Welcome & FHA Mission to Care HIIN Update

Upcoming HIIN Events and Opportunities

FHA HIIN Infection Prevention Webinar Series | Waterborne Illness in Hospitals: Prevention, Identification and Management

– Linda R. Greene, RN, MPS, CIC, FAPIC, Manager of Infection Prevention, UR Highland Hospital, Rochester, NY

Q&A

Evaluation Survey & Continuing Nursing Education
HIIN Core Topics – Aim is 20% reduction

- Adverse Drug Events (ADE)
- Catheter-associated Urinary Tract Infections (CAUTI)
- Clostridium Difficile Infection (CDI)
- Central line-associated Blood Stream Infections (CLABSI)
- Hospital-onset MRSA Bacteremia
- Injuries from Falls and Immobility
- Pressure Ulcers (PrU)
- Sepsis – Post-Op
- Surgical Site Infections (SSI) – Colon
- Venous Thromboembolisms (VTE)
- Ventilator-Associated Events (VAE/IVAC/PVAP)
- Readmissions (12% reduction)
- Worker Safety
HAI Prevention: Resources, Trainings and Tools

- Mission to Care Website
- HRET HIIN Website

Hospital-Acquired Infections topics:
- Change Packages
- Top 10 Checklists
- Toolkits
- Resource Guides
- Event Archives
Our Progress

<table>
<thead>
<tr>
<th>Project</th>
<th>Measure</th>
<th>Baseline</th>
<th>Project-to-Date: October 2016 to Present</th>
<th>Most Recent 3 Months</th>
<th>Hospital Target</th>
<th>Top 25th Percentile Project to Date</th>
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<tbody>
<tr>
<td>CAUTI</td>
<td>CAUTI Rate - all except NICUs</td>
<td>0.975</td>
<td>1,660</td>
<td>2,098,872</td>
<td>8.02</td>
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<td></td>
<td>CAUTI Rate - ICUs except NICUs</td>
<td>1.090</td>
<td>771</td>
<td>952,109</td>
<td>8.10</td>
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<td>CDiff</td>
<td>C. diff Rate Facility-wide - all except NICUs (per 10,000)</td>
<td>7.455</td>
<td>5,778</td>
<td>14,729,408</td>
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<td>CLABS1 Rate - All</td>
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<td>2,203,903</td>
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<td>CLABS1 Rate - ICUs</td>
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<td>MRSA</td>
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<td>1,001</td>
<td>15,536,224</td>
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<td>SSI</td>
<td>SSI rate, colon surgeries*</td>
<td>4.054</td>
<td>1,223</td>
<td>38,436</td>
<td>3.357</td>
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<td>SSI rate, abdominal hysteroctomy*</td>
<td>1.309</td>
<td>332</td>
<td>29,678</td>
<td>1.119</td>
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<td>SSI rate, knee surgeries*</td>
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<td>355</td>
<td>81,052</td>
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<td>SSI rate, hip surgeries*</td>
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<td>453</td>
<td>45,197</td>
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<td>VAE</td>
<td>Ventilator-associated condition rate</td>
<td>6.600</td>
<td>7,947</td>
<td>527,081</td>
<td>5.591</td>
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<td>Infection-related ventilator-associated condition rate</td>
<td>2.212</td>
<td>961</td>
<td>522,456</td>
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<td>Possible ventilator-associated pneumonia</td>
<td>0.754</td>
<td>274</td>
<td>352,580</td>
<td>0.756</td>
<td>0.627</td>
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<td>Harm Measure</td>
<td>Baseline Rate per 1000</td>
<td>Target Rate</td>
<td>Project To Date Rate per 1000 Discharge</td>
<td>Harms Prevented</td>
<td>Costs Avoided</td>
<td>Lives Saved</td>
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<tr>
<td>------------------------------</td>
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<td>-------------</td>
<td>-----------------------------------------</td>
<td>-----------------</td>
<td>---------------------</td>
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<tr>
<td>CAUTI Rate - All Settings</td>
<td>0.74</td>
<td>0.59</td>
<td>0.57</td>
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<td>$6,465,249</td>
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<td>CLABSI Rate - All Settings</td>
<td>0.70</td>
<td>0.56</td>
<td>0.48</td>
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<td>MRSA Rate</td>
<td>0.35</td>
<td>0.31</td>
<td>0.34</td>
<td>17</td>
<td>$292,778</td>
<td>4.7</td>
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<td>SSI Rate, Colon</td>
<td>0.43</td>
<td>0.34</td>
<td>0.43</td>
<td>10</td>
<td>$268,153</td>
<td>0.29</td>
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<td>SSI Rate, Abd</td>
<td>0.12</td>
<td>0.10</td>
<td>0.11</td>
<td>14</td>
<td>$397,769</td>
<td>0.42</td>
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<td>SSI Rate, Knee</td>
<td>0.16</td>
<td>0.12</td>
<td>0.13</td>
<td>81</td>
<td>$2,290,654</td>
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<td>SSI Rate, Hip</td>
<td>0.20</td>
<td>0.16</td>
<td>0.16</td>
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<td>$3,181,035</td>
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<td>Clostridioides difficile rate</td>
<td>3.56</td>
<td>2.85</td>
<td>1.98</td>
<td>4,311</td>
<td>$74,416,423</td>
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<td>VAC</td>
<td>1.25</td>
<td>1.00</td>
<td>1.05</td>
<td>560</td>
<td>$26,449,783</td>
<td>218.4</td>
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Source: HRET Improvement Calculator, effective date January 9, 2020
### Infection Prevention Virtual Series

