Legionellosis
(Legionnaires' Disease and Pontiac Fever)

Organism: *Legionella pneumophila* are fastidious aerobic bacilli. At least 48 different species have been implicated in human disease, but most documented Legionella infections in the United States are caused by *Legionella pneumophila* serogroup 1.

Incubation period: Legionnaires' disease 2-10 days, most often 5-6 days. Pontiac fever 5-72 hours, most often 24-48 hours.

Infectious period: Person-to-person transmission has not been documented.

Transmission route: Legionnaires' disease is acquired through inhalation of aerosolized water contaminated with *L. pneumophila*. *Legionella* can be found in natural, freshwater environments, but they are present in insufficient numbers to cause disease. Potable (drinking) water systems, whirlpool spas, and cooling towers provide the three conditions needed for *Legionella* transmission – heat, stasis, and aerosolization; therefore, these are common sources of outbreaks.

Treatment: The recommended treatment of Legionnaire's disease is either a respiratory fluoroquinolone, such as levofloxacin, or a macrolide (azithromycin). Observational studies suggest that levofloxacin may be more effective than macrolides, especially in severe cases.

Information Needed for the Investigation:

Verify the Diagnosis

- Legionellosis is associated with two distinct clinical manifestations:
  - **Legionnaires' disease**: characterized by pneumonia and a non-productive cough. Chest imaging findings are variable and may show patchy or focal areas of consolidation or bilateral involvement. The illness may be quite severe and may ultimately progress to respiratory failure.
  - **Pontiac fever**: a self-limited febrile illness, usually accompanied by cough, which does not progress to pneumonia or death. Patients recover spontaneously in 2-5 days without treatment. This clinical syndrome may represent reaction to inhaled *Legionella* antigen rather than bacterial invasion.

Laboratory criteria for diagnosis:

- **Confirmed:**
  - By culture: isolation of any *Legionella* organism from respiratory secretions, lung tissue, pleural fluid, or other normally sterile fluid.
  - By detection of specific *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.

- **Suspect:**
  - 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. mcdadei, 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.

Case Classification

Suspected: A clinically compatible case that meets at least one of the presumptive (suspected) laboratory criteria.

- Travel-associated: a case that has a history of spending at least one night away from home, either in the same country of residence or abroad, in the ten days before onset of illness.

Confirmed: A clinically compatible case that meets at least one of the confirmatory laboratory criteria.

- Travel-associated: a case that has a history of spending at least one night away from home, either in the same country of residence or abroad, in the ten days before onset of illness.

Determine the Extent of Illness

- Investigation of contacts and source of infection. Search (households, business) for additional cases due to infection from a common environmental source.
- Ask patient, family members or friends about travel in the 10-14 days before onset of symptoms. Travel-associated legionnaires' disease should be a priority. About 21% of all cases reported to the CDC are thought to be associated with recent travel and that number is rising as reporting improves.

Laboratory Specimens

- Urinary antigen assay *AND* culture of respiratory secretions on selective media are the preferred diagnostic tests for Legionnaire disease
- *Legionella* testing is not performed at the Alaska State Public Health Laboratory (ASPHL). Testing is readily available at reference labs (Lab Corp, Quest).
- CDC does not accept laboratory specimens of any type without clearance through the Respiratory Diseases Branch prior to submission. This includes urine antigen testing, specimens for culture, or other submissions for either initial or confirmatory testing.
- CDC Laboratory testing is only done under special circumstances, *e.g.*, an outbreak investigation that CDC is involved with, or if CDC has granted prior permission for submission of specimens. *Routine laboratory submissions are not accepted by the CDC laboratories.*

