

Water quality management plans

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International Editi

Legionnaires disease sickens 9 at Graceland hotel

By Daniella Emanuel, CNN

🕒 Updated 1842 GMT (0242 HKT) July 20, 2017

Health Department investigating 2 cases of legionellosis potentially associated with James Square

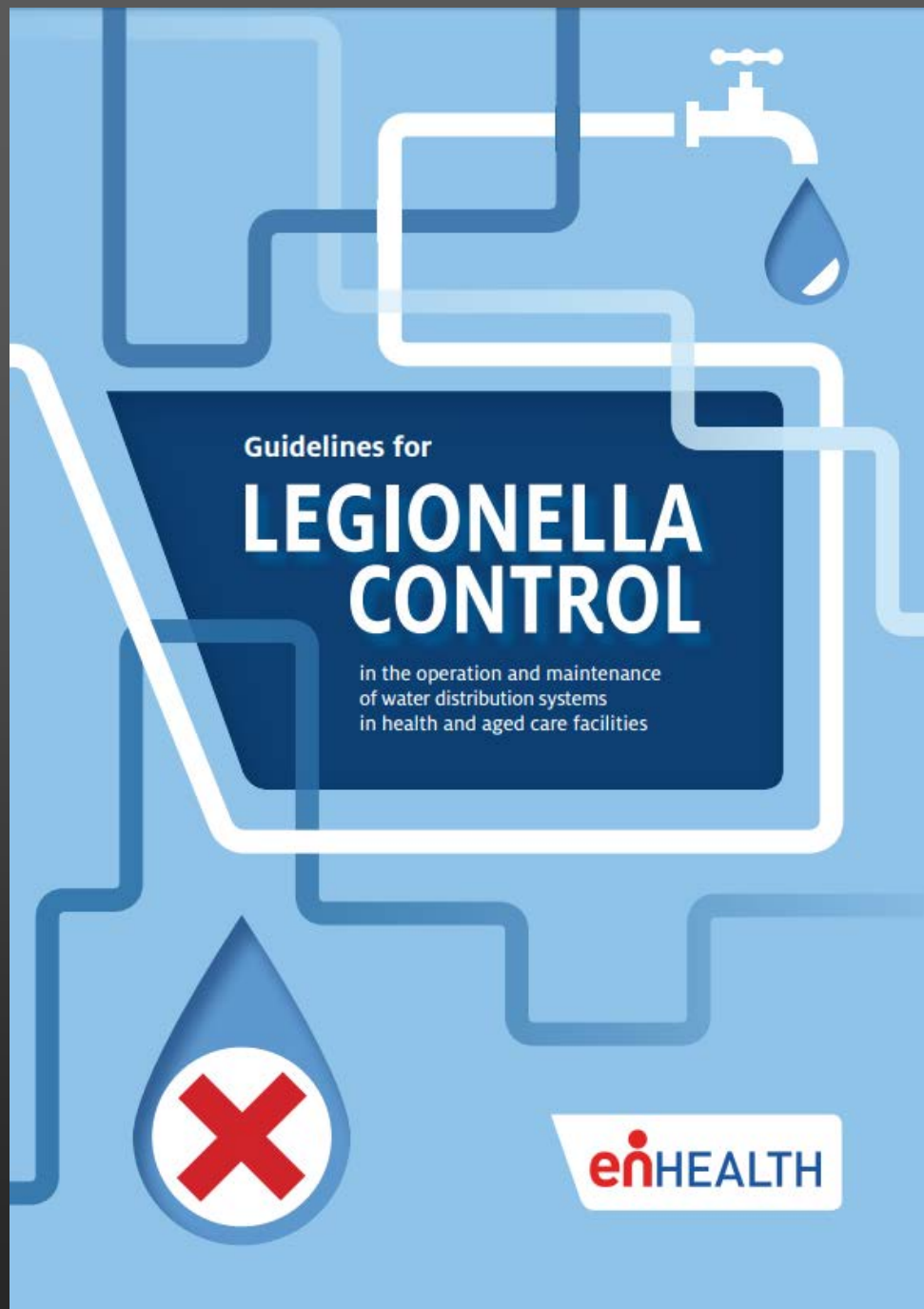
Posted: Aug 09, 2017 04:01 PM EDT

Updated: Aug 09, 2017 11:37 PM EDT



SYRACUSE, N.Y. (WSYR-TV) - The New York State Department of Health is collaborating with James Square Health and Rehabilitation Centre on an investigation of two cases of legionellosis that has potentially been associated with the nursing home.