**NHSN: SSI Surveillance Identification and Analysis**

**SSI-Colon: How to Assess Root Cause and Prevention Strategies**

**NHSN: VAE Surveillance Identification and Analysis**

**VAE: How to Assess Root Cause and Prevention Strategies**

**NHSN: MRSA Bacteremia Surveillance Identification and Analysis**

**MRSA Bacteremia: How to Assess Root Cause and Prevention Strategies**

**Implementation of Best Practices for VAE Prevention**

**Implementation of Strategies for the Prevention of IVAC/PVAP**

**Decreasing Surgical Site Infections in Abdominal Hysterectomy Patients**

**Strategies to Prevent Hospital-onset MRSA Bloodstream Infections**

**Decreasing Surgical Site Infections in Colon Surgery Patients**

**Infection Prevention Boot Camp Resource Guide**

### Surgical Infection Prevention Webinar Series:

**Webinar #1: Pre-operative Strategies for Prevention of SSI**

**Webinar #2: Intra-operative Strategies for Prevention of SSI**

**Webinar #3: Post-operative Strategies for Prevention of SSI**

**Preventing Post-Surgical Harm Resource Guide**

### 2020 IP Webinar Series

**Waterborne Illness in Hospitals - Prevention, Identification and Management (Jan. 24)**

**SSI Prevention for Total Joint Replacements (Feb. 19)** [Click to register]

**Why Infection Prevention is Important for Patient Safety (Mar. 10)** [Click to register]

*Access Event Archives ([Recordings | Slides](#)) on the Mission to Care HIIN Website*
Patient & Family Engagement (PFE) Series

In Pursuit of Partnership: Engaging Patients and Families in Hospital Quality and Safety

- **PFE Subject Matter Expert**: Tara Bristol Rouse, MA, CPHQ, CPXP, BCPA  
  PFE Project Consultant for the AHA Center for Health Innovation

- **Knowledge, Tools and Resources** to help in effectively and meaningfully engage patients and families in your work to reduce harm and build a culture of safety

- **Coaching & Support** will provide an opportunity for hospitals to address localized questions

- **Virtual Events & Office Hours (10:30 – 11:30 am ET):**

  - Jan. 24  [Virtual Event 1: The Role of Patients and Families in Promoting Hospital Quality and Safety](#)
  - Feb. 7  [Office Hours 1](#)
  - Feb. 14  [Virtual Event 2: Selecting, Orienting and Engaging Patient and Family Partners](#)
  - Feb. 28  [Office Hours 2](#)
  - Mar. 6  [Virtual Event 3: Training and Supporting Providers for Successful PFE](#)
  - Mar. 20  [Office Hours 3](#)
  - Mar. 27  [Virtual Event 4: Sustaining Meaningful Partnerships](#)
The Workforce Resilience Webinar Series is a 12-month series will be led by well-known healthcare workforce resilience expert Bryan Sexton, PhD, Associate Professor and Director of the Duke Center for Healthcare Safety & Quality at Duke University Health System. The program will provide evidence-based burnout solutions, including skills and tools, to enhance caregiver resilience. The program is offered FREE of charge to FHA members thanks to the generous sponsorship of the Memorial Healthcare System.

Information and registration are available at www.fha.org/education. For questions or assistance, contact the FHA Education Department at education@FHA.org.
Legislative Session Starts January 14!!
Mark Your Calendars:

Reserve Your Spot Today! Visit www.fha.org
Upcoming In-Person Event

Critical Care: Collaborating for Quality, Safety and Best Practices

– Feb. 13, 2020
– Harry P. Leu Gardens in Orlando, FL
– Subject Matter Expert: E. Wesley Ely, MD, MPH, Professor of Medicine, Allergy, Pulmonary and Critical Care at Vanderbilt University School of Medicine
– Register Online: http://www.cvent.com/d/bhqf99/2K
Upcoming Virtual Events

- Feb. 5 (12-1 pm ET) – FHA Monthly Quality Hot Topics
- Feb. 7 (10:30-11:30 am ET) – PFE Office Hours 1
- Feb. 14 (10:30-11:30 am ET) – PFE Virtual Event 2: Selecting, Orienting and Engaging Patient and Family Partners
- Feb. 18 (2-3 pm ET) – Readmissions Reboot Session 4
- Feb. 19 (12-1 pm ET) – Infection Prevention Webinar: SSI Prevention for Total Joint Replacements
- Feb. 28 (10:30-11:30 am ET) – PFE Office Hours 2

