



**SPECIAL  
PATHOGENS  
LABORATORY®**  
THE LEGIONELLA EXPERTS®

# ENDING LEGIONNAIRES' DISEASE: AN AUDACIOUS AND ACHIEVABLE GOAL

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This course is registered with **AIA CES** for continuing professional education.

## AIA Buffalo/WNY Chapter

A001

### Ending Legionnaires' Disease: Audacious and Achievable Goal

BUF2016-

Janet E. Stout, PhD

Date: October 15, 2018



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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

# Course Description

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CMS has mandated *Legionella* risk assessments and water safety plans for healthcare and LTC facilities referring facilities to ASHRAE Standard 188 and the CDC Toolkit. Successful implementation will require specific knowledge about the risk of *Legionella* in the built environment, *Legionella* guidelines and standards, the role of testing in disease prevention, approaches to prevention, secondary disinfection and other waterborne pathogens of concern. Learn what can happen when a confirmed case of healthcare-acquired Legionnaires' disease is diagnosed and key elements to developing an effective water management plan. You will be better prepared for when a CMS surveyor asks for your *Legionella* risk assessment and water management plan.

# Learning Objectives

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At the end of the this course, participants will be able to:

1. Understand *Legionella* as a waterborne pathogen, and cause of healthcare-acquired pneumonia
2. Understand the role of environmental testing for *Legionella* in evaluating risk
3. Implementing approaches to prevention

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## My Affiliations – Two Hats

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- Research Associate Professor in the Dept. of Civil & Environmental Engineering at the University of Pittsburgh
- President of Special Pathogens Laboratory, a laboratory and consulting firm specializing in *Legionella* detection and control

## SPL's Mission: End Legionnaires' Disease

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- No one should die from a preventable disease caused by a bacteria in water.
- Legionnaires' disease can and should be prevented.

## Today's Topics

- Our evolving understanding of *Legionella pneumophila* as a waterborne pathogen
- Evaluating risk and the role of environmental testing for *Legionella*
- Approaches to prevention – Ending Legionnaires' disease

Celebrating More Than 40  
Years of Making Headlines





## American Legion Convention at the Bellevue-Stratford Hotel

1976 Philadelphia



- 58th convention of the American Legion held July 21-24
- Mysterious illness effects 221 and kills 34
- Causative agent of pneumonia would not be identified until 1977

## 1980: Research Begins in Pittsburgh



- More than 30 years studying Legionnaires' disease
  - I'm a Legionellologist
- Mission: What I've learned can help you address Legionella risk

## Since 1980: Research Pioneers



Janet E. Stout and Victor L. Yu

- Over 100 nosocomial cases identified in 5 years in one hospital
- The source of the outbreak was the hospital water system – not a cooling tower!





The  
**New England  
Journal of Medicine**  
Established in 1812 as The NEW ENGLAND JOURNAL OF MEDICINE AND SURGERY

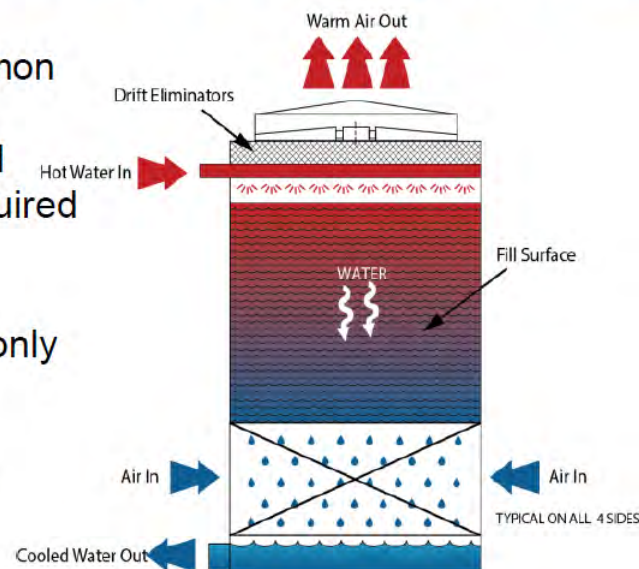
Abstracts in the  
advertising  
section

**UBIQUITOUSNESS OF *LEGIONELLA*  
*PNEUMOPHILA* IN THE WATER SUPPLY  
OF A HOSPITAL WITH ENDEMIC  
LEGIONNAIRES' DISEASE**

JANET STOUT, M.S.,  
VICTOR L. YU, M.D.,  
R. M. VICKERS, B.S.,  
JEFFREY ZURAVLEFF, M.S.,  
MICHELE BEST, B.A.,  
ARNOLD BROWN, M.D.,  
ROBERT B. YEE, Ph.D.,  
AND ROBERT WADOWSKY, M.S.