The facility collected Legionella samples from the nursing home's potable water system, which recently tested positive for Legionella.



Overview

- What is *Legionella*
- Why is it important?
 - Outbreaks
 - Hard to trace
 - Hard to diagnose
 - High mortality rate
 - High rate of ICU admission

Legionnaires' Disease

- Mild headache, flu like symptoms
- Cough, sometimes with blood
- Chest pain
- Difficulty breathing
- Nausea and vomiting
- Diarrhoea
- Altered mental state
- Aches

Pontiac / Lochgoilhead Fever

- Acute influenza type symptoms

Risk factors

- Middle to Advanced age
- Male
- Smoking
- Chronic heart or lung disease
- Immunocompromised hosts / Diabetes
- Hematologic malignancies
- End-stage renal disease
- Alcohol abuse

Transmission

- *Legionella pneumophila* and others (water borne)
 - Transmitted via droplets that are inhaled into the lungs
- *Legionella longbeachae* (compost)
 - Transmitted possibly of dust inhaled into the lungs
- Person to person spread has not been recorded

Sources

- Cooling systems
- Warm water systems
- Showers
- Decorative fountains
- Humidifiers
- Respiratory therapy equipment
- Whirlpool spas
- Ice machines
- Potting soil
- Compost
- Roadside puddles
- Commercial car wash systems



<https://i.ytimg.com/v/k6MxVs9exg/maxresdefault.jpg>

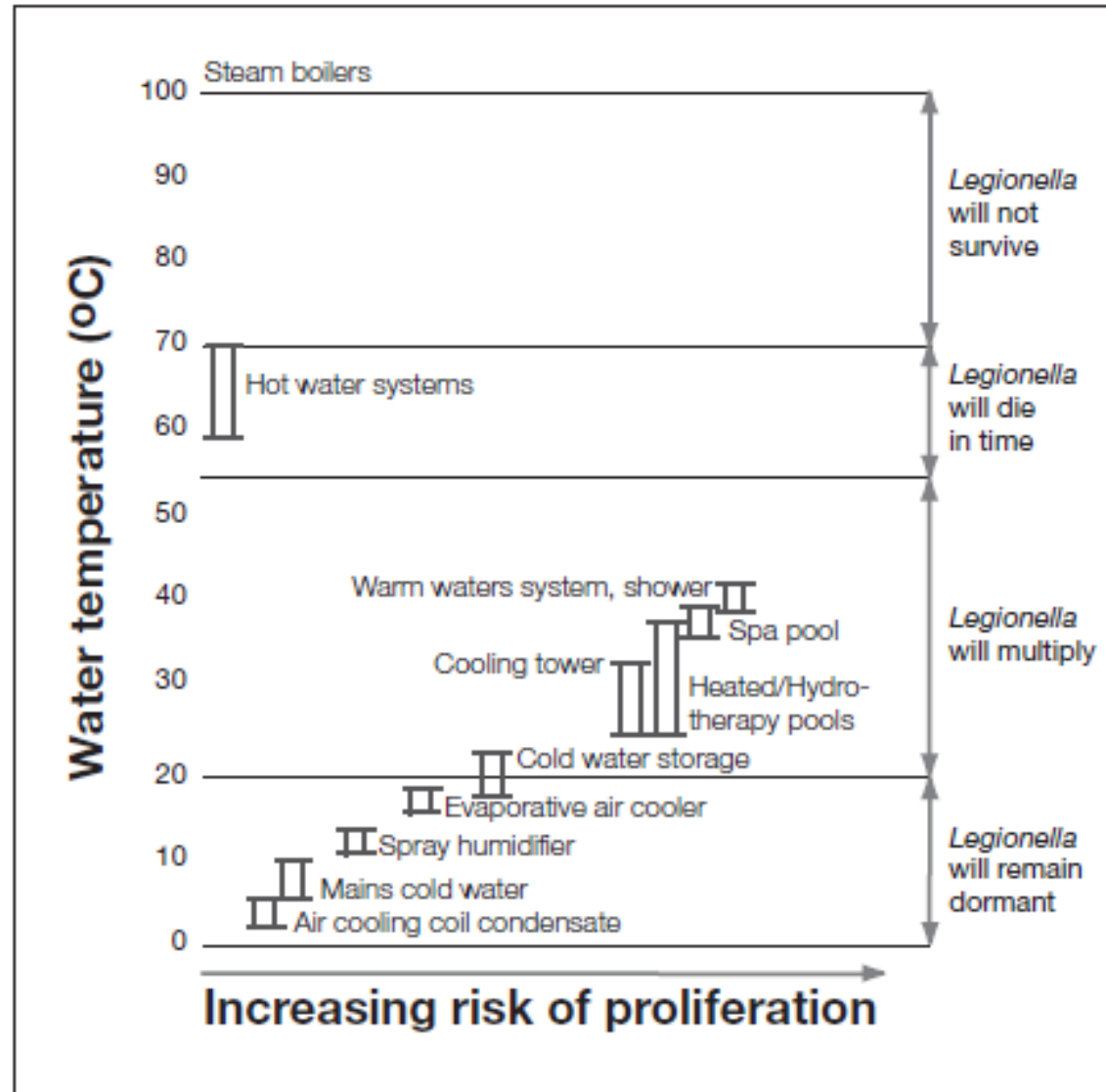
<http://www.airsolutionz.co.nz/wp-content/uploads/2013/10/cooling-towers.jpg>

