



SHEA

The Society for Healthcare
Epidemiology of America

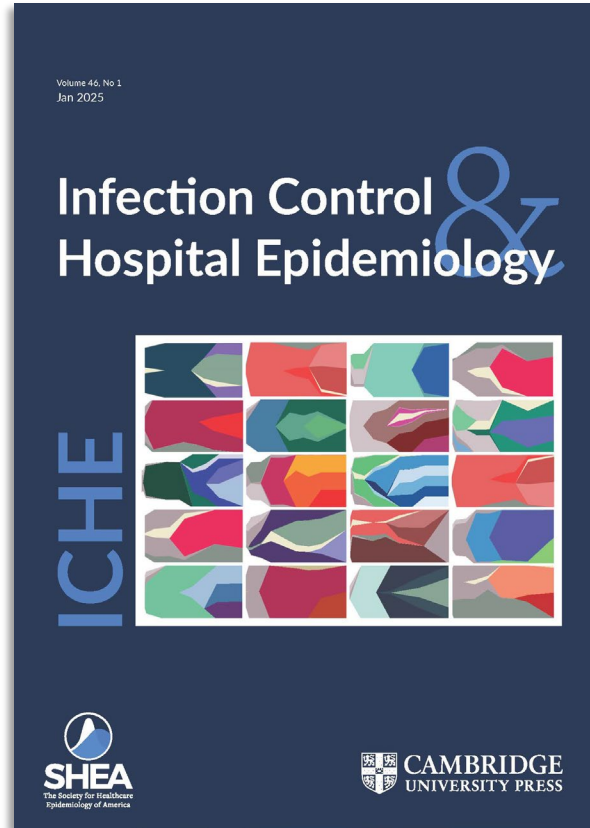
SAFE HEALTHCARE FOR ALL



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ICHE Journal



Infection Control & Hospital Epidemiology publishes scientifically authoritative, clinically applicable, peer-reviewed research on control and evaluation of the transmission of pathogens in healthcare institutions and on the use of epidemiological principles and methods to evaluate and improve the delivery of care. Major topics covered include infection control practices, surveillance, antimicrobial stewardship, cost-benefit analyses, resource use, occupational health, and regulatory issues.

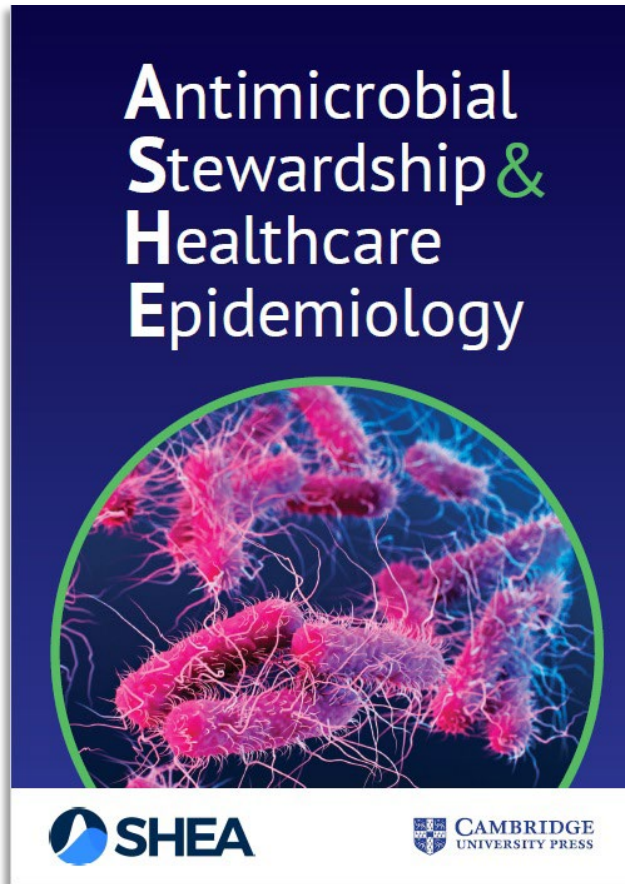
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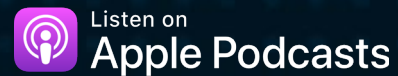
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TUNE IN TO SHEA'S PODCASTS



AVAILABLE ON:



Online ID Fellows Course

Primer on Healthcare Epidemiology, Infection Control & Antimicrobial Stewardship



SCAN TO
LEARN MORE





NEW!