Contact and Control Measures

- Because of the public health importance of timely reporting, inform CDC of travel-associated cases by emailing travellegionella@cdc.gov .
- If the case is cruise ship related, inform the CDC Division of Global Migration & Quarantine and the CDC Vessel Sanitation Program. (Can be a single email: VSP@cdc.gov , FMA0@cdc.gov., and travellegionella@cdc.gov)
- If suspected environmental source is in Anchorage, contact the Municipality of Anchorage (MOA). For sources in Alaska, but outside of Anchorage, contact the Division of Environmental Conservation (DEC), 269-7501.
- If suspected environmental source is outside of Alaska, contact the local state public health department.
- For detailed information on environmental assessment and sampling and de-contamination of affected water systems see CDC resources available here: http://www.cdc.gov/legionella/health-depts/inv-tools.html

Hospital Considerations

- Standard Precautions

Reporting Requirements

- AK-STARS: enter all suspect and confirmed cases.
- CDC case investigation forms that can be used to investigate a case: http://www.cdc.gov/legionella/downloads/case-report-form.pdf
- Inform CDC about travel-associated cases by emailing travellegionella@cdc.gov. CDC is working to improve the efficiency of travel-associated surveillance at CDC.
- FTR for outbreaks.

References

- http://www.cdc.gov/legionella/index.html
- Red Book 2012 Report of the Committee on Infectious Diseases, 29th Edition
- Control of Communicable Diseases Manual 20th Edition
- Mandell LA, Wunderink RG, Anzueto A, et al. Infectious Diseases Society of America/American Thoracic Society consensus guidelines on the management of community-acquired pneumonia in adults. *Clin Infect Dis* 2007;44 Suppl 2:S27-72.
- CDC Case Definition is used to define suspect and confirmed cases. http://wwwn.cdc.gov/NNDSS/script/conditionsummary.aspx?CondID=94

Legionellosis *(Legionella pneumophila)*

2005 Case Definition

Clinical description

Legionellosis is associated with two clinically and epidemiologically distinct illnesses: Legionnaire disease, which is characterized by fever, myalgia, cough, and clinical or radiographic pneumonia; and Pontiac fever, a milder illness without pneumonia.

Laboratory criteria for diagnosis:

Suspect:

- 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, immunohistochemstry (IHC), or other similar method, using validated reagents.
- By detection of *Legionella* species by a validated nucleic acid assay.

Confirmed:

- 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 classification

Suspect: a clinically compatible case that meets at least one of the presumptive (suspect) laboratory criteria.

- Travel-associated: a case that has a history of spending at least one night away from home, either in the same country of residence or abroad, in the ten days before onset of illness.

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Alaska Division of Public Health

Prevention Promotion Protection

Legionnaires' Disease Fact Sheet

What is Legionnaires' disease?
Legionnaires' disease (LEE-juh-nare) is caused by a type of bacteria called *Legionella.* The bacteria got its name in 1976, when many people who went to a Philadelphia convention of the American Legion suffered from an outbreak of this disease, a type of pneumonia (lung infection). Although this type of bacteria was around before1976, more illness from Legionnaires' disease is being detected now. This is because we are now looking for this disease whenever a patient has pneumonia.

Each year, between 8,000 and 18,000 people are hospitalized with Legionnaires' disease in the U.S. However, many infections are not diagnosed or reported, so this number may be higher. More illness is usually found in the summer and early fall, but it can happen any time of year.

What are the symptoms of Legionnaires' disease?
Legionnaires' disease can have symptoms like many other forms of pneumonia, so it can be hard to diagnose at first. Signs of the disease can include: a high fever, chills, and a cough. Some people may also suffer from muscle aches and headaches. Chest X-rays are needed to find the pneumonia caused by the bacteria, and other tests can be done on sputum (phlegm), as well as blood or urine to find evidence of the bacteria in the body.

These symptoms usually begin 2 to 14 days after being exposed to the bacteria.

A milder infection caused by the same type of *Legionella* bacteria is called ***Pontiac Fever.*** The symptoms of Pontiac Fever usually last for 2 to 5 days and may also include fever, headaches, and muscle aches; however, there is no pneumonia. Symptoms go away on their own without treatment and without causing further problems.

Pontiac Fever and Legionnaires' disease may also be called "Legionellosis" (LEE-juh-nuh-low-sis) separately or together.