<http://homeprosontheweb.com/wp-content/uploads/2013/11/hard-water-shower-head.jpg>

Risks for *Legionella* proliferation

- Temperatures of 20-42°C
- Stagnation
- Nutrient growth
- Poor water quality
- Scale and sediment
- Presence of other organisms
- Deficiencies in cooling tower systems
- Location and access to Cooling towers

Figure 1. Relationship between proliferation of *Legionella* and typical water temperature of water handling systems



NSW Code of Practice for the Control of
Legionnaires' Disease June 2004

Pseudomonas aeruginosa

- Respiratory disease
- Skin infections
- Burns infections
- Resistant to antibiotics
- Water borne
 - Tap fittings
 - Mops and cloths
 - Flowers

Other microorganisms of concern

- *Stenotrophomonas maltophilia*
- *Serratia marcescens*
- *Enterobacter spp.*
- Cryptosporidium
- Non tuberculosis Mycobacteria (NTM)
- *Mycobacterium chimera*

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Mycobacterium chimaera and open-heart cardiac surgery

Update - 11 August 2017

A fourth NSW case of *Mycobacterium chimaera* infection has now been confirmed. The case is in a man in his 60s who underwent open-heart cardiac valve surgery at Prince of Wales Hospital in 2015.

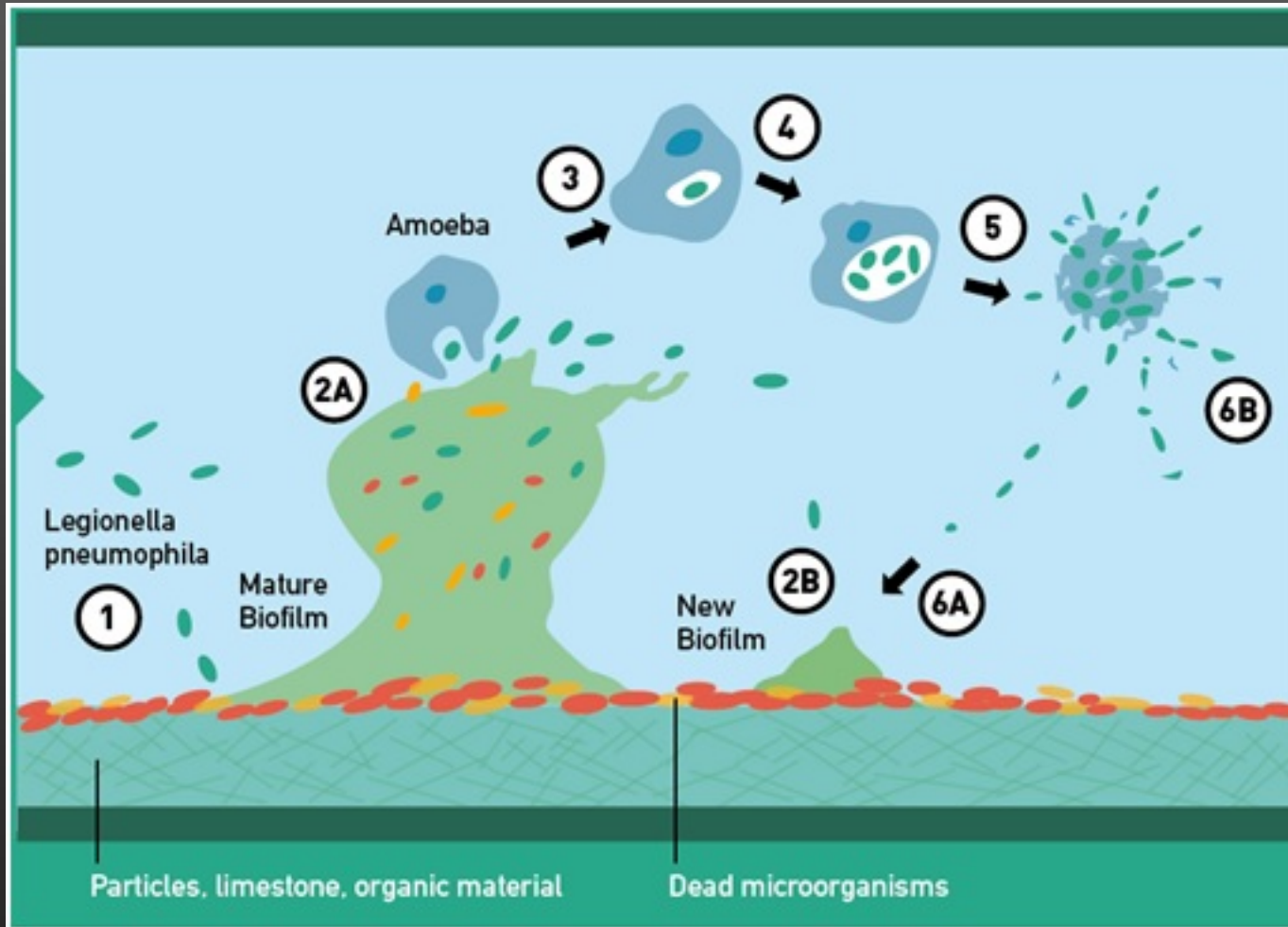
Related Links

[Immunisation Programs](#)

[Environmental Health](#)

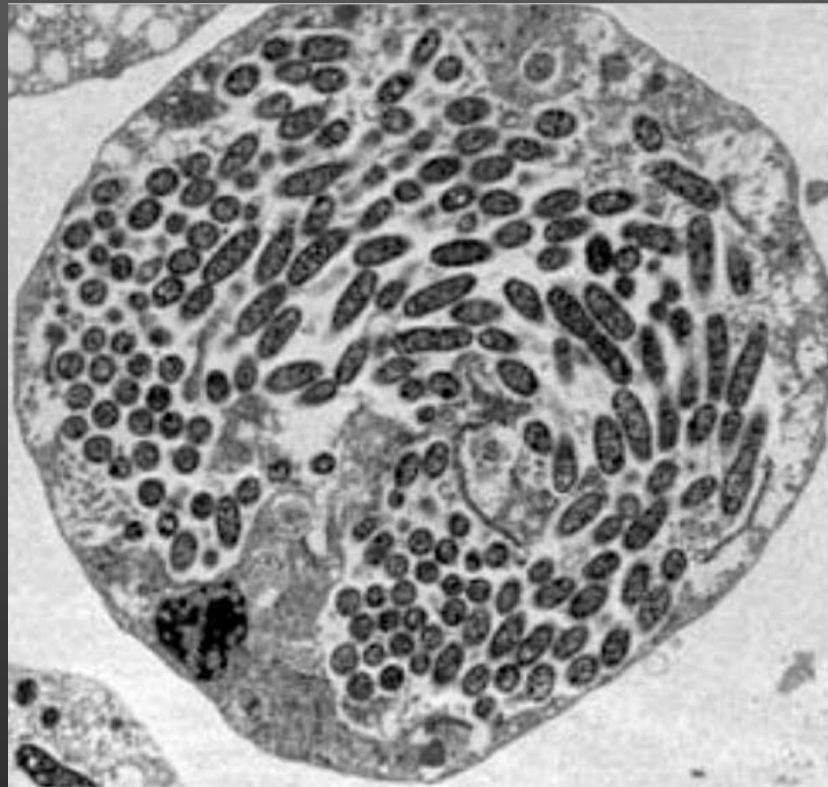
Biofilm

<http://www.adept-dental-water.com/Files/Images/Adept/Vand/Bakteriervarmtvand.jpg>



Amoeba

- *Acanthamoeba species*
- Protect from disinfectants
- Can release 20-200 Legionella at a time.
- One *A. polyphaga* can release 25 vesicles per day.



