Meeting compliance and minimizing the risk of further waterborne pathogen related outbreaks in Australian Hospitals

By Morten Schnoor, Pall Water

The Challenge

Positive Legionella readings have increasingly been occurring at a number of hospitals throughout Australia.

These outbreaks have a timely, costly and labor-intensive decontamination process. Additionally, outbreaks create a logistical nightmare as entire hospital wards must close for cleaning and patients need to be relocated.

As a result of these outbreaks and with the danger Legionella presents for those with immune deficiencies, The Public Health Act 2005 passed a regulation with a compulsory Water risk management plan which require all hospitals to conduct regular water tests and publicly post water records online to ensure the safety of patients, visitors and staff.

Case Study

Wesley hospital, a private 535-bed hospital located in Brisbane, South East Queensland experienced a detrimental Legionella outbreak in 2013 and the hospital was shut down for about a fortnight after a patient died from the lung infection.
Legionella were detected in the water network and in Ice machines. While meeting the Australian drinking water standards, the municipal water supply potentially still carried the disease.

The Wesley Hospital, After the Legionella outbreak in 2013

After the outbreak, the hospital reached out to Dr. Sussanne Lee from Legionella Ltd in GB.
Dr. Susanne Lee visited the hospital for trouble shooting and gave practical advice on the prevention of contamination events on the premises and water systems.
A thorough report with recommendations was formulated including advising on appropriate control strategies following the incident.

The Wesley Hospital initiated the following actions:

- Implementation of vigorous cleaning/flushing regimes throughout the hospital.
- Point of use filters applied to every high risk faucet and showerhead in the hospital
- extensive water analysis executed via weekly tests across 40 points throughout the hospital
- Chlorination / Circulation installed at Water tanks
- 3 Additional chlorination points installed within the hospital
- Dead leg removal, >750 to date

Water Remediation Cost

Dead leg removal - >750 to date

Filters, post storage tanks

Chlorination & Circulation within storage tanks

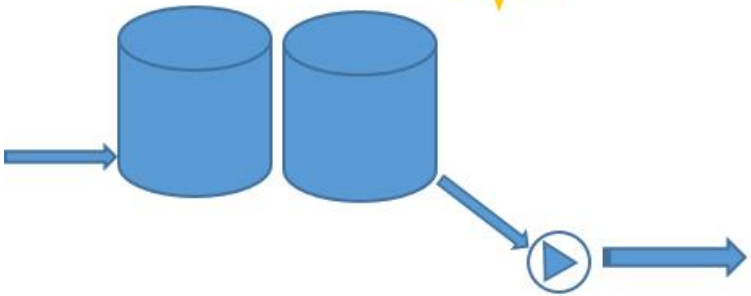
Plumbing costs

Immediate event:	$762,065	
Water remediation:	$970,615	1st month - $336,471
Advertising:	$227,379	
Total:	$1,960,059	

Previous Water Layout

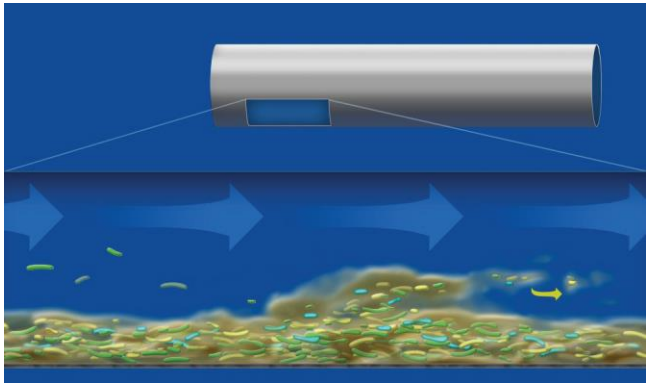
1 MLD 25dg

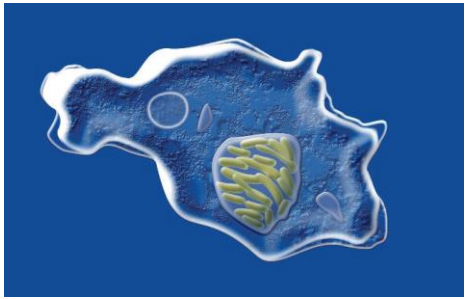
Town water



Wesley Hospital Recommendations

- Change mindset on Legionella
- It is all about water biofilms
- Scalding is slow, high risk WHS, costly & ineffective
  - -Doesn't deal with majority of the biofilm
  - -'Disinfection & Sterilisation 101'
- Statistically valid testing at water outlets





Amoeba can incorporate *Legionella* which then proliferate inside vacuoles and are later released, either in the form of planktonic, free living bacteria, or packed within vacuoles.