## Paradigm Shift: Not Cooling Towers

- NOT a common source for sporadic and hospital-acquired cases
- More commonly associated with large community outbreaks



## What We Know Now

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Potable water especially in hospitals  
(and other buildings)  
with complex hot water systems,  
is the most important source of  
*Legionella* transmission.

## PREVENTING LEGIONNAIRES' DISEASE

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# How Are We Doing?

# Centers for Medicare and Medicaid Services (CMS)

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DEPARTMENT OF HEALTH & HUMAN SERVICES  
Centers for Medicare & Medicaid Services  
7500 Security Boulevard, Mail Stop C2-21-16  
Baltimore, Maryland 21244-1850



Center for Clinical Standards and Quality/Survey & Certification Group

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Ref: S&C 17-30-ALL

**DATE:** June 02, 2017  
**TO:** State Survey Agency Directors  
**FROM:** Director  
Survey and Certification Group  
**SUBJECT:** Requirement to Reduce *Legionella* Risk in Healthcare Facility Water Systems to Prevent Cases and Outbreaks of Legionnaires' Disease (LD)

## Legionellosis in the U.S.

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Outbreaks continue to occur (building warm water systems, cooling towers, fountains)

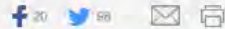


# Outbreaks in Nursing Homes & Assisted Living Facilities

OUTBREAKS

## Legionnaires' death toll rises to 10 in western Illinois

Published September 09, 2015



QUINCY, Ill. – At least 10 people in western Illinois have now died from Legionnaires' disease, after a state veterans home reported two new fatalities among its residents.

An outbreak first identified in late August after an initial case was detected several weeks earlier has sickened 53 residents at the Quincy home, nine of whom died. Four others in Quincy have been diagnosed with the illness, one of whom died. Officials say those cases aren't connected to the larger outbreak.

## Retirement Community

Second case of Legionnaire's disease reported at Ellicott City retirement community



# Hospital Outbreak

## Hotel Outbreaks



### **Legionellosis Outbreak at the Aria Hotel, 2009-2011 --Las Vegas, Nevada**

Public Health Investigation Final Report

- New \$135M 12-story patient tower
- Media coverage and legal action
- \$61k for outbreak management





# South Bronx Outbreak 2015

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- 138 cases, 16 deaths
- 26 were culture-confirmed with *Legionella pneumophila*, serogroup 1 isolated.

Legionnaires' disease outbreak in the South Bronx officially over: NYC health commissioner



Susan Watts/New York Daily News

"I'm happy to announce that the outbreak is over," Health Commissioner Mary Bassett told a Manhattan news conference.

The South Bronx outbreak of Legionnaires' disease that killed a dozen New Yorkers and sickened another 127 is officially history.

## Outbreak Linked to Hotel Cooling Tower



## Legionnaires' Disease Is International

Warstein, Germany

- 165 cases, 12 ICU, 2 deaths caused by *Legionella pneumophila*, serogroup 1
- Outbreak strain found in 2 cooling towers + other sources – including wastewater from a brewery!
- Public health communication

## Public Safety Announcement

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“Whether or not the Warsteiner brewery is found to be the breeding ground for the *Legionella* bacteria, officials have been making it clear that ...