Section G. Figure 4. Transmission electron micrograph of an amoeba-filled with *Legionella pneumophila*.

Photo credit: <http://www.caister.com/hsp/supplementary/acanthamoeba/g4.html>

Cooling tower legislation

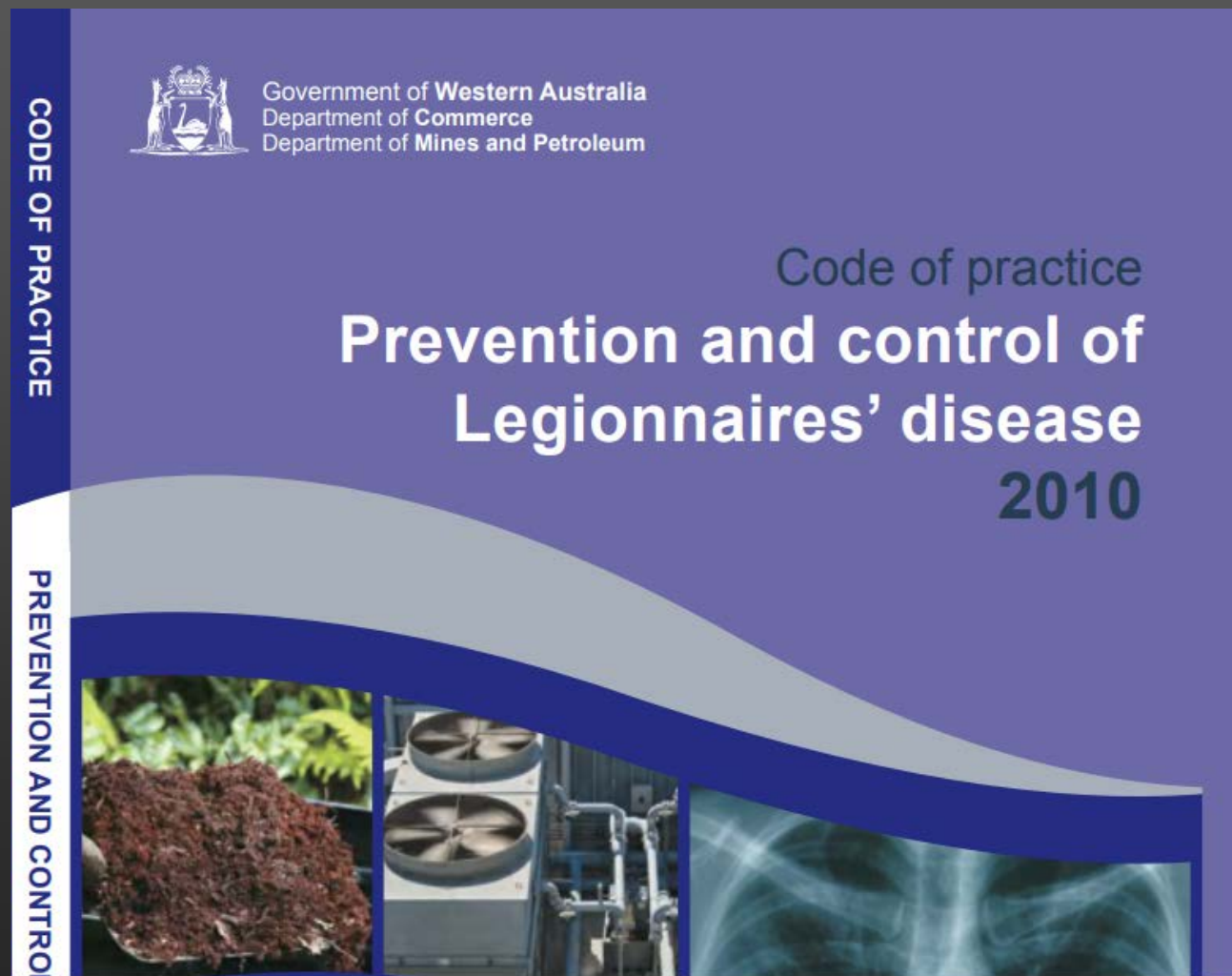
- Varies from state to state
- The Victorian Guidelines are the most prescriptive and strictest
- Require a risk assessment of cooling towers to assess 'Critical Risks'