How serious is it? What is the treatment?
Legionnaires' disease can be very serious and can cause death in up to 5% to 30% of cases. Most cases can be treated successfully with antibiotics [drugs that kill bacteria in the body], and healthy people usually recover from infection.

Where do *Legionella* bacteria come from?
The *Legionella* bacteria are found naturally in the environment, usually in water. The bacteria grow best in warm water, like the kind found in hot tubs, cooling towers, hot water tanks, large plumbing systems, or parts of the air-conditioning systems of large buildings. They do not seem to grow in car or window air-conditioners.

How do people get Legionnaires' disease?
People get Legionnaires' disease when they breathe in a mist or vapor (small droplets of water in the air) that has been contaminated with the bacteria. One example might be from breathing in the steam from a whirlpool spa that has not been properly cleaned and disinfected. The bacteria are NOT spread from one person to another person.

Outbreaks are when two or more people become ill in the same place at about the same time, such as patients in hospitals. Hospital buildings have complex water systems, and many people in hospitals already have illnesses that increase their risk for *Legionella* infection.

Other outbreaks have been linked to aerosol sources in the community, or with cruise ships and hotels, with the most likely sources being whirlpool spas, cooling towers (air-conditioning units from large buildings), and water used for drinking and bathing.

Who gets this disease?
People most at risk of getting sick from the bacteria are older people (usually 65 years of age or older), as well as people who are smokers, or those who have a chronic lung disease (like emphysema).

People who have weak immune systems from diseases like cancer, diabetes, or kidney failure are also more likely to get sick from *Legionella* bacteria. People who take drugs to suppress (weaken) the immune system (like after a transplant operation or chemotherapy) are also at higher risk.

What should I do if I think I was exposed to *Legionella* bacteria?
Most people exposed to the bacteria do not become ill. If you have reason to believe you were exposed to the bacteria, talk to your doctor or local health department. Be sure to mention if you have traveled in the last two weeks.

A person diagnosed with Legionnaires' disease in the workplace is not a threat to others who share office space or other areas with him or her. However, if you believe that there your workplace was the source of the person's illness, contact your local health department.

3601 C Street, Suite 540
Anchorage, AK 99503
907-269-8000
(f) 907-562-7802

Reset Patient ID Info

Patient's Name: _____ Telephone Number: _____ Hospital: _____
LAST / FIRST / MI

Address: _____ _____ Patient Chart No.: _____
NUMBER / STREET / APT NO / CITY / STATE ZIP CODE

PATIENT IDENTIFIER INFORMATION IS NOT TRANSMITTED TO CDC

Form Approved OMB No. 0920-0728

CDC • National Center for Immunization and Respiratory Diseases

LEGIONELLOSIS CASE REPORT

(DISEASE CAUSED BY ANY *LEGIONELLA* SPECIES)

Reset Form

Department of Health & Human Services
Centers for Disease Control and Prevention (CDC), Atlanta, Georgia, 30333
http://www.cdc.gov/legionella/index.htm

Case No.: ☐☐☐☐☐☐ (CDC use only)

1. State Health Dept. Case No.:	2. Reporting State: ☐☐	3. County of Residence:	4. State of Residence: ☐☐	5. Occupation:

6a. Date of Birth: ☐☐ ☐☐ ☐☐☐☐ (Mo. Day Year)

6b. Age: ☐☐☐ 1 ☐ Days 2 ☐ Mos. 3 ☐ Years

7. Sex: 1 ☐ Male 2 ☐ Female

8. Ethnicity: 1 ☐ Hispanic/Latino 2 ☐ Not Hispanic/Latino 9 ☐ Unknown

9. Race: (check all that apply)
1 ☐ American Indian/ Alaska Native
1 ☐ Asian
1 ☐ Black or African American
1 ☐ Native Hawaiian or Other Pacific Islander
1 ☐ White
1 ☐ Unknown

10. Diagnosis: (check one)
1 ☐ Legionnaires' Disease (pneumonia, clinical or X-ray diagnosed)
2 ☐ Pontiac Fever (fever and myalgia without pneumonia)
8 ☐ Other (e.g., endocarditis, wound infection): _____