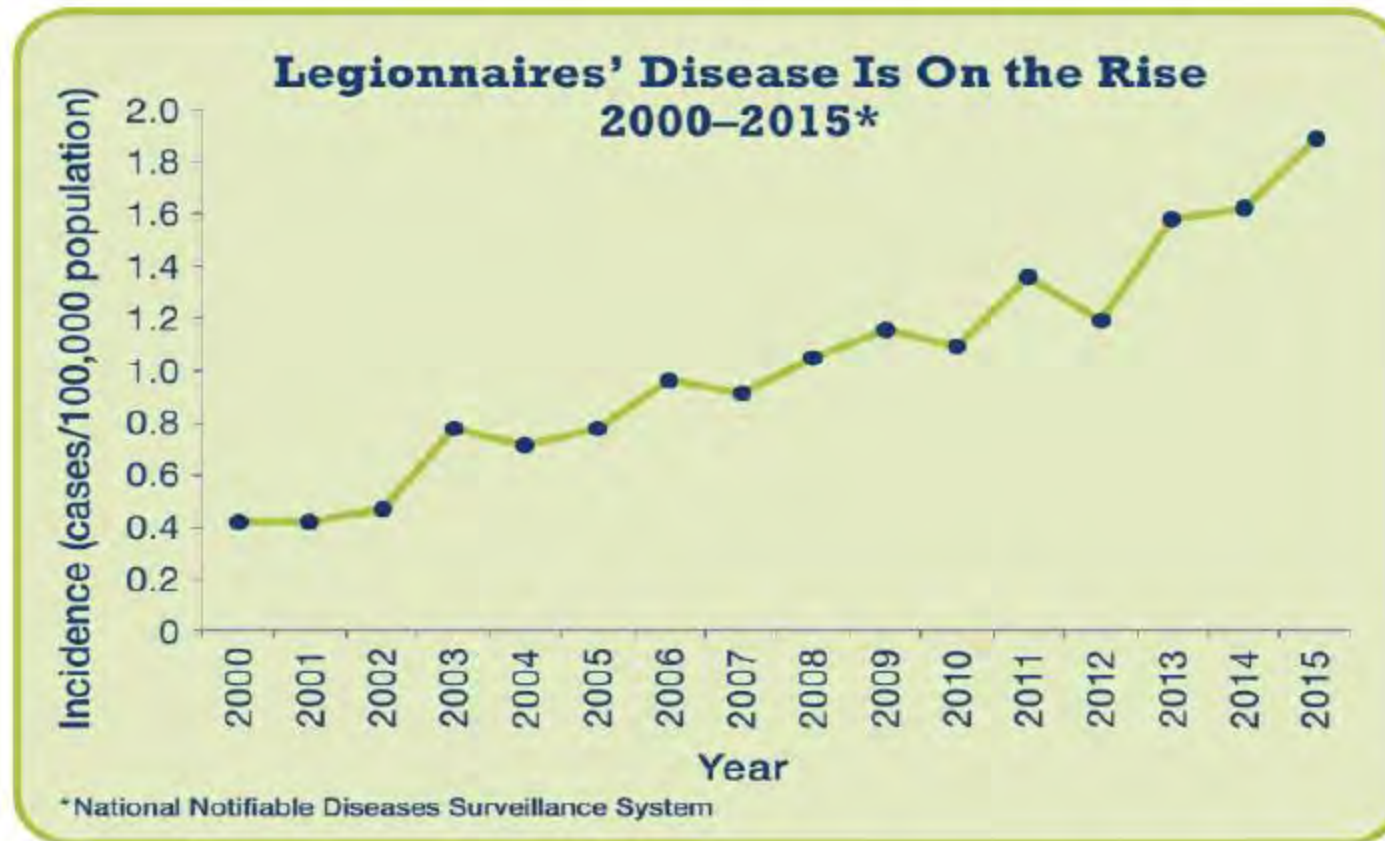
**the beer is completely safe to drink.”**

## Consider This...

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Legionellosis cases have increased substantially – over 300% in last 10 years