Check your HIIN Mission to Care Newsletter Weekly Email for more event details and registration.
Waterborne Diseases

Linda R. Greene, RN, MPS,CIC, FAPIC
Manager, Infection Prevention
UR Highland Hospital
Rochester, NY
linda_greene@urmc.rochester.edu
Objectives

• Discuss waterborne organisms causing healthcare – associated infection

• Describe presenting symptoms consistent with these HAIs

• Identify strategies to prevent these infections
Why Water is Important

- Wet environments support microbial growth
- Tap water is not sterile
- Healthcare:
  - Vulnerable patient populations
  - Large complex water systems
  - Varied water uses
Pathogens in Healthcare

- Biofilm formation
- Slow growth
- Survival mechanisms
- Thermal issues
Healthcare Outbreaks Associated With a Water Reservoir and Infection Prevention Strategies

Hajime Kanamori,1,2 David J. Weber,1,2 and William A. Rutala1,2

1Division of Infectious Diseases, University of North Carolina School of Medicine, and 2Hospital Epidemiology, University of North Carolina Health Care, Chapel Hill

<table>
<thead>
<tr>
<th>Water Contamination Scenario</th>
<th>Mycobacterium Species</th>
<th>BMT and Oncology Patients</th>
<th>Hospitalized Patients</th>
<th>NTM Pulmonary Disease</th>
<th>Patients with Hematological Malignancies</th>
<th>Mycobacterial Infection</th>
<th>Bloodstream Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic Faucet</td>
<td><em>Mycobacterium mucogenicum</em></td>
<td></td>
<td>Cancer patients (leukemia, rhabdomyosarcoma, neuroblastoma)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital Water System</td>
<td><em>Mycobacterium avium</em> complex</td>
<td>Contaminated hospital hot water system</td>
<td></td>
<td></td>
<td>NTM Pulmonary Disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital Water System</td>
<td>NTM (M. mucogenicum, M. neoaurum)</td>
<td>Exposure of CVC sites to contaminated water during bathing</td>
<td>Patients with hematological malignancies</td>
<td>Bacteremia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital Water System</td>
<td>Rapidly growing mycobacteria (eg, M. chelonae)</td>
<td>Contaminated water and ice machines</td>
<td>Hematopoietic cell transplant patients</td>
<td>Mycobacterial infection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital Water System</td>
<td><em>Mycobacterium fortuitum</em></td>
<td>Contaminated shower water</td>
<td>A postoperative patient with breast cancer</td>
<td>Breast infection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sink</td>
<td><em>Mycobacterium mucogenicum</em></td>
<td>Probable exposure when intravenous medication was prepared near the sink and implanted ports were accessed</td>
<td>Patients with sickle cell disease in an outpatient clinic</td>
<td>Bloodstream infection</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## What are the Waterborne Organisms associated with HAIs?

<table>
<thead>
<tr>
<th>Organism</th>
<th>Number of Reports</th>
<th>%</th>
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</thead>
<tbody>
<tr>
<td><em>Klebsiella pneumoniae/oxytoca</em></td>
<td>31498</td>
<td>7.7</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>29636</td>
<td>7.3</td>
</tr>
<tr>
<td><em>Enterobacter</em> spp.</td>
<td>17235</td>
<td>4.2</td>
</tr>
<tr>
<td>Yeast</td>
<td>10811</td>
<td>2.6</td>
</tr>
<tr>
<td><em>Serratia</em> spp.</td>
<td>5463</td>
<td>1.3</td>
</tr>
<tr>
<td><em>Acinetobacter baumannii</em></td>
<td>4375</td>
<td>1.1</td>
</tr>
<tr>
<td><em>Stenotrophomonas maltophilia</em></td>
<td>1758</td>
<td>0.4</td>
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</tbody>
</table>

Water associated pathogens in NHSN 2011-2014 (CLABSI, CAUTI, VAP, SSI) source: Arduino APIC 2019
Investigation of healthcare infection risks from water-related organisms: Summary of CDC consultations, 2014—2017

Kiran M. Perkins (a1), Sujan C. Reddy (a1), Ryan Fagan (a1), Matthew J. Arduino (a1) ...
DOI: https://doi.org/10.1017/ice.2019.60 Published online by Cambridge University Press: 03 April 2019

Methods: We reviewed internal CDC records from January 1, 2014, through December 31, 2017, using water-related terms and organisms, excluding Legionella, to identify consultations that involved potential or confirmed transmission of water-related organisms in healthcare.