New case of Legionnaires decease in December 2015

On the 31/12-2015 another patient tested positive for the legionella disease

Further tests, later proved that the strain at Wesley (Genetic strain) were found in the Brisbane town water.

Wesley Estimates that the cost incurred since the incident in 2013 is now sitting at $3.6Million

New methods were needed if things were to change to the better.

The Solution

Despite meeting drinking water specifications, the municipal water supply still carried the Legionnaires disease.

To prevent future waterborne pathogens, Wesley Hospital sought to implement its own water treatment system that could further treat and purify municipal water after experiencing the detrimental Legionella outbreak.

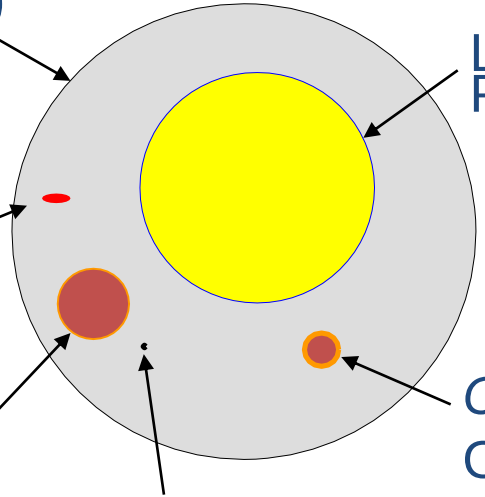
UF-Membrane Point of Entry system

Based on its reputation for successfully preventing similar Legionella outbreaks in Europe, Wesley Hospital installed a membrane filtration system from Pall Water to provide a **physical barrier** to contamination from incoming water.

The technology was highly recommended by an expert in Legionella control* who has written several papers on the topic which detail on how Pall membranes have effectively prevented Legionella outbreaks in hospitals across the United Kingdom.

*Recommended by Dr. Susanne Lee from

The Technology - UF Membrane



Pencil Dot (40 µm)

Large Siliceous Particle (20 µm)

Legionella cell is 0.5-1.0 micrometer wide and 1.0-3.0 micrometers long

Cryptosporidium Oocyst (2 - 5 µm)

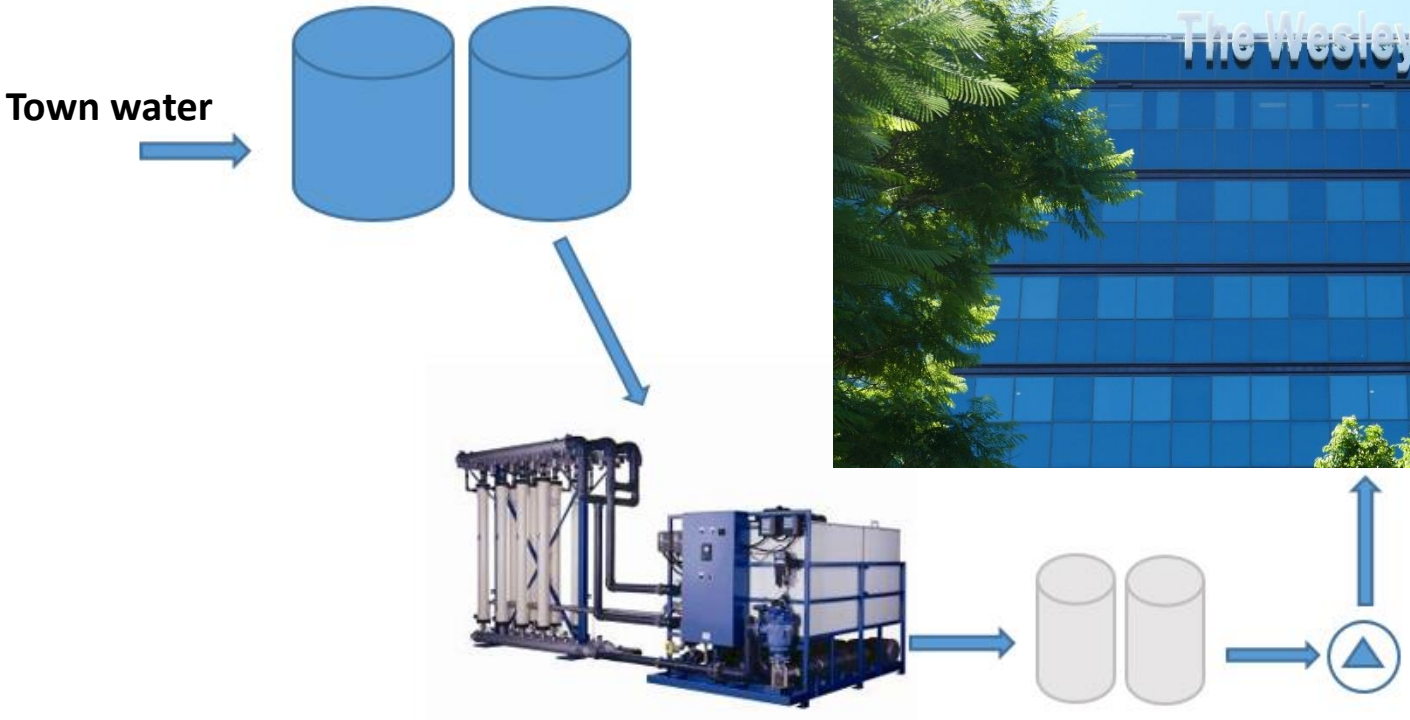
Giardia Cyst (5 - 11 µm)