SHEA Members Open Forum

Get ready for real discussion! This is a peer-driven, discussion-based program designed for SHEA members to connect, share experiences, and talk through real-world challenges.



July 22nd at 4:00 – 5:00 pm ET

Topic: *C. auris* Infection Prevention & Control Strategies

Moderator: April McDougal, DO



You Can Help!

Improving Antibiotic Stewardship
and Infection Prevention in
Nursing Homes



eLearning Course





LEARNINGCE
SHEA Online Education Center

SAVE THE DATE!
Stay Tuned for
Registration
Details

UPCOMING LIVE PROGRAMS

2025 Update on Management of Occupational Exposures to HIV
July 28, 2026 | 2:00 – 3:00 pm ET

Quality Improvement: From Principles to Practice
August 5, 2026 | 3:00 – 4:00 pm ET
August 17, 2026 | 3:30 – 4:30 pm ET

Expanding Handshake Stewardship: Practical Strategies for Scaling Collaborative Antimicrobial Stewardship Rounds
September 9, 2026 | 3:30 – 4:30 pm ET

Measuring the Social & Environmental Impact of Antimicrobial Stewardship & Infection Prevention
October 6, 2026 | 4:00 – 5:00 pm ET
November 9, 2026 | 4:00 – 5:00 pm ET



Virtual Workshop

Two Day Workshop: November 5 - 6, 2026

Improving Infection Prevention & Antibiotic Use in Long-Term Care: From Guidance to Practice



M A L A Y S I A

APUSIC



**20
26**

**12th INTERNATIONAL CONGRESS OF
ASIA PACIFIC SOCIETY OF INFECTION CONTROL**

Kuala Lumpur Convention Centre, Malaysia

SAVE THE DATE

30 JUL - 02 AUG 2026



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SHEA Webinar

Town Hall 2026

Housekeeping



- Technical difficulties? Visit: <https://support.zoom.us>
- Webinar recording, PowerPoint presentation, and references available on learningce.shea-online.org
- Streaming Live on SHEA's Facebook page
- Zoom Polling, Q&A & Chat



SAFE HEALTHCARE FOR ALL

July Town Hall Panelists:



Dr. Bernard Camins
Mount Sinai



Dr. Tom Talbot
Vanderbilt University



Dr. Chris Nyquist
Children's Hospital Colorado

Invited Panelist:



Dr. Abraham C. Cullom
Pace Analytical

Waterborne Pathogens and Healthcare Water Systems: Emerging Issues and Best Practices

Bernard C. Camins, MD, MSc

July 8, 2026



Icahn School
of Medicine at
**Mount
Sinai**

Why Water Is an Infection Prevention Priority?

- **Ubiquitous exposure**

- Water touches nearly every point of patient care — hand hygiene, bathing, drinking, dialysis, endoscopy, and medical device reprocessing

- **Hidden reservoirs**

- Plumbing (sinks, drains, showerheads, ice machines) can harbor biofilm-forming organisms that standard disinfection does not reach

- **Vulnerable patients**

- Immunocompromised, elderly, and critically ill patients face disproportionate morbidity and mortality from waterborne HAIs

- **Preventable harm**

- CDC data show the vast majority of healthcare Legionella outbreaks stemmed from preventable water management gaps

Key Waterborne Pathogens in Healthcare

Pathogen	Common Water Reservoir / Route	Clinical Impact
Legionella spp.	Aerosolized potable water, showers, cooling towers, respiratory equipment	Legionnaires' disease (pneumonia); ~9-10% overall CFR, higher in HA cases
Nontuberculous mycobacteria (NTM)	Tap water, ice, bronchoscopes, heater-cooler units	Pulmonary, wound, bloodstream, and surgical-site infections
<i>Pseudomonas aeruginosa</i>	Sinks, drains, faucet aerators, hydrotherapy equipment	Bloodstream, wound, and respiratory infections; often multidrug-resistant
Other gram-negatives (<i>Stenotrophomonas</i>, <i>Acinetobacter</i>, <i>Burkholderia</i>)	Sink drains, biofilm, contaminated solutions	Outbreaks linked to sink splashing and drain biofilm

How Patients Are Exposed to Waterborne Pathogens?