Results: Of 620 consultations during the study period, we identified 134 consultations (21.6%), with 1,380 patients, that involved the investigation of potential water-related HAIs or infection control lapses with the potential for water-related HAIs. Nontuberculous mycobacteria were involved in the greatest number of investigations (n = 40, 29.9%). Most frequently, investigations involved medical products (n = 48, 35.8%), and most of these products were medical devices (n = 40, 83.3%). We identified a variety of plausible water-exposure pathways, including medication preparation near water splash zones and water contamination at the manufacturing sites of medications and medical devices.
Conclusions

Conclusions: Water-related investigations represent a substantial proportion of CDC HAI consultations and likely represent only a fraction of all water-related HAI investigations and outbreaks occurring in US healthcare facilities. Water-related HAI investigations should consider all potential pathways of water exposure. Finally, healthcare facilities should develop and implement water management programs to limit the growth and spread of water-related organisms.
Legionella bacteria cause Legionnaires’ disease, a severe form of pneumonia that is also called legionellosis. This image is from the CDC.
Legionella

Legionnaires’ disease, a bacterial infection caused primarily by the species Legionella pneumophila

Initially recognized as the cause of a 1976 outbreak of respiratory disease that resulted in 221 cases of illness, primarily among attendees of an American Legion convention in Philadelphia

34 people died bringing the previously unidentified disease to national attention

Infection with Legionella spp. is now classified into 2 clinically distinct diseases:

Pontiac fever and Legionnaires’ disease; Pontiac fever is a milder illness that does not involve pneumonia
Definition

Defining Healthcare-associated Legionnaires’ Disease

Case Classification:

• Patients who meet clinical and laboratory criteria for confirmed Legionnaires’ disease are further classified based on the duration of healthcare exposure:
  
  • **Definite healthcare-associated**: the patient spent the entire 10 days before date of symptom onset in a healthcare facility
  
  • **Possible healthcare-associated**: the patient spent a portion of the 10 days before date of symptom onset in a healthcare facility
What Clinicians Need to Know about
LEGIONNAIRES’ DISEASE

Legionnaires’ disease is a sometimes fatal form of pneumonia that is on the rise in the United States. Unfortunately, this disease is also underrecognized and underdiagnosed. Clinicians are in a unique position to make sure cases are detected, allowing rapid investigation by public health officials and prevention of additional cases.

Diagnosis and Testing
Clinical features of Legionnaires’ disease include cough, fever, and radiographic pneumonia. Signs and symptoms for Legionnaires’ disease are similar to pneumonia caused by other pathogens; the only way to tell if a pneumonia patient has Legionnaires’ disease is by getting a specific diagnostic test. Indications that warrant testing include:

- Patients who have failed outpatient antibiotic therapy for community-acquired pneumonia
- Patients with severe pneumonia, in particular those requiring intensive care
- Immunocompromised patients with pneumonia
- Patients with a travel history (patients who have traveled away from their home within 10 days before the onset of illness)
- All patients with pneumonia in the setting of a Legionnaires’ disease outbreak
- Patients at risk for Legionnaires’ disease with healthcare-associated pneumonia (pneumonia with onset 2-48 hours after admission)

*Clinicians may also consider testing for Legionnaires’ disease in patients with other risk factors for this infection (see page 2).

Testing for healthcare-associated Legionnaires’ disease is especially important if any of the following are identified in your facility:

- Other patients with healthcare-associated Legionnaires’ disease diagnosed in the past 12 months
- Positive environmental tests for Legionella in the past 2 months
- Current changes in water quality that may lead to Legionella growth (such as low chlorine levels)

Infection control staff may have more information about these situations in your facility.

The preferred diagnostic tests for Legionnaires’ disease are culture of lower respiratory secretions (e.g., sputum, bronchoalveolar lavage) on selective media and the Legionella urinary antigen test. Serological assays can be nonspecific and are not recommended in most situations. Best practice is to obtain both sputum culture and a urinary antigen test concurrently. Sputum should ideally be obtained prior to antibiotic administration, but antibiotic treatment should not be delayed to facilitate this process. The urinary antigen test can detect Legionella infections in some cases for days to weeks after treatment. The urinary antigen test detects Legionella pneumophila serogroup 1, the most common cause of Legionnaires’ disease; isolation of Legionella by culture is important for detection of other species and serogroups and for public health investigation. Molecular techniques can be used to compare clinical isolates to environmental isolates and confirm the outbreak source.

Order both a culture of a lower respiratory specimen and a urinary antigen test when testing patients for Legionella.

In the United States, reported cases of Legionnaires’ disease have grown by nearly nine times since 2000. Nearly 10,000 cases of Legionnaires’ disease were reported in 2018, but this number is likely an underestimate as the illness is thought to be underdiagnosed.

More illness occurs in the summer and early fall, but Legionnaires’ disease can happen any time of year.
Be Suspicious

- Patients admitted to ICU with severe pneumonia

Patients at high risk for legionella with pneumonia occurring >48 hours after admission

Most healthy people do not get Legionnaires’ disease after being exposed to *Legionella*.

- People at increased risk of Legionnaire’s disease are 50 years of age or older or have certain risk factors:
  - Current or former smoker
  - Chronic disease,
  - Weakened immune system
  - At risk for aspiration
Legionella

The Legionella bacterium is a small, aerobic, waterborne, gram-negative un encapsulated bacillus that is non motile.

