboratory were negative for *Legionella* growth. Prior to CDC's onsite investigation, the racetrack facility management collected and shipped 12 potable water samples from their plumbing system to a commercial laboratory. Two samples collected from hot water taps in the men's and women's restrooms in the grandstand tested positive for *Legionella dumoffii*.

A decorative fountain located in the casino building on the racetrack premises that had been implicated in a previous LD outbreak in 2011 was assessed and found to be properly chlorinated (unpublished investigation finding). None of the current patients had documented exposure to this area; therefore, the probability of the fountain being the source of *Legionella* transmission in this outbreak was considered low and water samples were not collected for processing and culture.

A freestanding consumer-grade hot tub was located in a small room on the first floor of the clubhouse (Figure 1). The hot tub did not possess an autochlorination system and received hand-fed biocide intermittently, compatible with models designed for home use. Two weeks prior to the outbreak, a semiannual inspection by the local health department reported no detectable biocide in the device, which had been malfunctioning and overflowing. Subsequent interviews with workers indicated that the device had been poorly and infrequently maintained, and one user reported personally adding liquid bleach before use. There was no mechanical exhaust pathway leading from the hot tub room to the outdoors, and corrosion was noted on metal ducting within the drop ceiling above the device in the room. All samples were negative for *Legionella* by culture: three biofilm swab samples, a small portion of the water filter, and a bulk water sample from the device. The investigation team, however, was informed that the hot tub had been hyperchlorinated and drained on October 25, 2018, which was prior to inspection and sample collection. The outbreak investigation team was therefore unable to obtain reliable free or total Cl measurements for samples of liquid remaining in the device due to extremely high calorimeter readings above the reportable limit of 2.0 ppm Cl_2.

While the environmental assessment raised suspicion of the hot tub as the *Legionella* source, approximately 35% of the patients had no direct exposure to the hot tub and never visited the first-floor clubhouse area. Inspection of the clubhouse HVAC system revealed that ventilation equipment serving the first-floor jockey locker room was poorly maintained, out-of-service, or missing critical components. A roof-mounted air handling unit (AHU) serving the first floor had not been functioning for an extended period. Similarly, two roof-mounted exhaust fans servicing the hot tub room, kitchen, and men's showers and bathrooms had been out-of-service for several months at the time of the investigation. Four AHUs servicing the second floor were functioning properly; two of the units had UV air treatment systems installed that were not functioning. Notably, none of the AHUs serving the first or second floors was supplying fresh, outdoor air to the occupied spaces, as the outside air intakes were sealed off (Figure 3).

Furthermore, each floor was served by discrete AHUs with no purposeful connection linking airflow between the two floors. The investigation team, however, identified three apparent pathways for air mixing between the first and second floors, where air could travel:

1. up and down the stairwell adjacent to the jockey locker room;
2. between the floors via the elevator shaft adjacent to the jockey locker room and stairwell; and
3. through a large crack that was discovered in the concrete ceiling/floor between the kitchen adjacent to the first-floor hot tub room and a second-floor mechanical/electrical room, where an AHU was also installed for that floor (Figure 3).

This mechanical room was adjacent to a common breakroom and kitchenette in the second-floor office space. The application of a nontoxic, smoke-free fog generator near the crack between floors clearly showed directional air movement from the first floor to the second floor via this route. The second-floor AHU supplied recycled air from a common return plenum space; therefore, any airborne contaminants reaching the second floor could conceivably spread throughout the entire space.

FIGURE **3**

Observed Air Flow in Building of Outbreak Location

Discussion and Conclusion

Our investigation revealed an outbreak of confirmed and suspected legionellosis among 17 workers at a racetrack facility in West Virginia. An epidemiologic and environmental investigation implicated a poorly maintained hot tub as the mostly likely source, although laboratory testing could not directly link that water source to confirmed cases because the hot tub had been hyperchlorinated before CDC's investigation. Just prior to the outbreak, the consumer-grade hot tub had a documented condition of poor maintenance and hypochlorination, providing a suitable environment for *Legionella* growth.