1. Source & distribution

- Municipal supply enters the facility; chlorine residual can decay across large, complex plumbing systems

2. Stagnation & biofilm

- Low-flow branches, dead legs, and suboptimal temperatures let biofilm and pathogens proliferate

3. Point-of-use devices

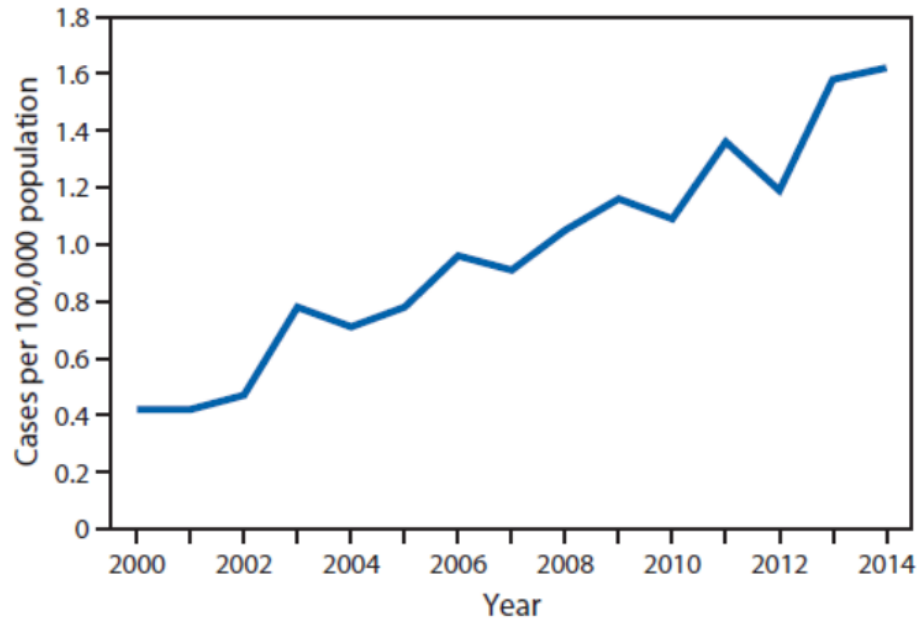
- Faucets, showerheads, ice machines, and sinks/drains amplify exposure

4. Patient exposure

- Ingestion, aspiration, aerosolization, or direct contact during hygiene, dialysis, or device use
- *Colonization can occur in the proximal infrastructure, the distal outlets, or both — informing where sampling and remediation should focus*

Legionella: The Leading Healthcare Water Threat

FIGURE 1. Reported cases of legionellosis per 100,000 population, by year — United States, 2000–2014



- **33%** of CDC-investigated Legionnaires' outbreaks (2000-2014) were healthcare-associated
- **85%** of outbreak-associated deaths occurred in healthcare-associated outbreaks
- **~6.5x** increase in U.S. Legionnaires' disease incidence, 2000 to 2019
- About 2 in 3 outbreaks trace to process failures such as lacking or not following a water management program; roughly half involve human error (e.g., missed maintenance)

Source: CDC Vital Signs / MMWR 2016;65(22):584-589

Regulatory and Accreditation Landscape

Authority / Standard	Requirement Summary
CMS Directive (S&C 17-30, June 2017)	Requires hospitals, critical access hospitals, and long-term care facilities to maintain water management policies addressing ASHRAE Standard 188
ANSI/ASHRAE Standard 188 (2015)	Industry standard for Legionella risk management in building water systems
CDC Toolkit (2016, updated)	Practical guidance to help facilities implement ASHRAE 188 and develop a water management program
The Joint Commission	Water management program standard; surveys for documented policies, risk assessment, and monitoring
CDC/HICPAC Environmental Infection Control Guidelines	Foundational recommendations on water quality, disinfection, and outbreak response

