Legionella in Hospital Water Systems

A Proactive Approach to Preventing Legionnaires Disease
Ted Kusz, BSc

- Vice President and Sales Manager of Klenzoid Canada and Eldon Water
- Industrial Water Treatment Service Provider
- Healthcare is a major marketplace
Janet E. Stout, PhD

- President & Director, Special Pathogens Laboratory and Research Associate Professor, University of Pittsburgh
- More than 30 years of pioneering research in *Legionella* and Legionnaires’ disease prevention
- Evaluated all disinfection technologies used today and continues to explore new approaches for *Legionella* control
Goals of Presentation

• Present information which causes you to revisit your maintenance practices – make revisions which help you lower risks relating to LD.

• Learn about “current best practices” and how the laws and standards are changing and what this might mean to you and your facility.
The 7 Habits

1. Be Proactive
2. Begin with the end in mind
3. Put first things first.
4. Think Win-Win
5. First seek to understand then to be understood
6. Synergize
7. Sharpen the saw.
2. Begin with the end in mind.

What does this mean with respect to LD?
The answer is easy!
- No deaths or cases
- No liabilities of any kind

How do you achieve this?
- No simple answer
- The Best Answer: Develop a Water Safety Plan
## Legionella vs Other Water Problems

<table>
<thead>
<tr>
<th></th>
<th>Scale</th>
<th>Corrosion</th>
<th>LD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time Scale</strong></td>
<td>100 + years</td>
<td>100 + years</td>
<td>1976</td>
</tr>
<tr>
<td><strong>Expert Consensus</strong></td>
<td>Excellent</td>
<td>Excellent</td>
<td>Poor</td>
</tr>
<tr>
<td><strong>Published Research Data</strong></td>
<td>Abundant</td>
<td>Abundant</td>
<td>Relatively Low</td>
</tr>
<tr>
<td><strong>Close to Problem</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Most people unaffected</td>
</tr>
<tr>
<td><strong>Probability of Incident</strong></td>
<td>High</td>
<td>High</td>
<td>Relatively Low</td>
</tr>
<tr>
<td><strong>ROI on prevention</strong></td>
<td>Economic</td>
<td>Economic</td>
<td>Hard to Measure - Value of Life - Legal settlement</td>
</tr>
<tr>
<td><strong>Preventable</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Risk of Legionnaires Disease

FACT: All healthcare facilities are considered HIGH RISK

• Complex water systems where aspiration is possible
• Water conditions conducive to Legionella Bacteria population growth
• At risk population in or near premises
As a Healthcare Facility
What should you do?

• Look to the Law
• Look to Standards and Guidelines

• Scale and Corrosion – Invest in proven preventative measures
• Legionella – Without cases there is no strong driver
The Law

• Province of Quebec and City of Hamilton Laws and By-Laws aimed at controlling this problem – in cooling towers.

• This response is a positive proactive measure and raises awareness about LD.
Best Practice Groups

• ASHRAE
• CTI
• AWT
• WHO

Generate facility specific Water Safety Plan
FACTS

• Cooling Towers have received publicity due to their association with outbreaks

August 31, 2012

3rd death tied to Chicago Legionnaires’ outbreak

By Mitch Smith | Tribune reporter

A third visitor to a downtown hotel earlier this summer has died after contracting Legionnaires’ disease, city officials announced Friday.

Media in Ireland are reporting that the man was a retired plumber who was in Chicago to celebrate his 40th wedding anniversary when he apparently contracted the disease.

Newly released test results indicate the primary source of the Legionnaires’ outbreak.

(The JW Marriott Hotel in the Loop recently had an outbreak.)

September 4, 2012

Legionnaires’ disease kills 10 in Quebec

Colleen McCurdy, CNN

Ten people have died, out of 165 total cases, after contracting Legionnaires’ disease in Quebec City, the provincial government said Saturday.

Canadian authorities have not publicly pinpointed the exact source of the outbreak. Results from samples may take until mid-September to come in, said Regional Directorate of Health. The agency said it is focusing on places frequently by those afflicted with the disease.

