Worker Exposure & Water Risk at Sinks & Eyewash Stations [and Emergency Showers, etc]

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THE NEPHROS WATER INSTITUTE

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Learning Objectives

Distinguish worker exposure review

…from drinking water, patient safety, product quality, system control, and emergency equipment readiness frameworks

Identify worker-facing water points

…that may warrant closer evaluation based on task, fixture condition, exposure pathway, and surrounding environment

Evaluate risks of routine tasks and exposure concerns

…related to splash, aerosolization, drains, stagnation, and emergency-use fixtures

Explain where point-of-use filtration may fit

…as one engineering control within a broader multi-barrier water safety strategy

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What water do employees encounter while doing their jobs?

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Water Programs Answer the Questions They Were Built to Address

Example Programs

Healthcare Water Management	Emergency Station Standards	Product Water	Employee Drinking Water
Are patient exposure risks being managed?	Is emergency flushing equipment accessible and functional?	Is process or product-contact water controlled / sufficiently pure?	Is potable water available for consumption?

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Functional ≠ Safe

Just because a water outlet or fixture works as it should does not mean the water flowing through or from it is safe

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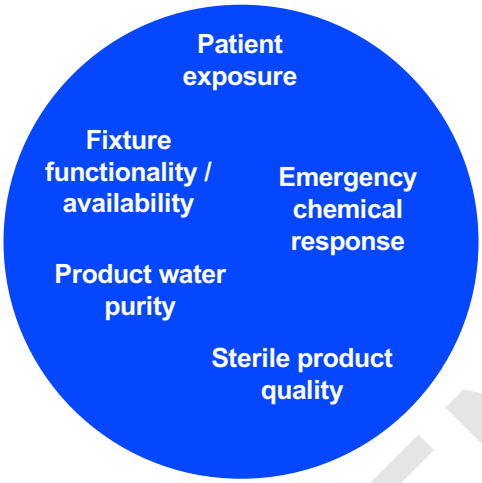
Program Compliance Versus Worker Exposure Reality

Program / Guidance / Regulatory Focus



Worker Exposure to Waterborne Risk

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Over time the disparity between guidance and actual worker exposure widens

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Outlets and Risks to Consider

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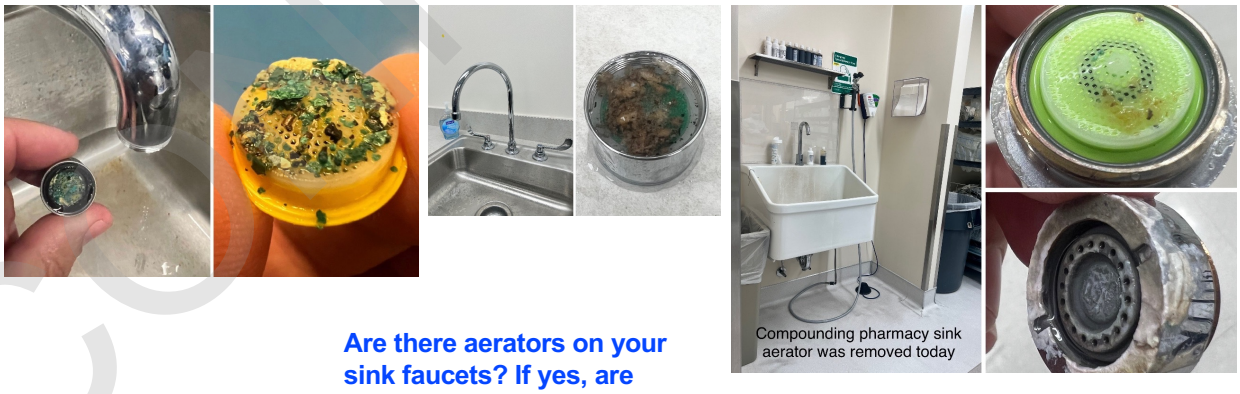
Consider: Handwashing & Compounding Sink Fixtures



Are there aerators on your sink faucets? If yes, are they cleaned regularly?