A guide to developing
risk management plans for
cooling tower systems

WA

- Automated dosing systems
- Monthly inspection
- 6 monthly cleaning
- Risk assessment and management plan
- HCC monthly and Legionella 3 monthly
 - Action >100, 000cfu/ml HCC or >10cfu/ml Legionella

WA Code of Practice



Hot Water Systems

- Deliver water at $>60^{\circ}\text{C}$
- May require thermostatic mixing valves (TMVs)

Warm Water Systems

- Warm water systems 30°C to 60°C.
- No specific standards available under the plumbing code of Australia (PCA) for the design, installation and management of warm water systems.
- Plumbing code states that
“people should be safeguarded from illness, injury or loss due to failure of a heated water installation.”
- Individual project design in accordance with the health authority with jurisdiction

En health

- En health guidelines released in 2015
- Guidelines sit over the top of each States' regulatory framework.
- Applies to all water systems except Cooling Towers in healthcare and aged care premises
- Provide a template Risk Management plan online

En Health

- Concentrate on proactively managing risk, rather than reacting to positive testing results
 - System analysis
 - Components
 - Other connected systems
 - Outlets
 - Construction Materials
 - Temperature
 - Previous testing

Queensland

- Queensland Government Guidelines for Managing Microbial Water Quality in Healthcare Facilities (2013)
- Public Health (Water Risk Management) Amendment Bill 2016
- Routine testing should be in place