While 65% of confirmed and suspected cases had either direct contact with the hot tub or were exposed to the neighboring hallway, the remaining 35% reported having spent no time on the facility's first floor. The room that housed the hot tub had no functioning exhaust fans to expel warm, humid air and none of the AHUs was supplying fresh, outdoor air to the system. These factors created a closed system with an air-concentrating effect, allowing air to passively move upward through elevator shafts and stairwells via the thermal stack effect. Most significantly, a large crack was discovered in the ceiling and floor, allowing a pathway for aerosols to pass into the second-floor breakroom and into the AHU serving the second floor (Figure 3). We hypothesize that aerosolized water containing *Legionella* passed from the first-floor hot tub to the second floor via these aforementioned mechanisms (Figure 3).

The attack rate among workers in the second-floor office space was 31%, which is an above-average attack rate for LD, especially when one considers that there was no direct exposure (Fraser et al., 1977). The closed system and lack of fresh air intakes concentrating contaminants in the air could account for this above-average attack rate.

To stop this outbreak, the facility management voluntarily closed the clubhouse building. No further cases occurred more than one incubation period after the closure. The management of the facility, however, chose to remove the hot tub because results of the investigation implicated the hot tub as the source of *Legionella* that caused the outbreak. The clubhouse reopened on November 21, 2018, and no new cases associated with that building were identified. Two patients with LD who reported visiting the casino during their exposure periods were identified, but none associated with the clubhouse was identified.

This investigation was subject to several limitations. *Legionella* was not cultured from samples taken from the hot tub, likely because the hot tub had been hyperchlorinated and drained approximately 2 weeks prior to the investigation.

In total, 11 cases (65%) were classified as suspected because they did not have confirmatory laboratory test results. Patients lacked appropriate testing for several reasons. For example, many did not seek healthcare, and some healthcare professionals might not have suspected legionellosis; therefore, healthcare professionals would not have collected appropriate specimens and ordered the relevant tests. This situation is often the case for PF, which presents as a nonspecific illness with milder symptoms than LD. For this rea-

son, sporadic cases of PF are rarely detected outside the context of a known outbreak.

Legionellosis outbreaks are preventable. Proper implementation of an effective water management program can reduce the risk of *Legionella* growth and transmission in building water systems and aerosolizing devices (ASHRAE, 2018; CDC, 2018). Each water management program should be tailored to the individual needs of that building. Considerations include vulnerabilities of the building's occupants, water system age and design, and presence of aerosolizing devices.

Despite the lack of laboratory evidence linking patients to the hot tub, epidemiologic and environmental links were well-documented. In this outbreak, we identified that six cases (35%) had no direct exposure to the suspected source. Many LD outbreaks, including those that are occupational in nature, have been caused, at least in part, by indirect exposure to cooling towers (Band et al., 1981; Dondero et al., 1980; Principe et al., 2017; Quinn et al., 2015). Fewer outbreaks caused by indirect exposure to hot tubs, however, have been documented (Sánchez-Busó et al., 2016). The design, maintenance, and performance of a building's air-handling systems should be considered during investigations when the source is unknown or suspected to be a hot tub. Considering indirect exposure routes can be particularly useful for source identification and case-finding, which could lead to more effective public health action.

Disclaimer: The findings and conclusions in this article are those of the authors and do not necessarily represent the official position of CDC. This project was reviewed in accordance with CDC human research protection procedures and was determined to be nonresearch, public health response; therefore, CDC institutional review board approval was not required.

Corresponding Author: Jared R. Rispens, National Center for Environmental Health, Centers for Disease Control and Prevention, 4770 Buford Highway, MS S106-5, Atlanta, GA 30309. E-mail: jared.r.rispens@uscg.mil.

References

ASHRAE. (2018). *ANSI/ASHRAE Standard 188-2018, Legionellosis: Risk management for building water systems*. Atlanta, GA: Author. https://www.ashrae.org/technical-resources/bookstore/ansi-ashrae-standard-188-2018-legionellosis-risk-management-for-building-water-systems

Band, J.D., LaVenture, M., Davis, J.P., Mallison, G.F., Skaliy, P., Hayes, P.S., . . . Fraser, D.W. (1981). Epidemic Legionnaires' disease. Airborne transmission down a chimney. *JAMA*, *245*(23), 2404–2407.