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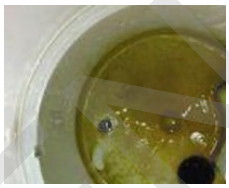
Consider: Water Dispensers

Are the outlets and interiors of water dispensers being cleaned?







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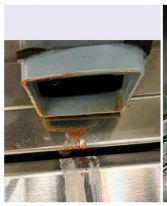
Consider: Ice Machines

Are you using your ice machines as a water dispenser?



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The Myth of "The Process Covers It"

MISCONCEPTION

When formal programs are in place for patients and critical systems, staff assume there's no need to worry about worker-only fixtures

REALITY

Functional checks aren't microbial assessments

- Stagnant water in pipes can re-introduce pathogens during thermal disinfection, and controlling *Legionella* requires flushing dead-legs and cleaning aerators

Stagnation and unmonitored fixtures allow biofilms to grow

- Premise plumbing harbors biofilm and germs > infrequently used fixtures and dead-legs must be flushed regularly
- Worker-area sinks, janitor closets and break-rooms are often omitted from sampling plans, leaving hidden reservoirs of risk

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Exclusion from a sampling protocol is not exclusion from risk

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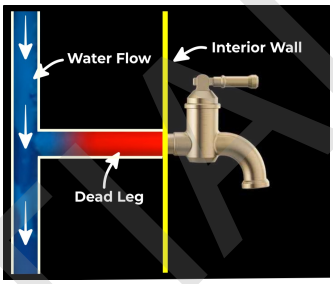
Risks of Stagnation



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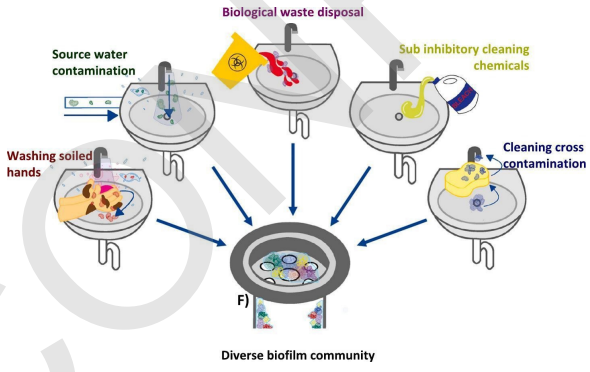
Risks in Sinks



Potentially pathogenic bacterial genera identified in handwashing basin biofilms

Aeromonas	*Enterobacteriaceae*	*Mycoplasma*
Acinetobacter	*Haemophilus*	*Pseudomonas*
Bacillus	*Legionella*	*Sphingomonas*
Bosea	*Methylobacterium*	*Staphylococcus*
Campylobacter	*Methylorubrum*	*Stenotrophomonas*
Coxiella	*Mycobacteria*	*Vibrio*
	Yersinia	

Source: *"Handwashing basins and healthcare associated infections: Bacterial diversity in biofilms on faucets and drains."* https://www.sciencedirect.com/science/article/pii/S0048969724053440?_cf_chl_tk=4Txwd3uEfkajNWoqa5lVvBYiTYT9VJ4FolWFnxSIJr8-1779277451-1.0.1.1-EACK7LjiY6qhv78rWAUGs.fvgn2zBXQZvfULNCgGlyo

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Gap Examples

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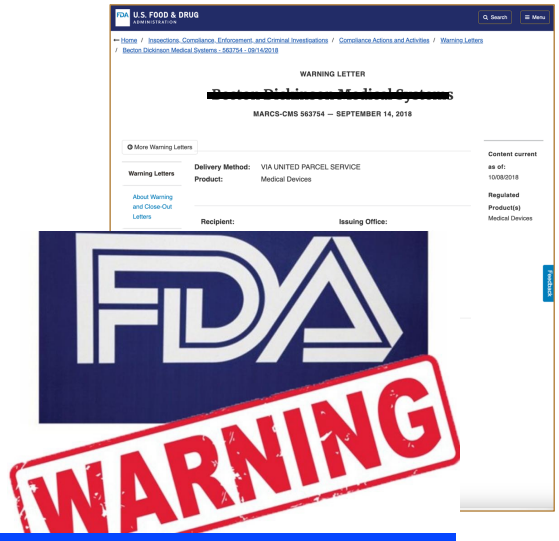
EXAMPLE: Tap Water / Environmental Monitoring

