What am I really drinking in my soup of hot or cold water– a microbiome conundrum?

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BACKGROUND

Water drinking units for the provision of potable water have been around for many years. Many healthcare facilities utilize these systems to provide instant access to either chilled water at 4 degrees and instant hot water above 90 degrees With the risk of *Legionella* ever present within a vulnerable population, it is important that as the time of installation and commissioning, these systems providing water for patients and staff are tested before use.

INVESTIGATION Part 1

In 2017 chilled water collected from a drinking unit in a healthcare facility returned a positive *Legionella pneumophila* result. Subsequent remedial work undertaken on the unit and further testing showed that *Legionella pneumophila* was still present after sanitization. A second system at the same site also tested positive for *Legionella pneumophila*.

This highlighted a concern for the Infection Prevention And Control Unit as ~207 systems were installed within new Royal Adelaide Hospital (nRAH), due to open soon. As a result, a meeting was held with key stakeholders to review the systems installed and environmental water testing requirements.

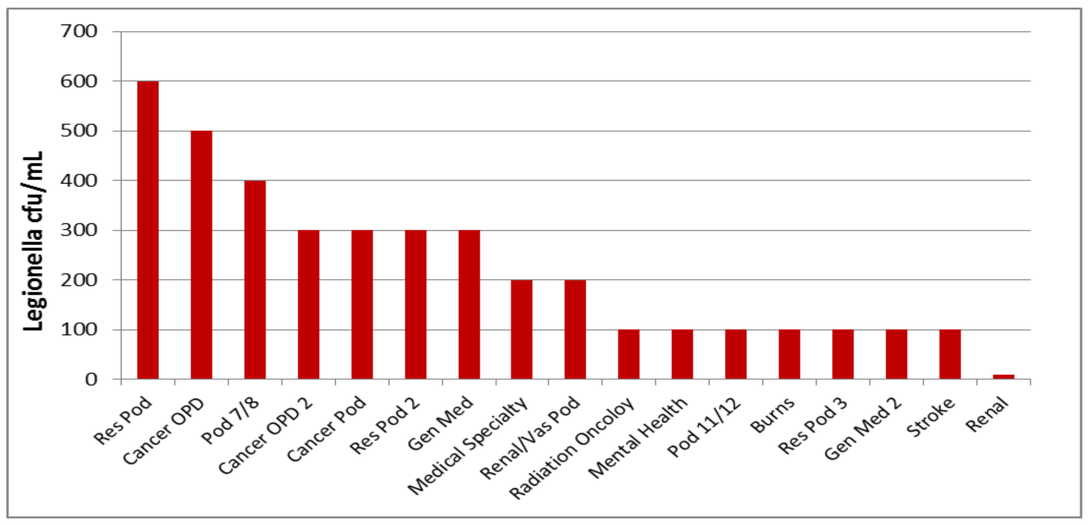
On review we found all units were installed with carbon filters (carbon filters remove chlorine - they are not recommended for patient drinking water as per the Australian Guidelines *for Legionella* Control in the operation and maintenance of water distribution systems in health and aged care facilities 2015).

The conundrum - while reviewing the layout and design, we found a number of issues requiring attention. Carbon filters were in place, horizontal plastic piping/tubing for hot and cold water flow both retained stagnant water and came in close contact with each other. Units were also installed within a cabinet with sub optimal ventilation.

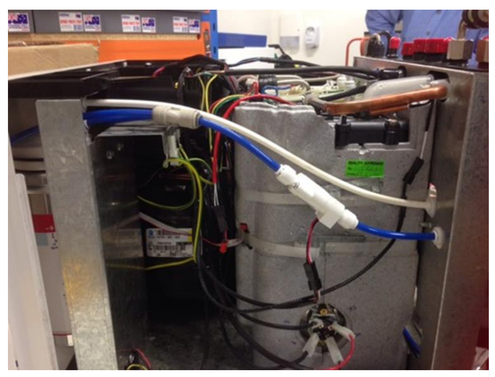
INVESTIGATION Part 2

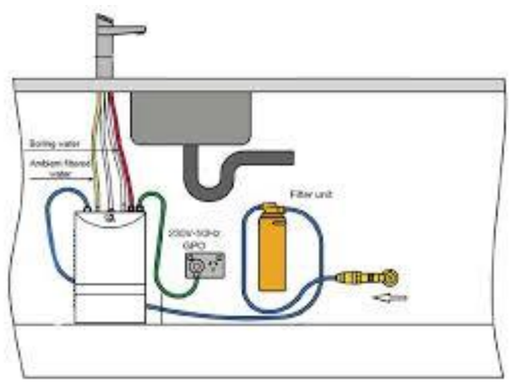
Subsequently as part of commissioning the site stakeholders undertook a variety of actions (see below) to ensure compliance with the guidelines. We detected, *Legionella species* (not *L. pneumophila*) with counts ranging between a 100 to 600 cfu/mL from the cold water outlet in 43% (17/40) of the systems tested. We only tested systems in inpatient units.

Chlorine levels were all within the normal limits. Overall a further 200 samples were taken from the hot water outlet and the associated sink tap. No *Legionella* was detected from these samples.



Location and colony forming units (CFU) of cold water outlets testing positive for Legionella





INVESTIGATION Part 3

Subsequent actions undertaken were:

- All systems were re-sanitised
- Filters changed to non-carbon 0.2 micron or 0.5 micro
- The hoses adjusted to the shortest length possible to reduce stagnant water and fitted with a kick back water return mechanism
- The cold and hot hoses were separated i.e. not resting on each other. Stagnant water in the hot water hose will heat the cold water hose allowing for a “warm water” environment.
- Ventilation changes into the cupboard as there was no vent on the door
- All the chilled water outlets in -clinical and staff areas - were disabled leaving only the hot water functional
- *Mains water at those units which tested positive was tested for the presence of Legionella*
- Mains water at 200 outlets across the hospital -tested for *Legionella*
- Memo sent to all staff re drinking water at nRAH.

Further actions taken included isolating the cold system whilst leaving the hot water functional (this has remained permanently in the inpatient areas). 10 new systems were installed in staff office spaces and monitored monthly for Legionella and chlorine levels. No *Legionella* detected. Subsequently the refurbished systems are slowly being rolled out across all the office space areas only.

CONCLUSIONS

System designs can create infection control issues. Review of design options, determining best practice for installation, commissioning and requirements for routine and ongoing maintenance of water drinking units may assist in managing any risk associated with drinking outlets in health care facilities.

References
1.Guidelines for the Control of Legionella in Manufactured Water Systems in South Australia, revised 2013
2.South Australian Public Health (Legionella) Regulations 2013
3.enHealth Guidelines for Legionella control in the operation and maintenance of water distribution systems in health and aged care facilities 2015

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