

GUIDELINES FOR THE PREVENTION OF NOSOCOMIAL LEGIONNAIRES' DISEASE

in

Los Angeles County Department of Health Services Medical Facilities

Background

In response to the 2002 nosocomial Legionnaire's Disease (LD) outbreak at a Los Angeles hospital in Los Angeles, the Los Angeles County (LAC) Board of Supervisors (BOS) directed Thomas Garthwaite, MD, Chief Medical Officer, and Jonathan E. Fielding, MD, MPH, Health Officer, to conduct water sampling and culturing for *Legionella species* at all 6 LAC Department of Health Services (DHS) hospital facilities and one county office building, the Hall of Administration.

Three of the six DHS hospital facilities and the one county office building sampled grew *Legionella pneumophila* from their water systems. The water supplied to these facilities includes chlorinated water provided by Los Angeles City Department of Water and Power (DWP), mono-chloraminated water from the Metropolitan Water District, and non-chlorinated and chlorinated well water from other water agencies.

This document has been prepared by the Acute Communicable Disease Control Unit (ACDC) LAC DHS and reviewed by the State of California Department of Health Services to provide guidelines for the prevention of LD in DHS medical facilities. The risk of developing community acquired LD from public buildings where *Legionella* sp. have been recovered from potable water is unknown. This bacterium has frequently been detected in water systems of buildings and hospitals without being associated with known cases of disease. It has also been isolated from environmental sources (plumbing systems, cooling towers) where outbreaks and sporadic cases have been confirmed. This document will provide recommendations for only LAC DHS medical facilities from January 2001 through December 23, 2003, no cases of nosocomial LD were reported to ACDC from any DHS hospital.

Pre-emptive Culturing of Water

Pre-emptive culturing of water from hospitals without reported Legionnaires' Disease (LD) cases is considered primary prevention of LD. Sample collection, site of collection, number of specimens collected, and time of collection all can affect the results.

Primary prevention of LD in hospitals with no nosocomial identified cases remains controversial. The Centers for Disease Control and Prevention (CDC) outlines two prevention strategies:

1. Routine periodic culturing of water samples from the hospital's potable water system for the purpose of detecting *Legionella* species; and
2. Maintain a high index of suspicion for LD among all nosocomial pneumonia cases, especially in individuals at high risk for this disease, and pursue an environmental investigation upon confirmation of one definite case or two probable cases.

The CDC has generally recommended that the second strategy be followed. In contrast to the CDC guidelines, the Allegheny (PA) County Health Department has recommended routine environmental cultures of the hospital water supply, since 1986, so as to screen for the possibility of occult LD in the hospital. When $\geq 30\%$ of the samples from a single screening period from the hospital's potable water system are culture-positive for *Legionella* sp., the hospital's potable water system is decontaminated, and diagnostic laboratory tests for LD are made available for clinicians in the hospital laboratory so active case surveillance can be implemented. **It is to be noted that the 30% action level for potable water mitigation and enhanced LD surveillance is based on data collected by Allegheny County Public Health Department, which has not been replicated outside this county.** This approach is based on the premise that cases of nosocomial LD can occur only if *Legionella* sp. is present in the potable water system, and conversely, if *Legionella* sp. is cultured from the water system, cases of nosocomial LD could occur. They feel this approach has resulted in a 50% decrease in nosocomial LD. The main argument against this approach is that, in the absence of cases, the relationship between water cultures and the risk for LD remains undefined.

It should also be recognized that none of the LAC DHS hospitals currently perform bone marrow or solid organ transplantation, which is a well established risk factor for LD. The CDC endorses environmental surveillance for *Legionella* sp. for facilities performing bone marrow and solid organ transplants and subsequent water remediation efforts when *Legionella* sp. is cultured from the potable water.

Recommendations for Prevention

The objective of *Legionella* prevention is not elimination of *Legionella* in water systems, but ensuring the absence of conditions that foster bacteria amplification that may lead to disease transmission.

All Medical Facilities – Regardless of Water Culture Results

In addition to routine hospital and building plumbing/environmental maintenance, the following standards should be followed by all medical facilities, regardless of water culture results:

1. Clinicians should be educated to heighten their suspicion for cases of nosocomial and community acquired LD and use appropriate methods for its diagnosis and treatment.
2. Appropriate diagnostic tests should be submitted when the diagnosis of LD is considered. Patients in whom LD is considered should have a sputum culture and a urine antigen test performed. Hospital clinical microbiology laboratories should have the capability of culturing for *Legionella* sp., which requires selective media. All clinical isolates of *Legionella* sp. should be sent to the LAC Public Health Laboratory for confirmation and serogrouping. For some clinical microbiology laboratories, direct visualization of the bacterium in respiratory secretions or tissue by immunofluorescent microscopy may also be feasible as an additional more rapid diagnostic approach. Urinary antigen screening will only detect *L. pneumophila* serogroup 1. Testing paired sera for *Legionella* antibodies (acute and convalescent sera 3 to 4 weeks apart) is appropriate for surveillance but is not useful for acute diagnosis.
3. The LAC Public Health Laboratory should serve as a reference laboratory for *Legionella* species, with the capability of serotyping, species identification, and molecular characterization of isolates.