Medical Device Manufacturing

- **Municipal tap water used for cleanroom disinfection was a contamination source:** The FDA found that BD used municipal tap water in its cleaning and disinfecting solutions for Class 10 000 cleanrooms and Class 100 laminar flow hoods. FDA sampling showed the **tap water "was found to be a potential source of microbial contamination,"** and the firm did not routinely monitor the water's microbial load
- **Janitor-room faucet harbored opportunistic bacteria: FDA sampling detected *Brevibacillus choshinensis* in a water sample taken from "the faucet located in the janitor room,"** and the same organism was found on surfaces in cleanrooms and a gowning area
- **Environmental monitoring ignored janitor and pre-gowning rooms:** The FDA noted that BD's environmental monitoring program "does not require monitoring of the Class 10 000 janitor room and pre-gowning room" even though "these two rooms are used on all production days"



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EXAMPLE: Compounding Product Water

OTC Drug Manufacturing

- **Domestic OTC Manufacturer Warning Letter (2026)**: The FDA reported a severe compounding facility failure where **the water system consistently failed chemical and microbial specifications for two straight years**
- The system had structural "dead-legs" near processing points > allowed highly pathogenic, water-loving gram-negative organisms, specifically ***Pseudomonas aeruginosa* and *Serratia marcescens***
  - Posed an extreme infection hazard to the workers preparing the batches

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EXAMPLE: Non-Sterile Sinks

Compounding Pharmacy

r/pharmacy:

- In a thread detailing severe USP 797/800 non-compliance, an anonymous compounding professional reported **an unmonitored anteroom sink setup**
- Because the sink itself was never sanitized, it became a breeding ground for standing water bacteria, forcing technicians to choose between bypassing hand hygiene or exposing themselves to localized pathogens

"The sink is never cleaned and the paper towels are not sterile and leave dirt/debris/whatever the hell on your hands when you use them"

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EXAMPLE: Industrial Jet Cutters / Floor Scrubbers

Manufacturing Facility

- Two unique equipment sources of Legionella bacteria were identified. *Legionella pneumophila* was isolated from three devices: two water jet cutters and one floor scrubber
- *L. pneumophila* sequence type 36 was identified in environmental isolates, indicating that those devices were the likely source of infection
  - The mechanical brush rotation and vacuum exhaust **aerosolized the contaminated water reservoir, exposing workers across multiple shifts who inhaled the fine mist**
  - Similar exposure occurred due to aerosolized water produced by industrial jet cutters

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EXAMPLE: Hospital Sinks

- ***"…a shallow depth of the sink bowl enabled potentially contaminated water to splash onto patient care items, healthcare worker hands, and into patient care spaces****—at times at a distance of more than four feet from the sink itself."*
- *"…also found aerators on sinks where they had previously been removed, pointing to an overall inconsistency of equipment protocols across the facility."*

https://medicalxpress.com/news/2019-06-hidden-truth-hospital-faucets-home.html

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EXAMPLE: Staff Water Outlets

Various Industries

r/WorkplaceSafety

Providing clean drinking water

*"**My employer has two water/ice dispensers. One is broken and the other is filthy(no one will drink it due to the massive floaters and disgusting outside condition).***

So when I make this issue known to my supervisors they advise me to purchase bottled water from their bistro. Is this okay? What can I do about it?

These are 12 hour manufacturing shifts in the Georgia heat by the way…"

Workplace bathroom has constant sewage smell and standing water in sink and drinking fountain

"Is it an OSHA violation in Michigan for a workplace to refuse to fix plumbing in work bathroom that employees and customers are to use?

My work is going on almost 8 solid months of the bathrooms having a horrid sewage smell that makes the entire lobby reek of sewage, and facility maintenance are not doing anything about it.