11. Date of symptom onset of legionellosis: ☐☐ ☐☐ ☐☐☐☐ (Mo. Day Year)

12. Date of first report to public health at any level: ☐☐ ☐☐ ☐☐☐☐ (Mo. Day Year)

13. Was the patient hospitalized during treatment for legionellosis? 1 ☐ Yes 2 ☐ No 9 ☐ Unknown
If yes, date of admission: ☐☐ ☐☐ ☐☐☐☐ (Mo. Day Year)
Hospital name: _____
City, State: _____

14. Outcome of illness:
1 ☐ Survived 2 ☐ Died 3 ☐ Still ill 9 ☐ Unknown

15. In the 10 days before onset, did the patient spend any nights away from home (excluding healthcare settings)?
(check one) 1 ☒ Yes* 2 ☐ No 9 ☐ Unknown *If yes, please complete the following table.*

ACCOMMODATION NAME	ADDRESS	CITY	STATE	ZIP	COUNTRY	ROOM NUMBER	DATES OF STAY	
							ARRIVAL	DEPARTURE

*If yes, was this case reported to CDC at **travellegionella@cdc.gov**? 1 ☐ Yes 2 ☐ No 9 ☐ Unknown

16. In the 10 days before onset, did the patient get in or spend time near a whirlpool spa (i.e., hot tub)?
(check one) 1 ☐ Yes 2 ☐ No 9 ☐ Unknown *If yes, describe where:* _____ *If yes, list dates:* _____

17. In the 10 days before onset, did the patient use a nebulizer, CPAP, BiPAP or any other respiratory therapy equipment for the treatment of sleep apnea, COPD, asthma or for any other reason?
(check one) 1 ☐ Yes 2 ☐ No 9 ☐ Unknown *If yes, does this device use a humidifier?* 1 ☐ Yes 2 ☐ No 9 ☐ Unknown
If yes, what type of water is used in the device? (check all that apply) 1 ☐ Sterile 1 ☐ Distilled 1 ☐ Bottled 1 ☐ Tap 1 ☐ Other 1 ☐ Unknown

18. In the 10 days before onset, did the patient visit or stay in a healthcare setting (e.g., hospital, long term care/rehab/skilled nursing facility, clinic)?
(check one) 1 ☐ Yes 2 ☐ No 9 ☐ Unknown *If yes, please complete the following table.*

TYPE OF HEALTHCARE SETTING / FACILITY (CHECK ONE)	TYPE OF EXPOSURE (CHECK ONE)	NAME OF FACILITY	IS THIS FACILITY ALSO A TRANSPLANT CENTER?	REASON FOR VISIT	CITY	STATE	DATE OF VISIT / ADMISSION	
							START DATE	END DATE
1 ☐ Hospital 2 ☐ Long term care 3 ☐ Clinic 8 ☐ Other:_____	1 ☐ Inpatient 2 ☐ Outpatient 3 ☐ Visitor or volunteer 4 ☐ Employee		1 ☐ Yes 2 ☐ No 9 ☐ Unknown					
1 ☐ Hospital 2 ☐ Long term care 3 ☐ Clinic 8 ☐ Other:_____	1 ☐ Inpatient 2 ☐ Outpatient 3 ☐ Visitor or volunteer 4 ☐ Employee		1 ☐ Yes 2 ☐ No 9 ☐ Unknown					

– IMPORTANT – PLEASE COMPLETE THE BACK OF THIS FORM –

Save Form Next Page

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State Health Dept. Case No.: _____

19. Was this case associated with a healthcare exposure: (check one)

1 ☐ **Definitely:** Patient was hospitalized or a resident of a long term care facility for the entire 10 days prior to onset

2 ☐ **No:** No exposure to a healthcare facility in the 10 days prior to onset

3 ☐ **Possibly:** Patient had exposure to a healthcare facility for a portion of the 10 days prior to onset