Legionella bacteria is commonly found in water. The bacteria multiply where temperatures are between 20-45°C. (68-122 F) The bacteria are dormant below 20°C and do not survive above 60°C.

Optimal growth occurs between 95 and 115 degrees.

Prefer a pH between 5.0 and 8.5.
**Legionella sources**

*Legionella* bacteria, which cause Legionnaires’ disease, are contracted by inhaling microscopic water droplets (vapor or mist). The bacteria grow best in warm water, and they are found most commonly in human-made environments.

In addition to large water systems like those in health-care facilities, *Legionella* can be found in:

- large plumbing systems
- hot-water tanks and heaters
- physical-therapy equipment
- bathroom showers and faucets
- decorative fountains
- swimming pools, whirlpools, and hot tubs
- mist machines, like those in the produce sections of grocery stores
- hand-held sprayers
- cooling towers of air conditioning systems
Testing

- L. *pneumophila* is divided into 15 *serogroups*, among which *serogroup* 1 is the most prevalent disease-causing.
- Urinary antigen testing – can detect *serogroup* 1 only
- All others require a sputum specimen
- *Serogroup* 1 should be followed up with a sputum specimen
MEMORANDUM SUMMARY

- **Legionella Infections:** The bacterium *Legionella* can cause a serious type of pneumonia called LD in persons at risk. Those at risk include persons who are at least 50 years old, smokers, or those with underlying medical conditions such as chronic lung disease or immunosuppression. Outbreaks have been linked to poorly maintained water systems in buildings with large or complex water systems including hospitals and long-term care facilities. Transmission can occur via aerosols from devices such as showerheads, cooling towers, hot tubs, and decorative fountains.

- **Facility Requirements to Prevent Legionella Infections:** Facilities must develop and adhere to policies and procedures that inhibit microbial growth in building water systems that reduce the risk of growth and spread of *legionella* and other opportunistic pathogens in water.

- **This policy memorandum applies to Hospitals, Critical Access Hospitals (CAHs) and Long-Term Care (LTC).** However, this policy memorandum is also intended to provide general awareness for all healthcare organizations.
Water Management Plan

Download the Toolkit


https://www.cdc.gov/legionella/wmp/toolkit/index.html
Factors external to buildings that can lead to *Legionella* growth

- **Construction:** Vibrations and changes in water pressure can dislodge biofilm and free *Legionella* into the water entering your building.

- **Water main breaks:** Changes in water pressure can dislodge biofilm and free *Legionella* into the water, while dirt and other materials can be introduced into the water and use up disinfectant.

- **Changes in municipal water quality:** Changes in water quality can increase sediment, lower disinfectant levels, increase turbidity, or cause pH to be outside recommended ranges. Changes in disinfectant type can impact how you should monitor your program.
Prevention

State of the Science Review

Are there effective interventions to prevent hospital-acquired Legionnaires’ disease or to reduce environmental reservoirs of Legionella in hospitals? A systematic review

Dejanira Almeida MSc a,*, Elisabete Cristovam MSc a, Daniel Caldeira MD b,c, Joaquim J. Ferreira MD, PhD b,c, Teresa Marques MD, PhD a

a Laboratory of Microbiology and Molecular Biology, Centro Hospitalar de Lisboa Ocidental, Lisbon, Portugal
b Laboratory of Clinical Pharmacology and Therapeutics, Faculty of Medicine, Universidade de Lisboa, Lisbon, Portugal
c Clinical Pharmacology Unit, Instituto de Medicina Molecular, Lisbon, Portugal

Invited Commentary | Infectious Diseases

Prevention of Health Care–Associated Legionnaires Disease

Shawn J. Sierrett, MD

Legionnaires disease (LD) is an often severe pneumonia caused by bacteria of the genus Legionella. Infection usually results from the inhalation of water droplets aerosolized from man-made water systems that support the amplified growth of Legionella.1,2 The number of cases of LD reported to the Centers for Disease Control and Prevention (CDC) has been steadily increasing since 2000.3 Whether this represents a true increase in incidence, an increase in reporting, or both is not clear. Cases of LD that occur among hospital inpatients and residents of long-term care facilities represent a small proportion of the total burden of legionellosis but are associated with high mortality, great expense, and loss of confidence in the health care system.1
Selected NTM rapid-growing and slow-growing species associated with healthcare
For a more comprehensive list see: Opportunistic Pathogens of Premise Plumbing

<table>
<thead>
<tr>
<th>Rapid-growing species</th>
<th>Slow-growing species</th>
</tr>
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<tbody>
<tr>
<td><em>M. abscessus</em> complex</td>
<td>M. avium complex (includes <em>M. avium</em> and <em>M. intracellulare</em> species)</td>
</tr>
<tr>
<td><em>M. cheloneae</em></td>
<td><em>M. chimaera</em></td>
</tr>
<tr>
<td><em>M. fortuitum</em></td>
<td><em>M. kansasi</em></td>
</tr>
<tr>
<td><em>M. mucogenicum</em></td>
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## NTM Infections