There has been standing water in the sink overflow for almost 8 months as well as the smell, and I have personally told all management about, and yet still not a thing has been done.

The drinking fountain which is on the other side of the bathroom sink, had brown standing water overflowing from the drain."

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EXAMPLE: Water-Based Work Processes

Printing Company

r/WorkplaceSafety

Weird smell coming from water at workplace?

"…I work at a printing company, and every winter we have water spray into our room to help preserve the paper we use. It keeps the air moist, which allows the paper to last longer.

This year, the water spraying out smells horrible. It has a rotten fishy smell that permeates the whole room. I have been getting severe headaches at work, and am thinking this might be the culprit. I almost never get headaches, so this is something new.

We have had the company maintenance guy looks at it, but he says the water doesn't smell so it must be in the pipes. He more or less said, "it isn't harmful and the owners probably won't pay so deal with it."

Has anyone heard of something like this happening? Can it be harmful? I don't have much faith in the maintenance guy, and am wondering if I should bring my concern up to one of the owners."

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EXAMPLE: Eyewash Stations

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EXAMPLE: Eyewash Stations

Various Industries

Re: video on previous slide:

"We do ours weekly and it still looks like this for the first few seconds..."

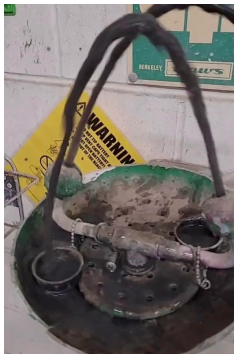
"I work in manufacturing. We have them all over the factory and this looks a little cleaner than average to me."

"Same thing happened at a lab I interned at. The safety guy didn't give a shit. I went around to test the eye wash and emergency shower. Both were rusted so bad it didn't work. The only thing that was working was the fire blanket..cuz it was just a blanket lol. We weren't some little company lab. ***We were the 4th largest service company in the world."***

Re: flushing frequency:

"Well, I work in an FDA regulated facility so…once a month"

"Working in a lab where everything gets flushed out on a weekly basis... ***I am haunted by the thought of the shower that was not allowed to be turned on except in an emergency because 'there was no drain'... I would rather bathe myself in acid"***



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Optimizing Worker Protection at Common Water Sources

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Increase Flushing Frequency / Improve Flushing Protocols

- **Prevent Stagnation**: CDC explains that stagnation lets hot water temperatures drop into the *Legionella* growth range (77–113°F) and lowers disinfectant residuals / EPA suggests flushing seldom-used outlets weekly to remove stagnant water
- **Follow Formal Flushing Procedures**: Flush from the point of entry outward, flush cold before hot, remove and clean aerators, and verify that fresh water and disinfectant residual are restored across identified outlets
- **Maintain Fixture Use**: GSA notes that taking fixtures out of service is counterproductive; regular fixture use and flushing, combined with proper water temperatures, can help control *Legionella* growth
- **Weekly Emergency Equipment Activation**: ANSI/ISEA Z358.1 requires activating emergency showers and eyewashes weekly to verify operation and clear stagnant water and sediment in “dead legs”
- **Flushing Duration**: EPA recommends running cold taps for ~2 minutes and hot taps until maximum temperature is reached when outlets haven’t been used

Flushing supports water turnover, helps replenish disinfectant residual, and may remove loose sediment or debris

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Control Water Temp & Disinfectant Levels

- **Maintain Safe Temperature Zones**: CDC recommends storing hot water above 140°F, maintaining circulating hot water above 120°F, and keeping cold water below the *Legionella* growth range; temperature control helps limit conditions that support growth
- **Water Heater Settings**: tore hot water above 140°F and use tempering controls to maintain appropriate tap temperatures for Legionella control while reducing scald risk
- **Disinfectant Residual**: CDC recommends monitoring disinfectant residuals, temperature, and pH as part of a water management program and adjusting measurement frequency when values are unstable
- **Flush Cold Before Hot**: EPA advises flushing cold water first, then hot water until it reaches maximum temperature during whole-building or branch flushing

Helps keep water outside the most favorable *Legionella* growth range and supports disinfectant conditions at the tap