Health authorities are looking especially into cooling systems in two large buildings in Quebec. CNN affiliates CTV and CBC report. A government order has been issued requiring those who own or manage buildings in an unspecified target area to regulate levels of
FACTS

• Cooling Towers represent a small faction of total LD case (≈15% - 30%)

Drift or Windage ≠ Evaporation
FACTS

• The potable water distribution system (Hot and Cold) are much more likely to a source of infection.

• Pools
• Spas
• Decorative fountains
Municipal Water

• Purified and sanitized for safety – not sterile
• Assume water is delivered safely to your inlet meter
• Multiple Processing Steps
  - Heating (Domestic Hot Water)
  - Chilling (Ice Making)
  - Filtering
  - Softening
  - Storage
  - Distribution
• A process unmanaged is a process which will go out of control
Figure 1 The cost effectiveness of accident prevention

[Diagram showing a graph with axes labeled 'Accident Frequency' on the x-axis and 'Cost in US $' on the y-axis. The graph includes lines labeled 'Accident Cost', 'Accident Prevention Cost', and 'Total Cost'. The diagram illustrates the cost effectiveness of accident prevention.]
Water Safety Plan

• Your BEST VALUE in evaluating what your facility should do.

• Facilities Manager is not the sole point of responsibility.
  – Other building stakeholders are involved
  – Outside expertise is engaged as required
  – Budgets can be established
LEGIONELLA: PAST PRESENT & FUTURE

Dr. Janet E. Stout
Hospital engineers often go to guidance documents for help in preventing Legionnaires’ disease. While advisory documents from health authorities and professional societies provide guidelines for approaches to prevention (Table 1), a consensus opinion for

- Recommendations be prospectively validated through controlled studies;
- Studies should include a prolonged observational period (greater than one year) to evaluate the efficacy of recommended actions; and
- Recommended approaches/actions achieve the expected result, prevention of the disease through environmental
Legionella

• Lots of Anxiety
• Legionella in Hospital Water Systems
• New Approaches to Control & Prevention
• My Favorite: New Research
The Challenge of Legionnaires’ Disease
Legionnaires’ Disease is Bacterial Pneumonia

- Chest x-ray shows fluid in the lung
- Chest pain common
- Cough is often accompanied by high fever which can exceed 104°F
- Diarrhea occurs in 20-40% of patients
Risk of Acquiring Disease

Legionnaires’ Disease Is Multi-factorial

Legionella in water (reservoir) + Transmission to the host (exposure) + Susceptible Host

© Special Pathogens Laboratory
Modes of Transmission for Legionnaires’ disease

- Aerosolization
- Aspiration
- Direct instillation into the patient (tap water rinsing of nasogastric tubes, respiratory tubing, etc)
Who Gets Legionnaires’ Disease?

- Elderly
- Smokers
- Immunocompromised
  - Transplant patients
  - High-dose steroids for lung disease
- Diabetes
- Cancer
Preventing Legionnaires’ Disease

How are we doing?
**Legionella Is Winning**

- Legionnaires’ disease is increasing
- *Legionella* control poses new challenges
Legionnaires’ Disease Increasing?


Karen Neil and Ruth Berkelman
Department of Epidemiology, Emory University, Atlanta, Georgia

(See the editorial commentary by Ng et al. on pages 600–2)

Background. An abrupt increase in the incidence of legionellosis in the United States has been noted since 2003. Whether the recent increase is associated with shifting epidemiologic trends has not been well characterized.

Methods. We analyzed all cases of legionellosis reported to the Centers for Disease Control and Prevention through the National Notifiable Disease Surveillance System from 1990 through 2005.

Results. A total of 23,076 cases of legionellosis were reported to the Centers for Disease Control and Prevention from 1990 through 2005. The number of reported cases increased by 70% from 1310 cases in 2002 to 2223 cases in 2003, with a sustained increase to >2000 cases per year from 2003 through 2005. The eastern United States showed most of the increases in age-adjusted incidence rates after 2002, with the mean rate in the Middle Atlantic states during 2003–2005 exceeding that during 1990–2002 by 96%. During 2000–2005, legionellosis cases were most commonly reported in persons aged 45–64 years. Persons aged <65 years comprised 63% of total cases in 2000–2005. Age-adjusted incidence rates in males exceeded those in females for all age groups and years. Legionellosis incidence showed marked seasonality in eastern states, with most cases reported in the summer or fall.