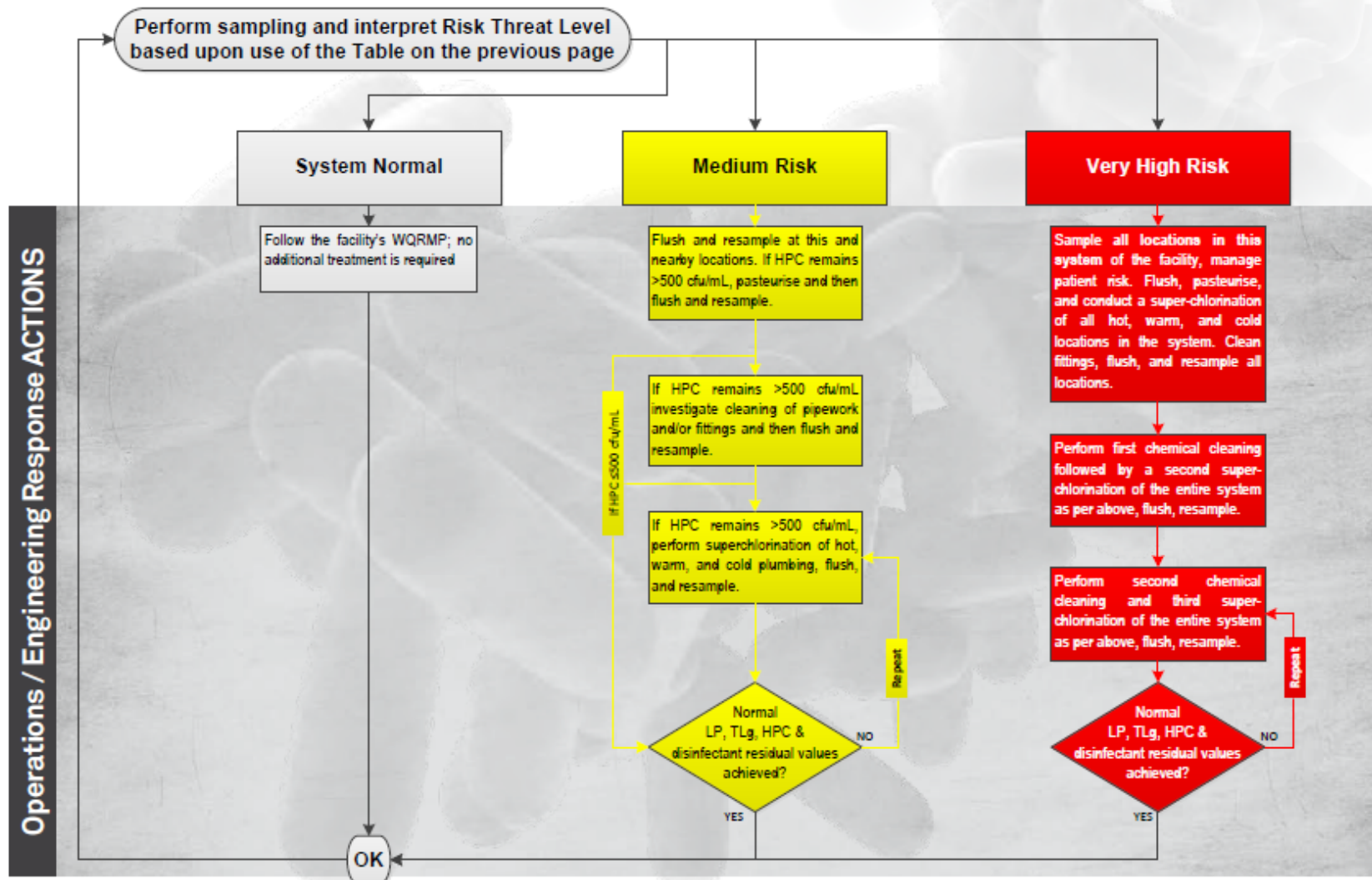
Managing Microbial Quality

HIGH Clinical Risk Locations



Sampling should be performed according to frequencies discussed in Appendix D. The table at the top of this page helps determine risk ratings for your facility's water system (hot, warm, and cold) HIGH clinical risk locations. Samples collected in order to properly use this table include disinfectant residual, HPC bacteria, and Legionella. First, find the box at the left of the table which best reflects the results obtained. Next, assign that location with the Risk Threat Level from the next box to the right and follow the clinical response indicated, and note the Operations / Engineering Response at the far right. The flowchart at the bottom of this page can be used by moving vertically downward the appropriate 'Response' path and performing the actions described.

Sampling Results	Risk Threat Level	Clinical Response	Operations / Engineering Response
<p> Cold Water ≥ 0.5 mg/L or Hot Water ≥ 0.2 mg/L AND</p> <p> ≤ 500 cfu/mL AND</p> <p>  No positive samples (LP & TLg both not detected)</p>	SYSTEM NORMAL	None	Refer to System Normal Actions Flowchart below
<p> Cold Water < 0.5 mg/L or Hot Water < 0.2 mg/L AND</p> <p> > 500 cfu/mL AND</p> <p>  No positive samples (LP & TLg both not detected)</p>	MEDIUM RISK	Yes. Advise local Public Health Unit or Private Health Regulation Team, as appropriate. Refer to CHRISP* document.	Refer to Medium Risk Actions Flowchart below
<p> Any Positive Sample Result OR</p> <p> Any Positive Sample Result</p>	VERY HIGH RISK	Yes. Advise local Public Health Unit or Private Health Regulation Team, as appropriate. Refer to CHRISP* document.	Refer to Very High Risk Actions Flowchart below



*Centre for Healthcare Related Infection Surveillance and Prevention (CHRISP). Guideline for Patient Management Response if Legionella Detected in Water Supply. Queensland Health, 2013.

Legionnaires' disease

The control of legionella bacteria in water systems

Approved Code of Practice and guidance on regulations



L8 (Fourth edition)
Published 2013

This book is aimed at dutyholders, including employers, those in control of premises and those with health and safety responsibilities for others, to help them comply with their legal duties in relation to legionella. These include identifying and assessing sources of risk, preparing a scheme to prevent or control risk, implementing, managing and monitoring precautions, keeping records of precautions and appointing a manager to be responsible for others.

This fourth edition of the ACOP and guidance on regulations contains revisions to simplify and clarify the text. The main changes are removing Part 2, the technical guidance, which is published separately as HSG274 at www.hse.gov.uk/pubns/books/hsg274.htm, and giving the following issues ACOP status:

- risk assessment;
- the specific role of an appointed competent person, known as the 'responsible person';
- the control scheme;
- review of control measures;
- duties and responsibilities of those involved in the supply of water systems.



Health and Safety
Executive

Legionnaires' disease

Part 2: The control of legionella bacteria in hot and cold water systems



This guidance is for dutyholders, which includes employers, those in control of premises and those with health and safety responsibilities for others, to help them comply with their legal duties. These include identifying and assessing sources of risk, preparing a scheme to prevent or control risk, implementing, managing and monitoring precautions, keeping records of precautions and appointing a manager responsible for others.