8 ☐ **Other (specify)** _____

9 ☐ **Unknown**

20. **In the 10 days before onset,** did the patient visit or stay in an assisted living facility or senior living facility? (check one) 1 ☐ Yes 2 ☐ No 9 ☐ Unknown

TYPE OF FACILITY	TYPE OF EXPOSURE	NAME OF FACILITY	CITY	STATE	DATE OF VISIT	
					START DATE	END DATE
1 ☐ Assisted Living	1 ☐ Resident 2 ☐ Visitor or Volunteer 3 ☐ Employee					
2 ☐ Senior Living (Includes retirement homes without skilled nursing or personal care)	1 ☐ Resident 2 ☐ Visitor or Volunteer 3 ☐ Employee					

21. Was this case associated with a known outbreak or possible cluster? (check one) 1 ☐ Yes 2 ☐ No 9 ☐ Unknown

If yes, specify name of facility, city, and state of outbreak: _____

PLEASE CHECK ALL METHODS OF DIAGNOSIS WHICH APPLY:

1 ☐ CONFIRMED CASE

1 ☐ **Urine Antigen Positive:** *If yes,*

Date Collected: ☐☐ (Mo.) ☐☐ (Day) ☐☐☐☐ (Year)

2 ☐ **Culture Positive:** *If yes,*

Date Collected: ☐☐ (Mo.) ☐☐ (Day) ☐☐☐☐ (Year)

Site: 1 ☐ lung biopsy 2 ☐ respiratory secretions (e.g., sputum, BAL) 3 ☐ pleural fluid 4 ☐ blood 8 ☐ other (specify) _____

Species: _____ Serogroup: _____

3 ☐ **Fourfold rise in antibody titer to *Legionella pneumophila* serogroup 1:** *If yes,*

Initial (acute) titer: _____ Date Collected: ☐☐ (Mo.) ☐☐ (Day) ☐☐☐☐ (Year)

Convalescent titer: _____ Date Collected: ☐☐ (Mo.) ☐☐ (Day) ☐☐☐☐ (Year)

2 ☐ SUSPECT CASE

4 ☐ **Fourfold rise in antibody titer OTHER THAN *Legionella pneumophila* serogroup 1 or to multiple species or serogroups of *Legionella* using pooled antigen:** *If yes,*

Initial (acute) titer: _____ Date Collected: ☐☐ (Mo.) ☐☐ (Day) ☐☐☐☐ (Year)

Convalescent titer: _____ Date Collected: ☐☐ (Mo.) ☐☐ (Day) ☐☐☐☐ (Year)

Species: _____ Serogroup: _____

5 ☐ **Direct Fluorescent Antibody (DFA) or Immunohistochemistry (IHC) Positive:** *If yes,*

Date Collected: ☐☐ (Mo.) ☐☐ (Day) ☐☐☐☐ (Year)

Site: 1 ☐ lung biopsy 2 ☐ respiratory secretions (e.g., sputum, BAL) 3 ☐ pleural fluid 4 ☐ blood 8 ☐ other (specify) _____

Species: _____ Serogroup: _____

6 ☐ **Nucleic Acid Assay (e.g., PCR):** *If yes,*

Date Collected: ☐☐ (Mo.) ☐☐ (Day) ☐☐☐☐ (Year)

Site: 1 ☐ lung biopsy 2 ☐ respiratory secretions (e.g., sputum, BAL) 3 ☐ pleural fluid 4 ☐ blood 8 ☐ other (specify) _____

Species: _____ Serogroup: _____

Interviewer's Name:	State Health Dept. Official who reviewed this report:
Affiliation:	Title:
Telephone No.:	Telephone No.:

REPORTING INSTRUCTIONS

Local Health Dept. Please submit this document to:

State/DHD/SSS via your CD clerk

State Health Dept. Return completed form to:

Respiratory Diseases Branch, Mailstop C25
Office of Infectious Diseases
Centers for Disease Control and Prevention
1600 Clifton Rd. NE, Atlanta, GA 30333

_____

_____

_____