Centers for Disease Control and Prevention. (2018). *Toolkit: Developing a water management program to reduce* Legionella *growth and spread in buildings*. https://www.cdc.gov/legionella/wmp/toolkit/index.html

Centers for Disease Control and Prevention. (2019). *Nationally notifiable infectious diseases and conditions, United States: Annual tables: Annual data for 2018*. https://wonder.cdc.gov/nndss/nndss_annual_tables_menu.asp

Council of State and Territorial Epidemiologists. (2009). *Public health reporting and national notification for legionellosis* (09-ID-45). Atlanta, GA: Author. https://cdn.ymaws.com/www.cste.org/resource/resmgr/PS/09-ID-45.pdf

Council of State and Territorial Epidemiologists. (2019). *Revision to the case definition for national legionellosis surveillance* (19-ID-04). Atlanta, GA: Author. https://cdn.ymaws.com/www.cste.org/resource/resmgr/2019ps/final/19-ID-04_Legionellosis_final.pdf

Dondero, T.J., Jr., Rendtorff, R.C., Mallison, G.F., Weeks, R.M., Levy, J.S., Wong, E.W., & Schaffner, W. (1980). An outbreak of Legionnaires' disease associated with a contaminated air-conditioning cooling tower. *The New England Journal of Medicine*, *302*(7), 365–370.

Fraser, D.W., Tsai, T.R., Orenstein, W., Parkin, W.E., Beecham, H.J., Sharrar, R.G., . . . Brachman, P.S. (1977). Legionnaires' disease—Description of an epidemic of pneumonia. *The New England Journal of Medicine*, *297*(22), 1189–1197.

Garrison, L.E., Kunz, J.M., Cooley, L.A., Moore, M.R., Lucas, C., Schrag, S., . . . Whitney, C.G. (2016). Vital signs: Deficiencies in environmental control identified in outbreaks of Legionnaires' Disease—North America, 2000–2014. *Morbidity and Mortality Weekly Report*, *65*(22), 576–584.

Glick, T.H., Gregg, M.B., Berman, B., Mallison, G., Rhodes, W.W., Jr., & Kassanoff, I. (1978). Pontiac fever. An epidemic of unknown etiology in a health department: I. Clinical and epidemiologic aspects. *American Journal of Epidemiology*, *107*(2), 149–160.

Kozak, N.A., Lucas, C.E., & Winchell, J.M. (2013). Identification of *Legionella* in the environment. *Methods in Molecular Biology*, *954*, 3–25.

National Academies of Sciences, Engineering, and Medicine. (2020). *Management of* Legionella *in water systems*. Washington, DC: The National Academies Press.

Principe, L., Tomao, P., & Visca, P. (2017). Legionellosis in the occupational setting. *Environmental Research*, *152*, 485–495.

Quinn, C., Demirjian, A., Watkins, L.F., Tomczyk, S., Lucas, C., Brown, E., . . . DiOrio, M. (2015). Legionnaires' disease outbreak at a long-term care facility caused by a cooling tower using an automated disinfection system—Ohio, 2013. *Journal of Environmental Health*, *78*(5), 8–13.

Sánchez-Busó, L., Guiral, S., Crespi, S., Moya, V., Camaró, M.L., Olmos, M.P., . . . González-Candelas, F. (2016). Genomic investigation of a legionellosis outbreak in a persistently colonized hotel. *Frontiers in Microbiology*, *6*, 1556.

Shah, P., Barskey, A., Binder, A., Edens, C., Lee, S., Smith, J., . . . Division of Bacterial Diseases, National Center for Immunization and Respiratory Diseases, CDC. (2019). *Legionnaires' disease surveillance summary report, United States, 2014–2015*. https://www.cdc.gov/legionella/health-depts/surv-reporting/2014-15-surv-report-508.pdf