Ultrafiltration Pore (0.02 µm)

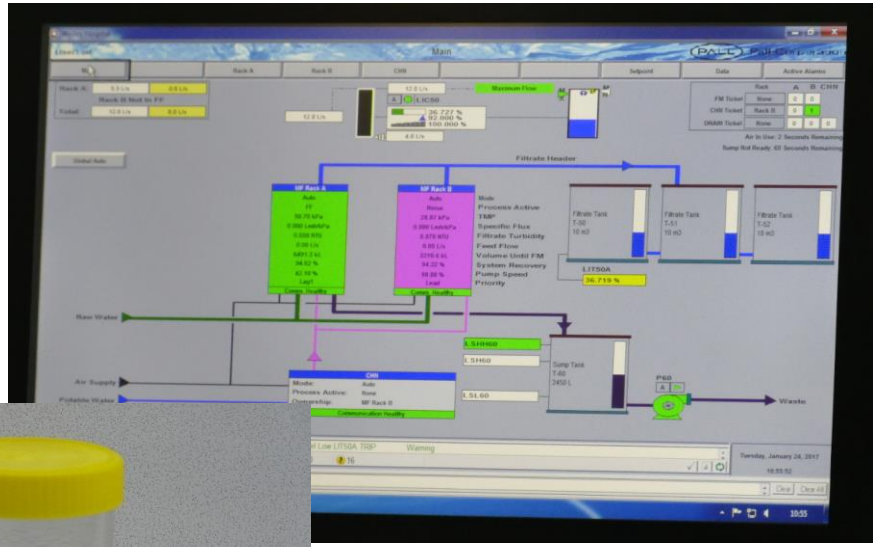
Giardia and Cryptosporidium protozoa >6 log removal

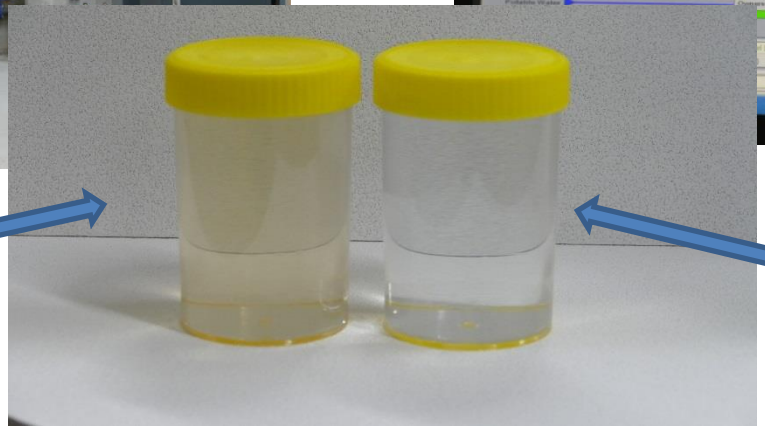
MS2 Coliphage or Bacteriophage 4.5 - 6 log removal

The Install



The equipment





Backwash
From town water

Filtrate

The benefits

The durability of the Aria FIT system helped Wesley Hospital overcome a disastrous Legionella outbreak and transform its water treatment strategy to prevent future waterborne pathogen related outbreaks.