<table>
<thead>
<tr>
<th>Body System</th>
<th>Signs and symptoms</th>
<th>Risk factors and exposures (examples)</th>
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</thead>
<tbody>
<tr>
<td>Cervical lymph nodes</td>
<td>Neck mass; draining sinus</td>
<td>• Dental procedures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No exposure identified</td>
</tr>
<tr>
<td>Skin and soft tissue</td>
<td>Pain, erythema, nodules, plaques, ulcerations, mass, draining sinus</td>
<td>• Trauma (direct inoculation from environment)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Surgery</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Cosmetic surgery</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Tattoos</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Intramuscular or intradermal injection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Medical tourism (e.g., cosmetic surgery)</td>
</tr>
<tr>
<td>Musculoskeletal</td>
<td>Pain, joint stiffness, fever, malaise, weight loss</td>
<td>• Spread of infection from contiguous source (e.g., surgery, injection, injury)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Prosthetic joint surgery</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Joint injections</td>
</tr>
<tr>
<td>Systemic (disseminated)</td>
<td>Rash or other skin lesions, lymphadenopathy, fever, malaise, weight loss, shortness of breath, liver and spleen lesions</td>
<td>• Immunosuppression</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Invasive devices (e.g., central line)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Surgery</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Heater cooler devices (<a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6355388/">Contaminated Heater Cooler Devices leading to M. chimaera infections in cardiothoracic surgery patients</a>)</td>
</tr>
</tbody>
</table>
NTM

Title: Standardized Case Definition for Extrapulmonary Nontuberculous Mycobacteria Infections

I. Statement of the Problem

Nontuberculous mycobacteria (NTM) are opportunistic pathogens that can be difficult to treat. While pulmonary NTM infection is a well-recognized cause of illness among those with underlying lung disease, extrapulmonary NTM infections appear to be increasing and are often associated with severe disease and poor outcomes. Extrapulmonary NTM infections are a cause of both sporadic and healthcare-associated infections in the United States. Outbreaks have been associated with medical devices, cosmetic procedures, contaminated parenteral medications, and medical tourism, as well as with community exposures such as tattoo parlors and nail salons. The true burden and incidence of NTM infections is unknown. Extrapulmonary NTM infection is not nationally notifiable and is currently reportable in a few jurisdictions, such as Oregon and Tennessee. Given the insidious nature of extrapulmonary NTM infections, i.e. nonspecific symptomatology and prolonged time between exposure and symptom onset, detecting outbreaks of extrapulmonary NTM infections can be challenging, which poses barriers to the identification and elimination of sources of infection. Establishing a case definition for extrapulmonary NTM infections will help to identify populations at risk and detect outbreaks in a timely manner to allow for early public health intervention.
<table>
<thead>
<tr>
<th><strong>Criterion</strong></th>
<th><strong>Probable</strong></th>
<th><strong>Confirmed</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical Evidence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fever</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Fatigue</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Weight loss</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Lymphadenopathy referable to the area from which the specimen in which mycobacteria were identified</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Surgical site infections referable to the area from which the specimen was obtained, in which mycobacteria were identified</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Wound infections referable to the area from which the specimen was obtained, in which mycobacteria were identified</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Cellulitis referable to the area from which the specimen was obtained, in which mycobacteria were identified</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Granulomas referable to the area from which the specimen was obtained, in which mycobacteria were identified</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Sepsis</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Failure to thrive</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Osteomyelitis referable to the area from which the specimen was obtained, in which mycobacteria were identified</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Other infection signs or symptoms referable to the area from which the specimen was obtained, in which mycobacteria were identified</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
Cluster Related to joint Surgery

Cluster of *Mycobacterium fortuitum* and *M. goodii* prosthetic joint surgical site infections occurring during 2010–2014.

Cases were defined as culture-positive nontuberculous mycobacteria surgical site infections that had occurred within 1 year of joint replacement surgery performed on or after October 1, 2010.

Identified 9 cases by case finding, chart review, interviews, surgical observations, matched case–control study, pulsed-field gel electrophoresis of isolates, and environmental investigation; 6 cases were diagnosed >90 days after surgery.

Cases were associated with a surgical instrument vendor representative being in the operating room during surgery; other potential sources were ruled out. A tenth case occurred during 2016.

This cluster of infections associated with a vendor reinforces that all personnel entering the operating suite should follow infection control guidelines;
Eye Surgeries

- Two of 6 patients from an ambulatory clinic that performs LASIK procedures 1 day a month experienced eye pain after their procedure in Feb. 2015
- They were diagnosed with *Mycobacterium chelonae*, an environmental organism found in soil and water
- Investigators found no lapse in infection prevention practices
- 2 more patients were identified in early March
- Two humidifiers to maintain the 40%–50% relative humidity recommended by the manufacturer of the laser device used in the LASIK procedures
Cold air, reservoir style, retail humidifiers were filled with tap water and located in the operating room close to where patients were situated during the procedures.