# Disease Incidence Increasing

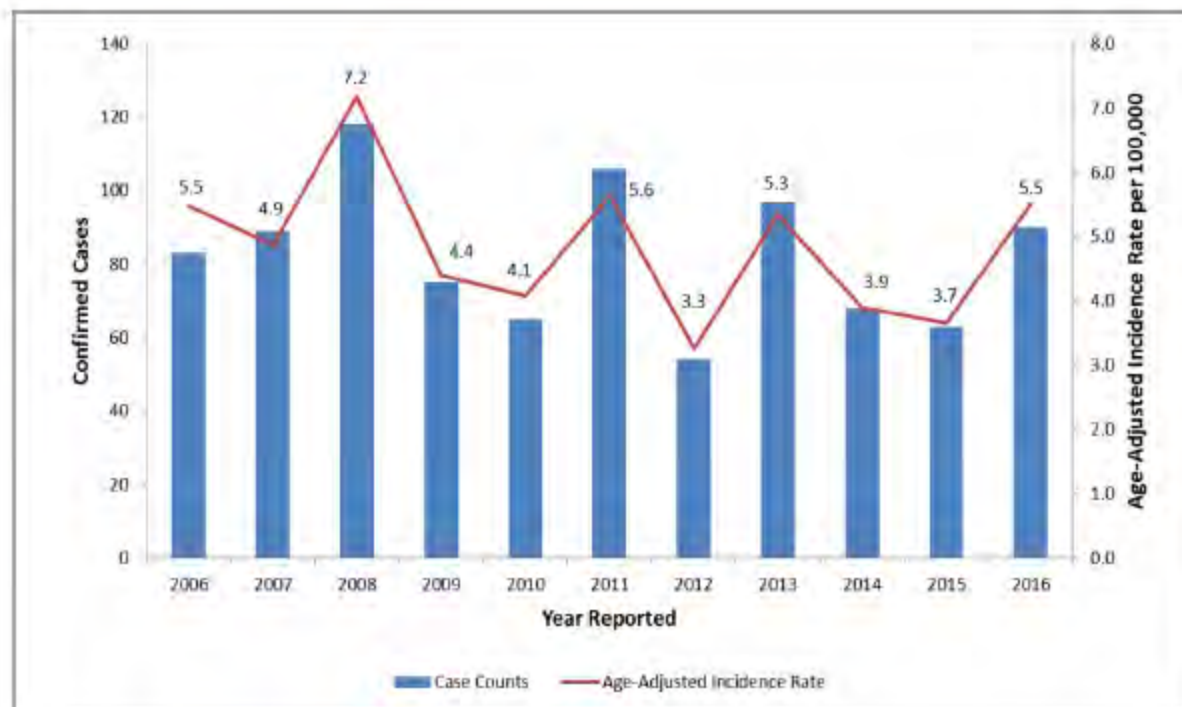








# Allegheny County (Pittsburgh) Incidence of Legionnaires' Disease



## Ohio

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- Second in the United States for number of cases
- Second in the United States when calculated as a rate (# of cases per 100,000 population).
- **New York is first!**

Rebecca Fugitt, Ohio DOH

## Modes of Transmission for Legionnaires' disease

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- Aerosolization
- Aspiration
- Direct instillation into the patient (tap water rinsing of nasogastric tubes, respiratory tubing, etc)

## Who's at Risk?

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- Elderly (>50)
- Smokers
- Immunocompromised
  - Transplant patients
  - High-dose steroids for lung disease
  - Diabetes
  - Cancer
- Approx. 25% cases no known risk factors

# Transmission by CPAP?

Sleep Medicine 14 (2013) 1038



Contents lists available at [ScienceDirect](#)

Sleep Medicine

journal homepage: [www.elsevier.com/locate/sleep](http://www.elsevier.com/locate/sleep)



## Letter to the Editor

### Two cases of Legionnaires' disease associated with continuous positive airway pressure therapy

#### To the Editor

Sporadic cases and outbreaks of *Legionella pneumophila* usually are related to exposure to water-containing *Legionella* bacterium. Legionnaires' disease is transmitted by contaminated water in medical equipment, including oxygen humidifiers, nebulizers, and face masks, and has been extensively reported [1,2]. Neverthe-

demonstrated a positive urine *Legionella* antigen test. He was administered levofloxacin to which he responded well; he was extubated 3 days after initiation of treatment.

To prevent dryness of patient airway, the CPAP machine circuit needs to be continuously humidified, which requires a water reservoir. This reservoir might serve as a media for *Legionella* bacterium, thus posing the risk for *L. pneumophila* infection to the patients. Physicians should be aware of this potential association especially when taking care of patients who use this machine, as seen in our two patients.