Antimicrobial Resistance and Water Systems

- Hospital water systems serve as reservoirs for MDROs
- Biofilms on outlet devices (faucets, drains) provide an ideal niche for MDRO dissemination
- Splashing and aerosolization from sinks can spread ESBL-producing organisms, KPC-producing *Klebsiella*, and *Pseudomonas* spp. to hands, clothing, and patient care supplies
- Research confirms that the sink drain biofilm resistome (collection of antimicrobial resistance genes) persists despite routine disinfection

Sink-Related Transmission: An Underappreciated Risk

- Handwashing has been observed only in 4% of total sink interactions
- Workflow can lead to contamination: filling/emptying water glasses, medication cups, tube feed bags; draining IV bags; food/beverage preparation; placing patient care items on nearby countertops
- Slow drainage increases contamination of sink bowls and nearby surfaces
- Contamination reduced when sink use was restricted to handwashing and basins were disinfected daily with bleach
- Medication preparation near water splash zones is a recognized exposure pathway

Recommended Infection Prevention Best Practices

- Restrict sink use to handwashing only; avoid medication preparation near splash zones
- Use sterile water for rinsing/cleaning devices and for care of immunocompromised patients
- Avoid use of tap water and ice from ice machines for patient care activities during outbreaks
- Remove decorative water features (fountains) from healthcare settings
- Implement daily bleach disinfection of sink basins
- Maintain adequate water flow — flush low-use or stagnant outlets regularly
- Ensure hand hygiene as the most important measure to prevent transmission of waterborne Gram-negative pathogens
- Conduct aggressive clinical surveillance for Legionellosis and other waterborne infections

What Is ANSI/AAMI ST108?

- A mandatory?, ANSI-approved standard establishes water quality and testing requirements for medical device reprocessing, enforceable by The Joint Commission and CMS
- Replaces AAMI TIR34 unlike the prior technical information report, ST108 sets binding requirements rather than optional guidance
- Comprehensive scope covers water treatment, distribution, storage, quality control, and bacterial-control strategies
- Requires a dedicated water management team that spans sterile processing, facilities engineering, and infection prevention, with a documented water management program
- Poor water quality can damage medical devices by causing staining, corrosion, pitting, malfunction, blocked lumens, reduces mobility of moving parts, and discoloration.

Testing, Monitoring & Quality Control

- **Testing parameters**
 - pH, total alkalinity, conductivity, total hardness, physical appearance
- **Microbial & endotoxin testing**
 - Bacteria (HPC) for all water types; endotoxin (LAL) required for Critical Water only
- **Sampling technique**
 - Recommendations for sampling locations and methods

Three Categories of Water Quality

Water Category	Primary Use	Treatment	Purity Requirement	Testing Frequency
Utility Water	Flushing, washing, intermediate rinsing	Tap water; may need treatment	Meets chemical criteria (pH, hardness)	Quarterly
Critical Water	Final rinse of critical & semi-critical devices	Multi-step RO / DI treatment	Conductivity below 5 microS/cm; endotoxin tested	Monthly
Steam	Sterilization in autoclaves & generators	Boiler or local generator	Condensate meets Critical Water criteria	Quarterly