Conclusions. Reported legionellosis cases have increased substantially in recent years, particularly in the eastern United States and among middle-aged adults. Legionella infection should be considered in the differential diagnosis of any patient with pneumonia. Public health professionals should focus increased attention on detection and prevention of this important and increasing public health problem.
2008 Conclusion

• Legionellosis cases have increased substantially, particularly among middle-aged adults

• Public health professionals should focus on prevention of this important and increasing public health problem
Centers for Disease Control and Prevention

217% Increase in Cases (2011)

Legionellosis — United States, 2000–2009

Legionnaires disease (LD), a serious, sometimes lethal pneumonia, and Pontiac fever (PF), an influenza-like, self-limited illness, are the most common forms of legionellosis, which is caused by Legionella bacteria. Legionellosis cases are reported to CDC through the National Notifiable Disease Surveillance System (NNDSS) and a Supplemental Legionnaires Disease Surveillance System (SLDSS) designed to manage surveillance data on travel-related cases and enhance outbreak detection. For this report, cases reported to NNDSS during 2000–2009 from the 50 states and the District of Columbia (DC) were assessed, and crude and age-adjusted incidence rates per 100,000 persons were calculated. U.S. legionellosis cases reported annually increased 217%, from 1,110 in 2000 to 3,522 in 2009, and the crude national incidence rate increased...
“Legionella ... is the single most common etiologic agent associated with outbreaks involving drinking water.”

Report by the U.S. Environmental Protection Agency (EPA) and the Committee on Public Water Supply Distribution Systems
Why Increase in Reported Cases?

- Better reporting
- Increase in diagnostic testing
- Environmental factors?
Outbreaks in Nursing Homes & Assisted Living Facilities

Number of Legionnaires' cases rises to 39

By Misti Crane
The Columbus Dispatch - Friday August 2

Legionnaires’ death toll at Reynoldsburg retirement center hits 6

By Misti Crane
The Columbus Dispatch - Wednesday August 7, 2013 4:37 AM

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Toronto Nursing Home Outbreak: 16 Deaths
Seven Oaks Home for the Aged class action suit reaches $1.2 million settlement

Settlement against the province and City of Toronto following the deadly 2005 legionnaires' disease outbreak at a Scarborough nursing home has been reached.

In this 2005 file photo, medical workers at Rouge Valley Centenary Hospital treat a patient from Seven Oaks Home for the Aged, where there was an outbreak of legionnaires disease.
Legionellosis causes 3-5% of community and hospital-acquired pneumonia in Canada.

Figure 1: Number and rate of legionellosis cases per 100,000 population in Ontario and Canada. Sources: Public Health Agency of Canada Notifiable Diseases Online (extracted June 11, 2010) and the Ontario Ministry of Health and Long-Term Care, Public Health Ontario Portal (extracted June 11, 2010). NA = Data not available as of June 11, 2010.

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Causes of Legionnaires’ Disease

Among More than 50 species

- **L. pneumophila; 90%**
- **L. pneumophila, serogroup 1; 50-80%**
- **L. p. other serogroups 10%**
- **Other species 10%**
Legionnaires’ Disease in Hospitals

- 35% of reported cases met the case definition for hospital-acquired infection (range 45% - 25%)

- Case fatality rate was 28% (range 46%-14%)

Diagnosis of Legionnaires’ Disease

2011 Data

Urine antigen tests were used to confirm 97% of U.S. resident cases reported during 2005–2009

MMWR / August 19, 2011 / Vol. 60 / No. 32
Urinary Antigen Test

Only detects

*L. pneumophila* serogroup 1
What if you have serogroup 6 in your water?
Environmental Testing Directs Diagnostic Testing

• Physicians cannot diagnose healthcare-acquired legionella infections if they use the wrong test.

• Urine antigen test will not detect serogroup 6 infections.
Testing Water Can Help Diagnosis

If you know what’s in your water, you can be confident that the Urine Antigen test will identify cases
What’s in Your Water®

Cross section of 4 inch pipe from hospital hot water system

© Special Pathogens Laboratory
What’s in Your Water?