4. Use the CDC case definition to determine whether the Legionella pneumonia case is nosocomially or community acquired.
 - a. Definite nosocomial case: Laboratory confirmed diagnosis and patient hospitalized continuously for ≥ 10 days before onset of Legionella infection.
 - b. Possible nosocomial case: Laboratory confirmed diagnosis and patient hospitalized 2 – 9 days before onset of Legionella infection.
 - c. Community acquired case: Diagnosis within the first 2 days of hospitalization and no recent hospitalizations within 10 days of symptom onset.
5. Hospital facilities with more than one case of laboratory-confirmed nosocomially acquired LD within a 6- month period should initiate, in conjunction with ACDC and DHS Environmental Health, a thorough epidemiologic and environmental investigation.
6. Nebulizers and other semi-critical respiratory care equipment should be cleaned with sterile water and maintained according to manufacturer's recommendations.
7. Water placed in nasogastric tubes for feeding or flushing should be bottled or sterile water.
8. Hospital units with high-risk patients should not use large volume humidifiers that create aerosols unless they are sterilized with a high level disinfectant daily and maintained according to manufacturer's recommendations.
9. All community acquired and nosocomial LD cases should be reported to ACDC within 7 calendar days, as required by California Code of Regulations, Title 17, section 2500.
10. To reduce the possibility that *Legionella* species may amplify in the potable water system, facilities maintenance personnel should:
 - Maintain cold water storage and distribution systems at temperatures below 20 degrees C (68 degrees F) when possible.
 - Hot water should be stored above 60 degrees C (140 degrees F) and be circulated with a minimum return of 51 degrees C (124 degrees F).
 - Follow the California Code of Regulations: Title 22, §70863 (d) that states for hot water used by patients, there shall be temperature controls to automatically regulate the temperature between 40.5 degrees C (105 degrees F) and 48.9 degrees C (120 degrees F). This implies that a higher continuous circulating temperature is permitted as long as the temperature at the tap is controlled with preset thermostatic mixing valves regulated to deliver hot water between 40.5 and 48.9 degrees C.
 - Be familiar with Plumbing Code, Title 24, part 5.
 - Maintain hot water free chlorine residuals at 1-2 mg/L (1-2 ppm) at the tap and the pH level between 7-8/
 - Develop a contingency plan for municipal water disruption.
 - Periodically clean showerhead and faucet aerators.

 - Periodically clean hot water storage tank, ice machines and equipment that filters potable water such as endoscope reprocessors.
 - Follow manufacture's recommendations for cleaning equipment.
 - Keep accurate maintenance records.

11. Health facility maintenance engineers and infection control personnel should be familiar with American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE) Standard Guideline 12-2000, "Minimizing the risk of Legionellosis associated with Building Water Systems", as a guideline endorsed by the Centers for Disease Control and Prevention as well as the State of California Department of Health Services to provide information and guidance to minimize risk of disease transmission from building water systems.

For medical facilities where *Legionella sp.* was isolated, additional measures should be considered:

1. Infection control committees should consider additional surveillance policies targeting nosocomial LD as an important preventable cause of nosocomial pneumonia. They should address how to increase the sensitivity of their surveillance system to detect increases in nosocomial pneumonia on any nursing unit, especially among patients with established LD risk factors, including chronic lung disease, cancer, kidney failure requiring dialysis, diabetes, AIDS, and chronic immune suppression drugs. In addition, surveillance should be considered for individuals who are readmitted to a hospital within a 72 hour period with a diagnosis of pneumonia.
2. Future environmental surveillance for *Legionella sp.*, within the water distribution systems in the hospital should be determined by an individual risk assessment of the institution. The risk assessment process should consider both institutional risk factors and remediation efforts. The risk factors are defined by: building engineering specifics (age of building, complexity, sedimentation, number of host water systems); patient mix (solid organ transplant, bone marrow transplant, cancer patients undergoing chemotherapy, COPD); prior history of LD identified among patient within the institution; and history of positive water cultures from the potable water system and outlets or cooling towers.

References

1. Guidelines for the prevention of nosocomial pneumonia. *MMWR*. January 3, 1997, Vol. 46, pp. 28-34.
2. Approaches to prevention and control of Legionella Infection in Allegheny County health care facilities. Allegheny County Health Department. January 1997.
3. Butler JC, Breiman RF. Legionellosis. From Evan AS, Brachman PS, ed. *Bacterial Infections of Humans; Epidemiology and Control*, 3rd ed. New York: Plenum Publishing Corp.
4. Yu VL. Nosocomial legionellosis. *Current Opinion in Infectious Diseases* 2000; 13:385-388.
5. Report of the Maryland Scientific Working Group to study Legionella in the water systems in healthcare institutions. State of Maryland Department of Health & Mental Hygiene. June 14, 2000.
6. Rosenberg, J. Nosocomial legionellosis. California Department of Health Services Public Health Grand Rounds, January 25, 2001.
7. Kool JL, Fiore AE, Kioski CM, et al. More than 10 years of unrecognized nosocomial transmission of Legionnaires' disease among transplant patients. *Infec Control Hosp Epidemiol* 1998; 19: 898-904.
8. Lepine LA, Jernigan DB, Butler JC, et al. A recurrent outbreak of nosocomial Legionnaires' disease detected by urinary antigen testing: evidence for long-term colonization of a hospital plumbing system. *Infec Control Hosp Epidemiol* 1998; 19: 905-910.

9. Yu VL. Resolving the controversy on environmental cultures for *Legionella*: a modest proposal. *Infect Control Hosp Epidemiol* 1998; 19:893-897.
10. American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE) Standard Guideline 12-2000, "Minimizing the risk of legionellosis associated with building water systems", February 5, 2000.