## Clinical Notes

### Clinical Notes

- Elderly – signs not typical
- 40%–50% of Legionnaires' disease patients have neurological symptoms
  - Some with encephalopathy (brain inflammation) triggered by antibodies that target brain cells ([www.legionella.org](http://www.legionella.org))
- Risk of death highest for community-acquired infection in patients that are immunocompromised followed by healthcare-acquired infections
- Mortality for healthcare-acquired cases as high as 30%

## 2016 CDC Report on Legionnaires' Disease Outbreaks

Morbidity and Mortality Weekly Report

### Vital Signs: Deficiencies in Environmental Control Identified in Outbreaks of Legionnaires' Disease — North America, 2000–2014

Laurel E. Garrison, MPH<sup>1</sup>; Jasen M. Kunz, MPH<sup>2</sup>; Laura A. Cooley, MD<sup>1</sup>; Matthew R. Moore, MD<sup>1</sup>; Claressa Lucas, PhD<sup>1</sup>; Stephanie Schrag, DPhil<sup>1</sup>; John Sanitsky, MPH<sup>2</sup>; Cynthia G. Whitney, MD<sup>1</sup>

*On June 7, 2016, this report was posted as an MMWR Early Release on the MMWR website (<http://www.cdc.gov/mmwr>).*

## Outbreak Sources: More Than Healthcare

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- 27 Outbreaks - Sources
  - 44% Hotels and resorts
  - 19% Long-term care facilities
  - 15% Hospitals
  - 21% Senior living facilities,
    - workplaces, and the community

## Hospitals at Significant Risk According to Recent CDC Report

Legionella in hospitals –  
accounted for 57% of all  
cases and 85% of deaths



## Potable Water vs. Utility (Cooling Towers)

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- Potable water was the most frequent source of exposure (56%), followed by cooling towers (22%)
- Potable water sources accounted for 67% of health care–associated outbreaks (in hospitals and long-term care facilities).

# HEALTHCARE-ACQUIRED CASES

## Epidemiology and Infection Prevention

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# Hospital-acquired Legionnaires' Disease

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Centers for Disease Control and Prevention

**MMWR**

Morbidity and Mortality Weekly Report

Early Release / Vol. 66

June 6, 2017

**Vital Signs: Health Care–Associated Legionnaires' Disease Surveillance Data  
from 20 States and a Large Metropolitan Area — United States, 2015**

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## Findings

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- 20% of the reported cases healthcare-acquired
- Majority (80%) of definite cases associated with long-term care
- Problem is nationwide with cases reported from 20/21 jurisdictions

## According to CDC Acting Director Anne Schuchat, MD

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“Legionnaires’ disease in hospitals is widespread, deadly, and preventable.”

“These data are especially important for health care facility leaders, doctors, and facility managers because it reminds them to think about the risks of *Legionella* in their facility **and to take action...**”

### Legionellosis in the U.S.

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Outbreaks  
continue to occur  
(building warm  
water systems,  
cooling towers,  
fountains)



## Cases Linked to Water Systems

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- Warm water distribution in:
  - Hospitals
  - Nursing homes
  - Rehabilitation centers
  - Office buildings
  - Apartment buildings
  - Hotels
- Other water systems:
  - Spas and hot tubs
  - Decorative fountains
  - Humidifiers
  - Cooling towers

## Today The D's Are For...

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- Diagnosis
- Denial
- Detection (Environmental)
- Disinfection

## Diagnosis: Many Cases Missed

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- Diagnostic tests for *Legionella* not routine – often not done
- Many studies have demonstrated under reporting/missed diagnosis

## Under Reporting Due to Missed Diagnosis

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Hollenbeck et al. *BMC Infectious Diseases* 2011, 11:237  
<http://www.biomedcentral.com/1471-2334/11/237>



### RESEARCH ARTICLE

### Open Access

## How often is a work-up for *Legionella* pursued in patients with pneumonia? A retrospective study

Brian Hollenbeck<sup>1</sup>, Irène Dupont<sup>2</sup> and Leonard A Merme<sup>2,3\*</sup>

### Abstract

**Background:** It is unclear how often patients with pneumonia are assessed for *Legionella* in endemic areas. Additionally, the sensitivity of the IDSA/ATS criteria for recommended *Legionella* testing is undefined.