- Minerals: iron, calcium, magnesium
- Complex matrix of organic materials and microbial communities

= BIOFILM

Want a drink of water?

© Special Pathogens Laboratory
What Biofilm Looks Like

Hospital Ice Machine

LEGIONELLA: A WORTHY OPPONENT

© Special Pathogens Laboratory
Miles of Pipes
How does *Legionella* get into our water?
Legionella in Drinking Water

“Public water supplies may contaminate the plumbing systems of hospitals and other large buildings.”

Survey of Ground, Surface, and Potable Waters for *Legionella*

“Results of this study confirm the ubiquity of *Legionella* in aquatic environments, even ground water.”

“Legionella ... is the single most common etiologic agent associated with outbreaks involving drinking water.

-- National Academy of Sciences Report, Report by the U.S. Environmental Protection Agency (EPA) and the Committee on Public Water Supply Distribution Systems
DRINKING water can be prime Legionnaires’ disease carrier

CHICAGO (AP) — Seven kinds of bacteria have been found to cause drinking more water. The evidence, however, was not conclusive. At that time, it was difficult to test for bacteria are causing the disease. Legionnaires’ disease remained undiscovered until 1976 because it was
DRINKING WATER

What Ben Franklin had to say
“With wine comes wisdom, with beer comes freedom, with water comes Legionella.”
Legionella in Our Water

- New at-risk populations: long-term care facilities (nursing homes) and rehabilitation centers
- Increase number of younger patients with no typical risk factors
- Potable water is the source
- Showering overemphasized
- Immunocompromised children at risk
Water Is a Source of Infection for Neonates AND Exposure Occurs in Healthcare Facilities
Epidemiology of Pediatric LD

• CDC study showed 72% pediatric cases had healthcare exposure

• Mortality rate 22%
  – Alexander NT, et al 2008 ICAAC
Lots of ...

Legionella Anxiety
Coping with *Legionella*

- Denial
- Bargaining
- Depression
- Acceptance
- Medication
Denial
Denial

Most wait to address the problem until after a case of Legionnaires’ disease is diagnosed.
Bargaining

• *Legionella* is everywhere

• It is too costly to control/monitor

• If I don’t know, I’m not responsible
Is *Legionella* Everywhere?

- 12 – 70% of hospitals are colonized, depending on the study
- 10 – 20% of homes are colonized
- *Legionella* is not ubiquitous
Is *Legionella* Too Costly to Control and Monitor?
CDC Estimates

• Cost per patient $34,000

• Average hospital stay 10 days

• Total hospitalization costs per year between $101 and $321 million dollars

Legionella Outbreaks Are Costly
Costly Outbreaks

- *Legionella* in the water systems of buildings is a serious health risk

- Even a single case can dramatically affect an organization
Outbreak Response: Pittsburgh VA Hospital

$10M in safety upgrades planned for 2 campuses, testing, mapping of pipes

BY ADAM SMELTZ

Despite allegations from Congress, a labor union and military families in mourning, a top official with the VA Pittsburgh Healthcare System said on Wednesday that he does not know of any attempt to conceal the Legionnaires' disease outbreak linked to deaths.

“As the overseer, I’m not aware of any effort to provide any kind of cover-up,” VA regional Director Michael Moreland said in a controlled interview provided to the Tribune-Review four months after the outbreak was publicly revealed.

Moreland rejected concerns from Congress that VA leaders withheld critical information.

VA administrators used the interview to announce more than $10 million in safety improvements at the 224-bed Oakland hospital and the 262-bed Heinz O’Hara campuses. “The first time Congress heard about this was when we notified them,” he said.

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Depression
Is *Legionella* Too Costly to Control & Monitor?