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Include Utility Outlets in Testing / Sampling Plans

- **Include All Functional Areas:** Sampling should cover bathroom sinks, patient rooms, procedure rooms, **janitors' closets, and utility sinks** so results better reflect the facility's diverse fixtures
- **Sample Effectively**: Samples should include hot and cold lines, low-flow piping, and seldom-used outlets, with the sampling method selected based on whether the goal is to evaluate fixture-level exposure or system conditions
- **Sample Frequency:** Sampling frequency should be risk-based; annual sampling may be appropriate for some facilities, while high-risk buildings, healthcare settings, or sites with prior positives may warrant quarterly or monthly testing

Helps ensure that all critical fixture types are assessed, provides quantitative baselines for *Legionella* growth, and guides risk-based testing frequency

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Establish PM Protocols for Worker Water Outlets

- **Clean or Replace Components**: CDC notes that *Legionella* control may require physical cleaning or replacement of affected components, including hot-water storage tanks, water heaters, faucets, and showerheads, to address scale, sediment, and biofilm
  - Local health guidance similarly recommends routine cleaning of mixing valves, aerators, showerheads, hoses, filters, and storage tanks
- **Aerators & Filters**: CDC reopening guidance recommends cleaning faucet screens or aerators because debris can collect there; if point-of-use filters are used, they should be installed correctly and replaced according to manufacturer instructions
- **Include Aerators in Flushing**: Remove aerator screens before flushing, then clean or replace them to address accumulated debris, scale, and biofilm
- **Maintain Drainage & Equipment**: NIOSH investigations emphasize maintenance plans that address stagnation, monitor disinfectant residuals, and improve drainage to reduce standing water where *Legionella* growth conditions may develop

Regular maintenance and component replacement helps address scale, sediment and biofilm which contribute to microbial growth

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Educate Staff About Waterborne Risks

- **Symptom Awareness & Reporting**: NIOSH recommends educating workers to recognize potential work-related symptoms and report concerns early; reporting logs can help employers identify patterns and respond to possible exposure issues
- **Training & PPE**: NIOSH and OSHA emphasize hazard recognition, task-appropriate PPE, and respiratory protection where workers may be exposed to aerosolized water or chemicals during maintenance, flushing, cleaning, or disinfection activities
- **Safe Flushing & Disinfection**: OSHA and NIOSH guidance support considering worker training and task-appropriate PPE when flushing, cleaning, or disinfecting water systems to reduce potential chemical and biological exposure
- **Formal Training Programs**: CDC provides water management program resources aligned with ASHRAE 188 that can support healthcare facilities in meeting CMS expectations for Legionella risk management

Informed staff can recognize potential exposures early, report concerns consistently, and support safer participation in water management activities

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Leverage Microbiological Point-of-Use Filtration at High-Risk Stations

- **Targeted Control Measure**: CDC identifies point-of-use microbial filters on showerheads or sink faucets as an immediate control measure; filters designed and validated for microbial control can serve as final barriers at selected fixtures or water-fed equipment
- **Broad Capabilities**: Micro- and ultrafilters are available in multiple form factors allowing for diverse applications (EX: attaching to plumbing fixtures or directly to water lines at a variety of equipment). Depending on model capabilities they may retain either bacteria, or bacteria, viruses, and endotoxins.
- **Proper Use & Replacement**: Follow manufacturer guidance for appropriate water conditions, including pressure, temperature, chemical exposure, installation requirements, and changeout timing
- **Part of a Larger Strategy**: Use POU filtration as part of a broader water management strategy, complementing control measures such as temperature management, disinfectant residual, flushing, sampling, and maintenance

POU microbiological filters provide site-specific protection and can reduce exposure to waterborne pathogens at specific outlets

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Some Microbiological Point-of-Use Filtration Applications

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Summary

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Takeaways

- Establish focus on, and review of worker-specific water outlets
- Don't assume "the process covers it" regarding protocols, standards, or regulatory guidance
- Most risk-assessments for worker water outlets focus on functionality
- **Functionality does not address microbial risk**

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Q&A

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Thank you

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