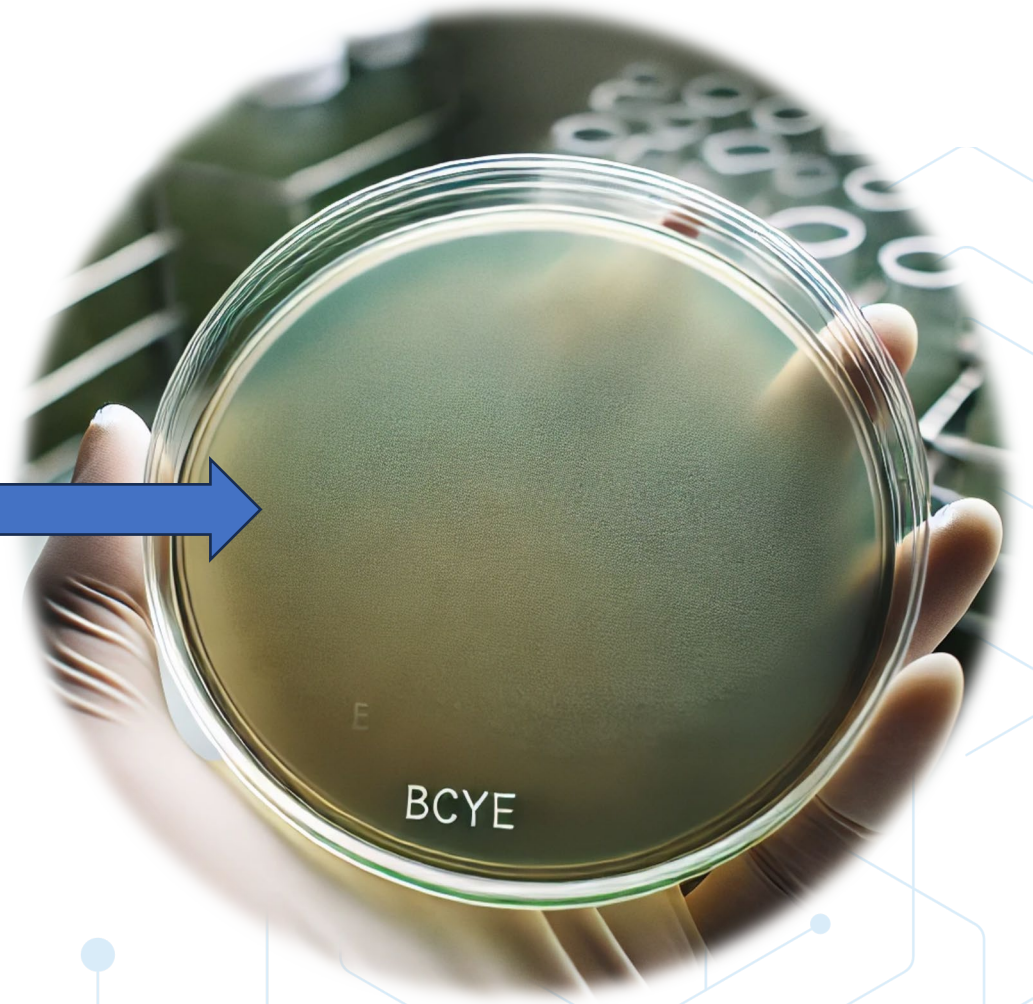
Thank you.
Water safety is patient safety.



VBNC Legionella

VBNC

**Viable
But
Not
Culturable**



Why do cells enter VBNC status?

1. Starvation
2. Heat
3. Chlorine
4. Copper



Not Culturable but...

VBNC *Legionella pneumophila* cells are still able to produce virulence proteins

Laëtitia Alleron^a, Arbia Khemiri^{b,c,d}, Mohamad Koubar^a,
Christian Lacombe^a, Laurent Coquet^{b,c,d}, Pascal Cosette^{b,c,d},
Thierry Jouenne^{b,c,d}, Jacques Frere^{a,*}

Resuscitation of Viable but Nonculturable *Legionella pneumophila*
Philadelphia JR32 by *Acanthamoeba castellanii*

MICHAEL STEINERT,^{1,2} LEVENTE EMÖDY,³ RUDOLF AMANN,⁴ AND JÖRG HACKER^{1*}

Starved viable but non-culturable (VBNC) *Legionella* strains can **infect**
and replicate in amoebae and human macrophages

Elisabeth Dietersdorfer^{a,1}, Alexander Kirschner^{b,c,*,1}, Barbara Schrammel^b,
Anna Ohradanova-Repic^d, Hannes Stockinger^d, Regina Sommer^{b,c}, Julia Walochnik^{a,**},
Sílvia Cervero-Aragó^{b,c}

Are we missing something?