- Lessoned Learned
  - Costs of the disease in millions
  - Outbreaks cost way more than proactive prevention
  - Ounce of prevention...
Acceptance
Approach to Prevention

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# Standard vs. Guideline

<table>
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<tr>
<th>Standard</th>
<th>Guideline</th>
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</thead>
<tbody>
<tr>
<td>• Referenced in code</td>
<td>• Non-binding</td>
</tr>
<tr>
<td>• Requirements</td>
<td>• Suggestions</td>
</tr>
<tr>
<td>• Standard of care</td>
<td>• Not a legal standard of care</td>
</tr>
<tr>
<td>• Must and Shall</td>
<td>• Should and Could</td>
</tr>
<tr>
<td>• No U.S. <em>Legionella</em> Standard</td>
<td>• Many U.S. <em>Legionella</em> Guidelines</td>
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</table>
NEW PARADIGM FOR PREVENTION
Proposed ASHRAE Standard 188P

Engineers’ codes target Legionella

Group proposes new rules for building operators to prevent waterborne bacteria

by ADAM SMELTZ

An engineering group that influences building codes nationwide is drafting tough new standards to prevent Legionella, the waterborne bacteria blamed in a deadly Legionnaires’ disease outbreak in Pittsburgh.

Federal estimates show Legionnaires’, a form of pneumonia, kills more than 4,000 people and sickens about 21,000 others each year, three decades after researchers figured out how to control the bacteria in tap water.

The proposed standards would require building operators to verify they are monitoring the Legionella threat in commercial, residential and medical facilities with established risk factors, such as multiple whirlpools and spas. It also outlines methods to prevent the growth of the bacteria.

The cost of implementing these standards is unknown. Single-family homes would not be included in the proposed changes.

“It’s not the science or the engineering lacking here. It’s the lack of a management system that can be applied in a practical and defensible way,” said William McCoy, Standards Committee chairman at the American Society of Heating, Refrigerating and Air-Conditioning Engineers in Atlanta.

McCoy’s international committee, part of the 55,000-member engineering society, worked for the past six years to craft the first unified and enforceable domestic rules for Legionella control in the plumbing of large buildings, where the bacteria can foster and grow. The proposed plan could be voted on by the society’s board this year.

The International Code Council in Washington generally adopts ASHRAE recommendations in building code guidelines that are used by state and local code enforcement agencies across the country.

“Current ICC recommendations do not mention Legionnaires’ disease, spokesman Steve Daggers said. The little-known council drew national attention in 2008 for advocating stringent fire sprinkler standards for single-family homes that met with heavy resistance from builders and consumers.

ASHRAE will not perform a cost-
DISCLAIMER

The opinions expressed are those of the author and do not represent those of ASHRAE or other cited organizations.
What Is ASHRAE Standard 188P?

Risk management approach for the prevention of legionellosis associated with centralized industrial and commercial building water systems.
Who Is Responsible?

– Facility Manager
  • Required to implement stronger safeguards to protect against Legionellosis

– Water Treatment Providers
  • May be expected to assume responsibility
  • May be asked to assist with compliance
Legionella Control

• If you know Legionella...
  – Can colonize water systems
  – Increases risk for disease
  – Has guidelines for its control

• Then...
  – You need to consider the risk of Legionella in your facility
LEGIONELLA RISK ASSESSMENT
Why Perform Risk Assessment?

How does a facility...

• determine its level of risk for Legionnaires’ disease?
• make water system improvements to reduce risk?
• know if supplemental disinfection is needed?
Legionella Risk Assessment

Three basic components of a risk assessment:

1. Site Characterization
2. Water System Evaluation
3. Recommendations
Water Safety Implementation

Describe Water System - Develop water system schematic or site plan

Assess Risks - Identify Hazards
- Assess and prioritize risks
- Determine existing control measures
- Identify additional or improved control measures

Control Risks - Implement or maintain control measures
- Establish operational monitoring program
- Define corrective action

Audit - Verify that the plan is being controlled
- Validate that the hazard is being controlled

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WATER SAFETY PLAN

ASSESS

INTERPRET and ADJUST

MONITOR/VERIFY
Legionella testing

WATER DISTRIBUTION SYSTEMS
Culture Is Gold Standard

• Laboratory-based and validated culture method is the industry standard

• Culture is more reliable than “rapid tests”
  – DFA
  – ICT
  – PCR
  – Dip slide
Same Water Sample
Different Results

Fails to detect
Legionella pneumophila serogroup 1

> 3,000 CFU/ml
Legionella culture successfully detects
Legionella pneumophila serogroup 1