The guidance gives practical advice on the legal requirements of the Health and Safety at Work etc Act 1974, the Control of Substances Hazardous to Health Regulations 2002 concerning the risk from exposure to *Legionella* and guidance on compliance with the relevant parts of the Management of Health and Safety at Work Regulations 1999.

HSG274 Part 2
Published 2014



Department
of Health

Health Technical Memorandum 04-01: Safe water in healthcare premises

Part A: Design, installation and commissioning



Department
of Health



Environmental Services

Health Technical Memorandum 04-01: Safe water in healthcare premises

Part B: Operational management



Department
of Health



Environmental Services

Health Technical Memorandum 04-01: Safe water in healthcare premises

Part C: *Pseudomonas
aeruginosa* – advice for
augmented care units

State and other legislation

- WHO state that ‘in high risk areas of hospitals such as organ transplant centres and intensive care units, water should be free of legionella bacteria (zero detectable bacteria in one litre of water) as these patients have weaker immune systems. And are more susceptible to developing the disease”
- State legislation varies:
 - WA – Effectiveness of the water management system, including water treatment should be assessed at least monthly
- All samples should be analysed by a NATA accredited laboratory

Developing a risk management plan

- Water quality
- Supply
- Emergency planning - supply
- Uses of water
- The distribution system
- Design
- Monitoring
- Emergency planning - detections

Water quality

- Potable water quality
- Above drinking water standards
 - Assess the risk of the patients who are supplied
 - Oncology (Chemotherapy)
 - Newborns
 - Older people
 - Immunosuppressed patients
 - Respiratory patients.

Supply

- Know your supply
 - Quality
 - Pressure
 - How much do you use?
 - Condition of the pipework

Emergency Planning

- What will you do if you have no supply?
 - Powercuts
 - Mains pipe fractures
 - Flooding
- Is your alternative water source safe for all uses?
- How are you going to transition back to mains water?

System knowledge

- Know your system
 - Schematics
 - Outlets
 - Bores
 - TMVs
 - Strainers
 - Pipework materials
 - New fittings



Design

- Take water quality into account at the design process
 - Warm and hot water systems
 - Don't fill the building with water too soon
 - Selection of fittings
 - Where the services go
- Don't fill the building with water too soon!

Uses of water

- Showering
- Drinking
- Food preparation
- Ice machines
- Water features
- Disinfection equipment
- Condensed steam
- RO water
- Heater coolers
- Humidifiers
- Misters
- Cooling
- Heating

Ownership and training

- Management training
- Infection control training
- Cleaning staff training
- Plumbing staff and contractor training.
 - Ownership of the wards and hospital
 - Reporting mechanism for problems

Monitoring

- Operational monitoring
 - Ensures that the controls are effective
 - Eg, residual chlorine, temperature, pH, turbidity
- Verification monitoring
 - To detect general colonisation
 - To determine effectiveness of control strategy
 - Legionella testing
 - Other microbial testing
- Must comply with State and Territory guidance and regulations

Operational Monitoring

- The most important monitoring
 - Chlorine levels
 - Turbidity
 - pH
 - Temperature

Verification monitoring

- *Legionella pneumophila* Culture
- Australia <10 cfu/mL
- HCC
- < 500 cfu/mL
- Slow

Legionella and HCC/TBC testing

- Baseline testing of system
- Pick the right temperature and test
 - Cooling tower testing is not sensitive enough
 - Two temperatures available
 - 37C and 22C (or 21C and 36C)
- Legionella should be below 10cfu/ml (NSW) or below detectable limit (QLD)
- NATA accredited laboratory
 - A negative result does not guarantee absence of legionella

HCC/ TBC

- No guideline levels in the Australian Drinking Water Guidelines
 - States that levels should be 'LOW'
- Queensland Guidelines
 - Water Service Provider should notify the healthcare facility if the HCC (TBC) level is >500cfu/mL

Emergency management - Detections

- Know who needs to be notified
- Have a plan in place
 - Media liaison
 - Medical advice
 - Infection Control

Exposure controls

- Removal of aerators from taps
 - No mist generating devices
 - Low aerosol producing showers
-
- Microfiltration to remove bacteria from water
 - Aerosol management
 - Avoiding water chillers and ice machines



Overview

Whole of facility should be involved

Know your water distribution system

Know your supply

Testing is only part of the plan

Compliance doesn't mean everything is OK

Living document