1 of these had an ultrasonic nebulizer that produced a mist the other did not (the misting nebulizer had been purchased in Dec. 2014).

Laboratory testing performed by CDC isolated *M. chelonae* from the water reservoir of the misting humidifier. Pulsed-field gel electrophoresis results indicated that three of the four patient isolates and the humidifier isolate were indistinguishable.

Stress the importance of evidence-based guidelines related to reservoir style humidifiers.
Contaminated rinsing water

Hospital outbreak of atypical mycobacterial infection of port sites after laparoscopic surgery
R. Vijayaraghavan, R. Chandrashekhar, Y. Sujatha, C.S. Belagavi

EDITOR'S CHOICE
Healthcare Outbreaks Associated With a Water Reservoir and Infection Prevention Strategies
Hajime Kanamori, David J. Weber, William A. Rutala

Invasive Nontuberculous Mycobacterial Infections among Cardiotoracic Surgical Patients Exposed to Heater-Cooler Devices

<table>
<thead>
<tr>
<th>Tap water</th>
<th>Mycobacterium abscessus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate sterilization of surgical instruments</td>
<td></td>
</tr>
<tr>
<td>Postsurgical patients</td>
<td></td>
</tr>
</tbody>
</table>
NTM

- Breast infections
- Liposuction
- Piercings
- Eye surgery
Assessment of NTM

- Identify concerning practices involving water or ice, such as:
- Preparing injections or infusions near sinks or other water sources
- Storage of materials used in invasive procedures (including injections) near a water source
- Storage of respiratory equipment such as nebulizers while wet without allowing the equipment to dry (e.g. storage of nebulizer cups after rinsing in a plastic bag)
- Use of aerosol generating devices (e.g. humidifiers)
- Use of ice to numb skin prior to an injection
- Use of non-sterile water or ice resulting in contact with non-intact skin or area of incision
- The use of non-sterile water or ice during surgery in such a way that it could lead to contamination of the sterile field or sterile equipment
- Dipping of bronchoscopes in ice prior to use
- Use of endoscopes that were not completely dry post-reprocessing
Gram Negative Organisms

Resistant Gram negative organisms identified from various sources.

Contaminated drains implicated in many of these infections

Recent pseudomonas outbreak in neonatal ICU in Pennsylvania
Geisinger Medical Center in Danville said the process it was using to prepare donor breast milk led to the deadly outbreak in the hospital's neonatal intensive care unit.

Infection control specialists used DNA testing to trace the Pseudomonas bacterium to equipment used to measure and administer donor breast milk. Geisinger said it has since switched to using single-use equipment. Hospital officials stressed the milk itself was not the source of the exposure.
State Findings

Failed to keep donor breast milk at the correct temperature

Stored equipment within the “splash zone” of a sink

No written instructions for routine cleaning of brushes, blenders, cylinders, and other equipment used to prepare infant formula and breast milk.
### Summary of Key Issues and Infection Prevention Strategies Against Waterborne Outbreaks by Major Water Reservoir in Healthcare Settings