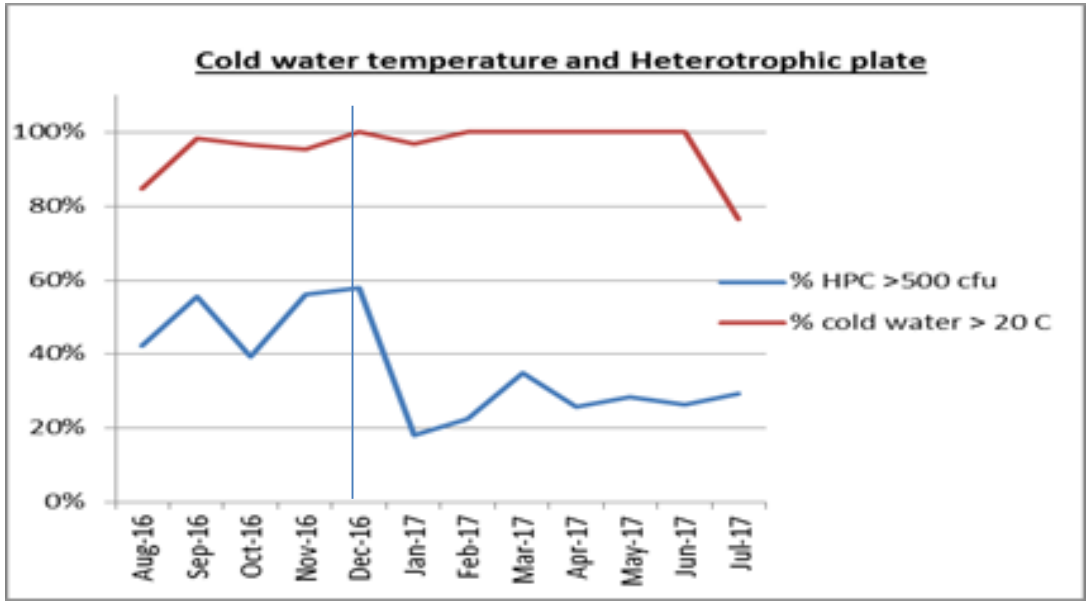
With its state-of-the-art membrane filtration solution, Wesley Hospital has become a model for hospitals in the region facing Water Management regulations.

After the install

- Successfully prevented Legionella and other waterborne pathogen related outbreaks outbreaks within the hospital.
- Since installing the filtration system, Wesley Hospital has not experienced a single Legionella detection
- Reduced heterotrophic plate counts in water samples, from up to 100,000 cfu to less than 3,000 cfu
- Decreasing the formation of biofilm within the hospitals pipework
- Significant cost savings on sampling regimes .
- POU filters are no longer used throughout which has presented a substantial yearly saving.
- ROI: 1,2 years

Impact after install

Percentage of HPC >500 cfu * dropped from 60% to 20% in 30 days after the install of the Ultra filtration unit.



*The 500 cfu threshold comes from the Australian Drinking Water Guidelines

QUOTE FROM CUSTOMER

"The quality of Pall Water's Aria FIT membrane filtration system has been evident from day one. Our point of use filters that previously looked discolored and dirty after 30 days of use now appear virtually brand new and unused as the water flowing through them from the Pall Water system is so clean. The Aria FIT system has allowed us to greatly reduce our reliance on point of use filters while ensuring that we are able to provide pure water to keep our patients safe."

- David Gray, Engineering Manager, Wesley Hospital.

Result

The Wesley Hospital are now meeting compliance and have severely reduced their risk of future outbreaks related to waterborne pathogens.

Since installing the filtration system, Wesley Hospital has not experienced a single Legionella detection. Wesley Hospital has also realized additional cost savings as the performance of Pall Water's filtration system has eliminated the need for the expensive and time consuming decontamination regimes that must occur following a positive legionella reading. These require extensive water analysis executed via weekly tests across 40 points throughout the hospital. This has saved the hospital an estimated $50,000 per year and an additional potential $1.2 million if another outbreak was to occur.

Thank you for your time

Any questions?