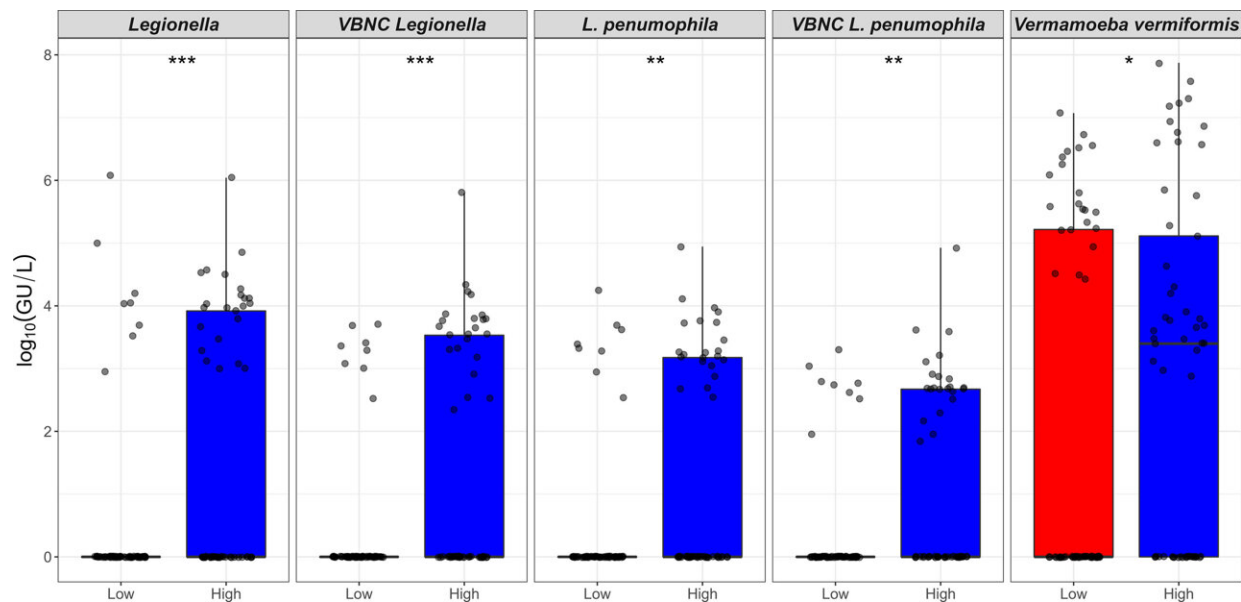


Simple maintenance can reduce hospital *Legionella* risks

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Prevalence (%) of *Legionella* spp. and free-living amoeba in a hospital water system. A total of 166 water (hand basin and shower) and biofilm (tap faucet) samples were collected in March 2021 (Phase 1), April 2021 (Phase 2), November 2021 (Phase 3), and June 2022 (Phase 4). Total amounts of *Legionella* spp./*L. pneumophila*, *Acanthamoeba*, and *Vermamoeba vermiformis* were detected and quantified by qPCR assays. Culturable *Legionella* spp. and amoebae were detected by standard microbiological culturing procedures. VBNC *Legionella* spp. and VBNC *L. pneumophila* were detected and quantified by flow cytometry-cell sorting and qPCR assay. The p values are: * $p \leq 0.05$, ** $p \leq 0.01$, and *** $p \leq 0.001$. Credit: *Frontiers in Cellular and Infection Microbiology* (2023). DOI: 10.3389/fcimb.2023.1190631

Hospital water systems are a significant source of *Legionella*, resulting in the potentially fatal Legionnaires' disease—but Flinders University researchers have proven simple maintenance that involves running hot water regularly and flushing the pipes has a huge effect in reducing the risk of the disease.

One of the biggest challenges for *Legionella* management within large hospital systems is that under unfavorable conditions, *Legionella* transforms itself into a state (called viable but non culturable—VBNC) that cannot be detected using standard methods.

To understand the extent of the problem, Flinders University researchers conducted the first comprehensive study that quantified all *Legionella*, including those in the VBNC state, and free-living amoebae from a hospital water system under dynamic flow and temperature conditions.

The research, "Stagnation arising through intermittent usage is associated with increased viable but non culturable *Legionella* and amoeba hosts in a hospital water system," by Muhammad Atif Nisar, Kirstin Ross, Melissa Hackett Brown, Richard Bentham, Giles Best, James Xi, Jason Hinds and Harriet Whiley, has been published in *Frontiers in Cellular and Infection Microbiology*.

"We took a different approach because we didn't know how often the standard method was returning [false negative results](#) for *Legionella* and it's really hard to determine the optimal management approach if you can't trust your testing method," says Flinders University's Associate Professor Harriet Whiley.

This study used a novel method in combination with the standard detection methods to examine the effect of temporary water stagnation, on *Legionella* and microbial communities present in a hospital water system.

The [water temperature](#), number and duration of water flow events for the hand basins and showers sampled was measured using a commercially available monitoring system developed by Enware Australia—and analysis demonstrated that 21.8% samples were positive for *Legionella* spp., 21% for *L. pneumophila*, 40.9% for *V. vermiformis* and 4.2% for *Acanthamoeba*.

Temporary water stagnation arising through intermittent usage (being less than two hours per month) significantly increased the amount of *Legionella*.

"Temporary stagnation arising through intermittent usage causes water quality to deteriorate—and this study identified that temporary stagnation for over a month promotes the persistence of *Legionella*," says Associate Professor Whitley.

"Similarly, free-living amoeba and heterotrophic bacteria present in this temporary stagnant environment were positively correlated with *Legionella*. All samples positive for *Legionella* were also positive for amoeba.

"Therefore, temporary stagnation and free-living amoeba must be managed for the proper control and prevention of Legionnaires' disease."

This study also showed that the standard microbiological culture method used to detect *Legionella* returned a false negative result for 88% of the *Legionella* positive samples—pointing to future research needed to investigate concentrations of *Legionella* that pose a risk to [public health](#) and inform improved *Legionella* guidelines.

More information: Muhammad Atif Nisar et al, Stagnation arising through intermittent usage is associated with increased viable but non culturable *Legionella* and amoeba hosts in a hospital water system,

Frontiers in Cellular and Infection Microbiology (2023). [DOI: 10.3389/fcimb.2023.1190631](https://doi.org/10.3389/fcimb.2023.1190631)

Provided by Flinders University

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