<table>
<thead>
<tr>
<th>Reservoir</th>
<th>Key Issues</th>
<th>Infection Prevention Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potable water, tap water, and hospital water systems</td>
<td>Potable water is not sterile, and pathogenic waterborne organisms may exist in potable water at acceptable levels of coliform bacteria (&lt;1 coliform bacterium/100 mL). Healthcare-associated outbreaks have been linked to contaminated potable water. Semicritical devices are often rinsed with potable water, which may lead to contamination of the equipment and subsequent healthcare-associated infections. Common pathogens include nonenteric gram-negative bacilli (e.g., <em>Pseudomonas aeruginosa</em>), <em>Legionella</em>, NTM.</td>
<td>Follow public health guidelines. Hot water temperature at the outlet at the highest temperature allowable, preferably &gt;51°C. Water disruptions: post signs and do not drink tap water. Maintain standards for potable water (&lt;1 coliform bacterium/100 mL). Rinse semicritical equipment with sterile water, filtered water, or tap water followed by alcohol rinse.</td>
</tr>
<tr>
<td>Water and ice baths</td>
<td>Contaminated water baths were used to thaw or warm blood products (fresh plasma, cryoprecipitate) or peritoneal dialysate bottles, followed by contamination of the infusates occurred during preparation. Contaminated ice baths were used to cool syringes or bottles of saline in measuring cardiac output. Potential pathogens include <em>Pseudomonas</em>, <em>Acinetobacter</em>, <em>Burkholderia</em>, <em>Staphylococcus</em>, and <em>Ewingella</em>.</td>
<td>Consider routine cleaning, disinfection, and changing of water in water baths. Add germicide to water bath or use plastic overwrap of blood products and keep the surfaces dry. Use sterile water in ice baths (or at room temperature) used for thermodilution catheters.</td>
</tr>
<tr>
<td>Electronic faucets</td>
<td>Electronic faucets were likely to be contaminated by several waterborne pathogens than handle-operated faucets. Issues associated with electronic faucets include a longer distance between the valve and the tap, resulting in a longer column of stagnant, warm water, which favors production of biofilms; reduced water flow; reduced flushing effect (growth favored); valves and pipes made of plastic (enhances adhesion of <em>P. aeruginosa</em>).</td>
<td>Electronic faucets need to be designed so that they do not promote the growth of microorganisms. No guideline (but some authors have recommended) to remove electronic faucets from high-risk patient care areas [eg, BMTU]). Some have recommended periodic monitoring of water samples for growth of <em>Legionella</em>.</td>
</tr>
<tr>
<td>Sinks</td>
<td></td>
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<td>-------</td>
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</tr>
<tr>
<td>Colonization of sinks with gram-negative bacilli has been reported. Some studies demonstrate a transmission link between a colonized sink and infected patients. Some studies describe that multidrug-resistant gram-negative bacilli are associated with contaminated sinks. Gram-negative bacilli can survive wet environments, including sinks, for a long time (&gt;250 d). Transmission can be caused by splashing of water droplet from contaminated sinks to hands of healthcare personnel, followed by transient colonization of hands. Common pathogens include gram-negative bacilli (eg, <em>Pseudomonas</em>, <em>Acinetobacter</em>, <em>Serratia</em>).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use separate sinks for handwashing and disposal of contaminated fluids. Decontaminate or eliminate sinks as a reservoir if epidemic spread of gram-negative bacteria via sinks is suspected.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ice and ice machines</td>
<td>Patients can acquire pathogens by sucking on ice, ingesting iced drinks, or use of contaminated ices for cooling medical procedure and patients' skin. Large outbreaks occurred when ice machines have become contaminated and ice used for cooling drinking water. Common pathogens include <em>Pseudomonas</em>, <em>Enterobacter</em>, <em>Legionella</em>, NTM, and <em>Cryptosporidium</em>.</td>
<td>Do not handle ice by hand. Do not store pharmaceuticals or medical solutions on ice for consumption. Use automatic dispenser rather than open chest storage compartments in patient areas. Clean and disinfect ice-storage chests regularly. Meaningful microbial standards for ice and ice machines do not exist. Routine culturing of ice machines are not recommended. A regular disinfection program for ice machines is recommended.</td>
</tr>
</tbody>
</table>
Key Issues

- Planning during construction and renovation
- Avoiding plumbing features that predispose to stagnation
- Correct water temperatures
- Avoid decorative fountains
- Continued surveillance for waterborne infections
# Tools

## Reprocessing: High Level Disinfection and Liquid Sterilization Process—“Clean” Area

*Instructions:* Observe area where instruments are reprocessed. For each category, record the observation Sum all Yes and No responses. Divide by sum of “Yes” + “No”.

<table>
<thead>
<tr>
<th>Equipment Reprocessing – Clean Area</th>
<th>Summary of Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Are disinfected instruments stored in a manner to protect them from damage and contamination?</td>
<td>☐ Yes ☐ No</td>
</tr>
<tr>
<td>2 Is each piece of equipment labeled with the day of most recent disinfection?</td>
<td>☐ Yes ☐ No</td>
</tr>
<tr>
<td>3 Are scopes, if present, stored in a dedicated area and hung vertically to facilitate drying?</td>
<td>☐ Yes ☐ No ☐ N/A</td>
</tr>
<tr>
<td>4 Is a log of reprocessed items (paper-based or electronic) maintained that documents:</td>
<td>☐ Yes ☐ Yes ☐ No ☐ No</td>
</tr>
<tr>
<td>a. The instrument reprocessed and date,</td>
<td>☐ Yes</td>
</tr>
<tr>
<td>b. The technician who performed the reprocessing, and</td>
<td>☐ Yes</td>
</tr>
<tr>
<td>c. An indication of whether or not the reprocessing run passed or failed any necessary chemical or mechanical tests.</td>
<td>☐ Yes</td>
</tr>
</tbody>
</table>

**TOTAL**
Eligibility for Nursing CEU requires submission of an evaluation survey for each participant requesting continuing education: [https://www.surveymonkey.com/r/IP01242020](https://www.surveymonkey.com/r/IP01242020)

- Share this link with others on your team if viewing today’s webinar as a group (*Survey closes Feb. 4, 2020*)
- Be sure to include your contact information and Florida nursing license number
- FHA will report 1.0 credit hour to CE Broker and a certificate will be sent via e-mail (Please allow at least 2 weeks after the survey closes)
Cheryl D. Love, RN, BSN, BS-HCA, MBA, LHRM, CPHRM
Florida Hospital Association
cheryll@fha.org | 407-841-6230

Linda R. Greene, RN, MPS, CIC
Manager of Infection Prevention
UR Highland Hospital, Rochester, NY
linda_greene@urmc.rochester.edu