LEGIONELLOSIS

1. **Agent**: *Legionella* species are weakly staining Gram-negative bacilli, which do not grow on standard bacteriologic media. More than 30 species have been identified, but *Legionella pneumophila* is responsible for 80–90% of clinical infections. Six serogroups of *L. pneumophila* are known to cause disease in humans, but serogroup 1 is most commonly associated with disease.

2. **Identification**: Two clinically and epidemiologically distinct syndromes: pneumonia (Legionnaires' disease) and Pontiac fever.

   a. **Symptoms**:

      Legionnaires' disease: Clinical manifestations and severity may vary between individuals. Typical presentation is subacute onset of malaise, fever, headache, muscle aches, and non-productive cough, followed in 24–48 hours by rapidly rising temperature, relative bradycardia, chills, progressive pneumonia, and evidence of multi-system involvement including diarrhea, changes in mental status, hyponatremia, and abnormal kidney and liver function tests. Initial chest X-rays commonly show patchy bilateral infiltrates, with rapid progression to consolidation.

      Pontiac fever: An acute, self-limiting flu-like illness, with headache, sore throat, fever, and myalgia, without pneumonia.

   b. **Differential Diagnosis**: Other known causes of pneumonia and febrile respiratory disease.

   c. **Diagnosis**: High index of suspicion; failure of pneumonia to respond to therapy with penicillins, cephalosporins, or amino-glycosides; isolation of organism on special media; 4-fold rise in indirect fluorescent antibody (IFA) titer to >1:128 taken within first 7 days of illness and 3–6 weeks later; direct fluorescent antibody (DFA) stain of lung tissue or sputum; urinary antigen testing by enzyme immunoassay (EIA) or immunochromatography; DNA probe testing of clinical specimens. A single elevated antibody titer does not confirm a case of Legionnaires' disease because IFA titers $\geq$1:256 are found in 1–20% of healthy adults.

3. **Incubation**: Legionnaires' disease: 2–10 days, usually 5–6 days. Pontiac fever: 5–66 hours, usually 24–48 hours.

4. **Reservoir**: *Legionella* organisms are common inhabitants of aquatic environments. Excavated soil, humidifiers, and air conditioning evaporative condensers and cooling towers have been implicated epidemiologically. The organism has also been isolated from hot and cold water taps and showers, and from creek and pond water and surrounding soil. Legionella is chlorine tolerant and proliferates in warm, stagnant water systems.

5. **Transmission**: Inhalation of aerosols of water contaminated with *Legionella* sp. are the primary mechanisms by which these organisms enter a patient's respiratory tract; aspiration of contaminated potable water or pharyngeal colonization.

6. **Communicability**: Person-to-person transmission has not been documented.

7. **Specific Treatment:** Quinolones are now the treatment of choice: levofloxacin 500 mg intravenously daily or ciprofloxacin 400 mg intravenously every 12 hours. Other treatment options include intravenous azithromycin 500 mg daily or erythromycin 2 g to 4 g intravenous daily with the addition of rifampin 600 mg daily for the first 3-5 days for more severe cases. The standard length of therapy is from 14 to 21 days depending of disease severity.

   Note: Rifampin stains contact lenses and turns urine orange-red. It is not recommended for use during pregnancy. It also may decrease the effectiveness of oral contraceptives.

8. **Immunity**: Apparently lifelong to specific strains.

REPORTING PROCEDURES

1. **Reportable**. (Title 17, Section 2500 and 2505, *California Code of Regulations*).

2. **Report Form**: **LEGIONELLOSIS CASE REPORT (CDPH 8588)**. ACDC will complete it.

3. **Epidemiologic Data:**

   a. Occupation.

   b. History of travel, convention attendance, or hospital stays or visits during the 2 weeks before onset of illness.

   c. Recent renovation, remodeling, construction, presence of air conditioning cooling towers at home or office.

   d. History of any chronic disease, alcohol use, smoking, organ transplant, dialysis, renal or hepatic failure or any form of immunodeficiency.

CONTROL OF CASE, CONTACTS & CARRIERS

CASE: Precautions: None.

CONTACTS: No restrictions.

CARRIERS: Carrier state not demonstrated to date.

Investigations of outbreaks will be coordinated by ACDC.

If one definite healthcare associated infection (HAI) case (i.e., after ≥10 days of continuous inpatient stay) is determined or if two possible HAI cases (i.e., within 2–9 days of inpatient stay) are determined to have occurred within 6 months of each other, the facility will conduct a 6 month retrospective review of patients throughout the facility with healthcare associated pneumonia (pneumonia that develops day 3 or more after admission), and continue enhanced surveillance for HAI pneumonia for 6 months prospectively.

Perform a full investigation at a facility for the source of Legionella when ≥1 case of definite healthcare associated Legionnaire's disease is identified or ≥2 cases of possible healthcare associated Legionnaire's disease is identified (within 6 months of each other) AND the Los Angeles County Department of Public Health assessment finds that there is a high probability that exposure to Legionella occurred at the identified facility/facilities.

If an environmental investigation is determined to be needed, licensed healthcare facilities must notify their local Licensing and Certification district office.

PREVENTION-EDUCATION

For prevention and control of healthcare associated Legionnaires' disease, refer to: Guidelines for Preventing Health-Care—Associated Pneumonia, 2003, Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee, MMWR, March 26, 2004 / 53(RR03); 1–36 and California Department of Public Health Healthcare Associated Legionnaire's Disease Investigation Quicksheet, both available at:

http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5303a1.htm

https://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/HA_Legionnaires%20Disease%20Quicksheet%20March%202017.pdf

Hospitals and other healthcare facilities often have large, complex water systems, making them potentially high risk settings for transmission of legionellosis to vulnerable patients or residents. We recommend all healthcare facilities have a water management program to control Legionella.

DIAGNOSTIC PROCEDURES

1. Culture of respiratory secretions and/or tissue is the preferred method of diagnosis. Culturing permits identification of the specific *Legionella* species and sero-group. It is essential where outbreaks are suspected so that environmental sources can be linked to patient isolates. Culturing requires specialized media; consult the Public Health Laboratory.

2. Urinary antigen detection by EIA is a very sensitive test for *L. pneumophila* serogroup 1 and is readily available through commercial laboratories and the Public Health Laboratory.

3. Direct fluorescent antigen (DFA) detection on respiratory secretions or tissue specimens can be performed at the Public Health Laboratory.

4. Serologic diagnosis by immunofluorescent antibody test (IFA) requires both acute and convalescent sera to make the diagnosis of legionellosis. Submit refrigerated spun sera to specialized commercial laboratory or the Public Health Laboratory for testing. The first specimen should be collected at acute onset to 2 weeks after symptoms and the second specimen 3 to 6 weeks later.