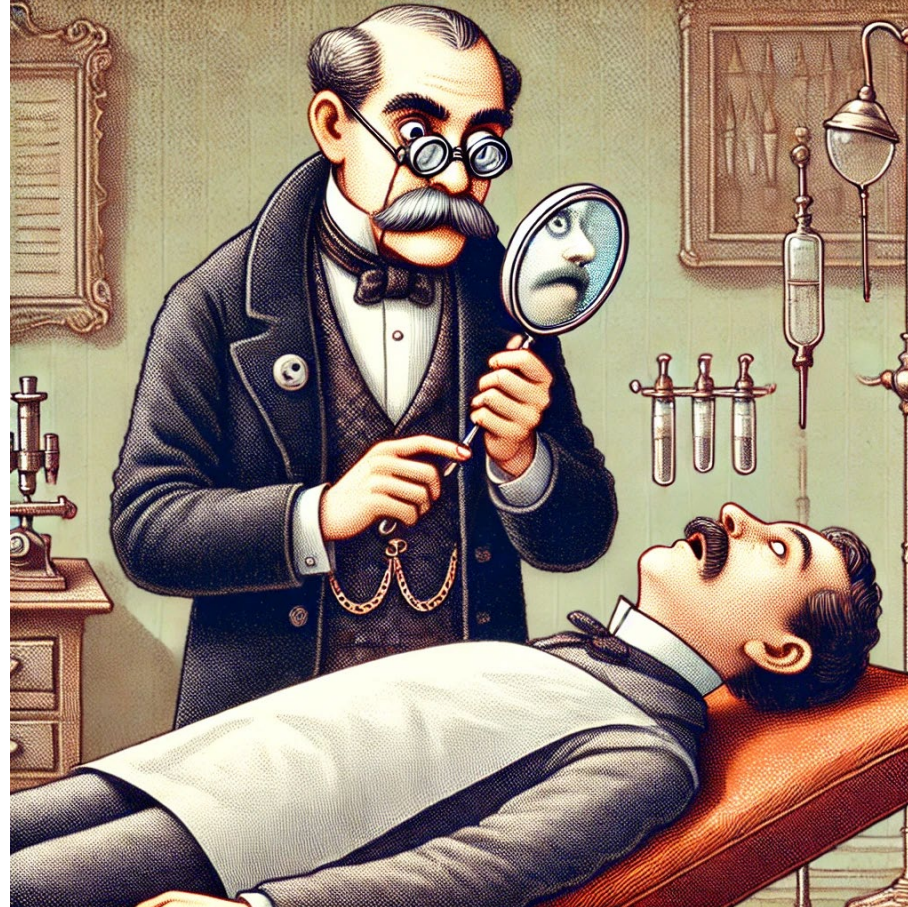
“No waterborne Legionella infections have been directly attributed to VBNC cells.”

LeChevallier, Mark W. "The Case for Monitoring for Legionella pneumophila in Drinking Water Distribution Systems." *Water* 17.4 (2025): 475.

Legitimate Implications of VBNC Bacteria

- Testing in proximity to water treatment
 - Shock chlorination
- Testing after stagnation

Viability Methods



How do you measure viability?

Viability Methods

- PMA-qPCR: Membrane integrity
 - Complication: Viable cells with damaged or permeable membranes
- PVT-Viable: Change in DNA levels after liquid enrichment
 - Complication: Bacteriostatic cells

...But not just Legionella!

Confirmed or very likely VBNC
behavior in drinking water

- *Legionella*
- *Pseudomonas aeruginosa*
- *Aeromonas hydrophila*
- *Klebsiella pneumoniae*

Plausible/limited evidence

- Nontuberculous mycobacteria
- *Acinetobacter baumannii*
- *Burkholderia cepacia* complex

Thank you!

Abe.Cullom@pacelabs.com