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Response to Outbreak

A 13th death from legionnaires' disease in Quebec City

THE CANADIAN PRESS Thursday, September 13, 2012 4:1 PM

QUEBEC - A 13th person has died from legionnaires' disease in Quebec City, while authorities are confident that the outbreak has been brought under control.
4.3.2. In addition to monitoring the physico-chemical and microbiological indicators, it is strongly recommended to monitor concentrations *Legionella pneumophila* in water by a method using the culture media.
MD 15161 – 2013
Control of *Legionella* in Mechanical Systems
3.5.6 While the system is in normal operation, perform monthly *Legionella* bacteria culture tests to identify *Legionella* pneumophila serogroup 1 (LPSG1), total *Legionella pneumophila* including all serogroups (LPTOT) and the Non-*Legionella pneumophila Legionella* (NLPL) bacteria levels.
Is the Sky Falling?

If I Find Some Legionella?
What is an acceptable amount of a contaminant?
IS ZERO NECESSARY?
Zero is the goal, but NOT NECESSARY to avoid outbreaks

LEGIONELLA
Establish Targets

- Action Levels
- Minimum Levels
- Goals
Allegheny County Approach to Prevention of Hospital-Acquired Legionnaires' Disease 1993
Interpretation – Potable Water

Risk of nosocomial Legionnaires’ disease was better predicted by the proportion of water system sites testing positive for Legionella than by the concentration of Legionella bacteria.

A proactive approach to prevention of health care–acquired Legionnaires’ disease: The Allegheny County (Pittsburgh) experience

Cheryl L. Squier, RN, CIC,\textsuperscript{b,c} Janet E. Stout, PhD,\textsuperscript{c,d} Sharon Krsytofiak, MS, MT(ASCP), CIC,\textsuperscript{b} Joan McMahon, RN, M Marilyn M. Wagener, MS,\textsuperscript{d} Bruce Dixon, MD,\textsuperscript{a} and Victor L. Yu, MD\textsuperscript{c,d}

Pittsburgh, Pennsylvania
Legionella Testing

- Informs decisions
- Increases index of suspicion
- Triggers control measures
LEGIONELLA

DISINFECTION OPTIONS
Disinfection Options

• Thermal shock treatment (heat & flush)
• Shock chlorination (>10 mg/L residual), may require water tanks to be 20-50 mg/L
• Continuous supplemental chlorination (2-4 mg/L)
• UV Light
• Copper-silver ionization (continuous)
• Chlorine Dioxide (ClO2)
• Point-of-use filtration
• Monochloramine
Disinfection Methods Review

INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY  FEBRUARY 2011, VOL. 32, NO. 2

REVIEW ARTICLE

Controlling *Legionella* in Hospital Drinking Water: An Evidence-Based Review of Disinfection Methods

Yusen E. Lin, PhD, MBA;¹ Janet E. Stout, PhD;²,³ Victor L. Yu, MD³
What’s New Disinfection Methods

HOSPITAL WATER SYSTEMS
Monochloramine Update

New Approach for *Legionella* Control in Hospital Water Systems
Monochloramine

*Risk of Hospital-Acquired Legionnaires' Disease in Cities Using Monochloramine Versus Other Water Disinfectants*

James D. Heffelfinger, MD, MPH; Jacob L. Kool, MD, PhD; Scott Fridkin, MD; Victoria J. Fraser, MD; Jeffrey Hageman, MHS; Joseph Carpenter, PE; Cynthia G. Whitney, MD, MPH; Society for Healthcare Epidemiology of America

-Infect Control Hosp Epidemiol 2003;24:569-574
New Monochloramine System

Sanipur, Italy

© Special Pathogens Laboratory
Chemicals Degrade with Storage

Injection Reaction Chamber

Buffered Ammonium Salt

Stabilized Chlorine
First Study in United States

OBJECTIVE
Determine the efficacy of this new system for on-site generation of monochloramine for controlling Legionella in a hospital water system
Dramatic reduction in *Legionella* after treatment

Sanipur Monochloramine Injection: 9/26/2011
Conclusions

• On-site generation of monochloramine significantly reduced *Legionella* positivity
• Monitor Legionella, monochloramine and ammonia
• Pay attention to reagent levels, storage and shelf life
Protecting Transplant / High Risk Patients/Neonates

WE FILTER THE AIR...BUT LET THEM DRINK TAP WATER?

© Special Pathogens Laboratory
Possible Solution
Point of Use Filtration

- High Risk Patients
- Bone marrow and solid organ transplant units
- Hematology/oncology units
- NICU
Barrier Against Exposure to Waterborne Pathogens

Efficacy of new point-of-use water filter for preventing exposure to Legionella and waterborne bacteria

Patricia J. Sheffer, MPM, a Janet E. Stout, PhD, a,b Marilyn M. Wagener, MPH, b and Robert R. Muder, MD a,b
Pittsburgh, Pennsylvania

History of Point-of-Use Filters

Bacterial exclusion at 0.2 micro

• Use duration approximately 30 days

• Depending on water quality (particulates), filters may clog

• Need for improvement
Field Evaluation of New Filter
Study Using New POU Filters

• New product – product label states 62 days of use
• Test location – Cancer Center
• Sampling – 5 control faucets (no filter) and and 5 test faucets (with filters)
• Sampling Frequency– Weekly
• Duration – 14 weeks
No Recovery of *Legionella* for 12 weeks

Results are the average of 5 sites.

Blue bars = Control Faucets/no filter

© Special Pathogens Laboratory
Sensor Faucets

Manual Faucet

Sensor Faucet

© Special Pathogens Laboratory
Anatomy of an Electronic Faucet

A = aerator
B = solenoid valve
C = check valve
D = inline filter
Sensor Faucets:
2 steps forward, 3 steps back?
BACTERIAL CONTAMINATION ASSOCIATED WITH ELECTRONIC FAUCETS: A NEW RISK FOR HEALTHCARE FACILITIES

James Hargreaves, DO; Larry Shireley, MS, MPH; Shannon Hansen, MT(ASCP), CIC; Virginia Bren, MPH, RN; Gordon Fillipi, PhD; Craig Lacher, BS; Virginia Esslinger, MS, RN; Terry Watne, MS, RN
**Pseudomonas aeruginosa infections due to electronic faucets in a neonatal intensive care unit**

Hacer Yapicioglu,1 Tulin Guven Gokmen,3 Dincer Yildizdas,2 Fatih Koksal,3 Ferda Ozlu,1 Eren Kale-Cekinmez,1 Kurtan Mert,1 Birgul Mutlu,1 Mehmet Satar,1 Nejat Narli1 and Aslihan Candevir4

Department of Pediatrics, 1Divisions of Neonatology and 2Pediatric Intensive Care Unit, and 3Department of Microbiology and 4Hospital Infection Control Committee, Cukurova University, Faculty of Medicine, Adana, Turkey
Disturbing Findings


Non-touch fittings in hospitals: a possible source of Pseudomonas aeruginosa and Legionella spp.

M. Halabi*, M. Wiesholzer-Pitl†, J. Schöberl† and H. Mittermayer††
Study Findings

• The magnetic valve, the mixing device and outlet most contaminated

• Low water flow

• Lower hot water temperature

• Outcome = removed all non-touch taps and replaced with conventional taps!
Electronic-Eye Faucets: *Legionella* Species Contamination in Healthcare Settings

Emily R. M. Sydnor, MD, MHS; Gregory Bova; Anatoly Gimburg, BEE; Sara E. Cosgrove, MD, MS; Trish M. Perl, MD, MSc; Lisa L. Maragakis, MD, MPH
Hopkins Study Conclusion

• Electronic faucets were more commonly contaminated with Legionella species and other bacteria

• 19/20 (95%) of electronic faucets were positive for Legionella vs. 9/20 (45%) manual faucets
Study Conclusions

• Periodic monitoring for *Legionella* recommended

• Consider removal from high risk areas – transplant units
Lots of ... 

*Legionella* Anxiety
Sometimes we could use a little **professional** *Legionella* help.

Dr. Janet Stout

© Special Pathogens Laboratory
Medication
Dr. Stout’s *Legionella* Chill Pills

- For treatment of *Legionella*-related anxiety.

- Take 2 tablets 1 hour before *Legionella* testing or as needed.
THANK YOU

Janet E. Stout, PhD
jstout@specialpathogenslab.com

WWW.SPECIALPATHOGENSLAB.COM