The Control of Legionella Bacteria in Water Systems – COVID-19

Legionella Bacteria Environment

- Water temperatures of 20°C - 45°C (thrives at body temperature - 37°C)
- Stagnant water (poor daily turnover, blind end pipework, lack of use or flushing)
- Systems containing nutrients for bacterial growth e.g. rust, sludge, sediment, scale, organic matter and biofilms
Legionnaires’ Disease

- Potentially fatal form of pneumonia.
- Incubation period 2-10 days (usually 3-6 days).
- Legionnaires’ disease has an infection rate of <5% with a fatality rate of approx. 12%.
- Some will not develop the full-blown disease but acquire flu-like symptoms.
- Contracted by inhaling aerosols contaminated with Legionella bacteria.

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What are the symptoms of Legionnaires' disease?

The severity of the symptoms varies greatly, ranging from a mild cough to rapidly fatal pneumonia. There may be initial influenza-like symptoms such as:

- Fever
- Loss of appetite
- Headache
- Tiredness
- Severe muscular aches
- Breathlessness & confusion
- Dry cough

Death occurs in 10% to 15% of healthy people because of progressive pneumonia with respiratory and multi-organ failure.
So what is an Aerosol?

- An aerosol is a suspension of small particles in the air
- Small enough to be inhaled deep into the lungs
- Big enough to carry viable bacteria
- Particles of 1μm to 3μm meet this criteria
- A true aerosol is not normally visible and may not be wet

Legionnaires’ Disease Higher Risk Groups

- Men appear more susceptible than women;
- Immuno-suppressed people;
- People aged over 45;
- Alcoholics, smokers; and
- People suffering from cancer, chronic respiratory disease or kidney disease

- COVID-19 survivors of varying ages are likely to have had their immune system further compromised
- COVID-19 increases risk of legionellosis as a secondary infection
- Consider susceptibility for legionellosis before staff return
The HSE’s View on Legionella Control

- The Duty Holder creates the risk (i.e. water system) and is therefore responsible for controlling the risk.
- COVID-19 does not absolve the Duty Holder from their legal duties
- Health & Safety at Work Act is still in effect, nothing has changed

Legionnaires’ Disease Outbreaks in the UK

- 1985 Stafford District General Hospital: 101 cases, 28 Deaths
- 1980 Kingston-upon-Thames: 11 Cases, 0 Deaths
- 1988 BBC: 92 Cases, 2 Deaths
- 1989 Piccadilly Circus: 33 Cases, 5 Deaths
- 2002 Barrow-in-Furness: 172 Cases, 7 Deaths
- 2003 Bulmers, Hereford: 28 Cases, 2 Deaths
- 2010 South Wales: 22 Cases, 2 Deaths
- 2012 Edinburgh, Scotland: 99 Cases, 3 Deaths
- 2020: ???

COVID-19 does not absolve the Duty Holder from their legal duties.
IMPORTANT NOTE

Simply reopening a building that has stood idle, without addressing the safety of its water system, is unacceptable and is likely to be in breach of the law.

If dutyholders are not able to put in place a proper recommissioning process to use the water system safely, they should not reopen the building!

Source: LCA Guidance – May 2020

COVID-19 - a Legionella problem brewing?

► During the ongoing pandemic we have been advised to;
  ▶ Work from home where possible
  ▶ Not to travel unless absolutely necessary
  ▶ Apply social distancing – stay 2mtrs apart

* All of the above is creating an ideal scenario for legionella bacteria to proliferate within water systems
COVID-19 – how could this be a Legionella problem?

▶ Work from home where possible

*Buildings are being left dormant or with lower occupancy, water turnover will decrease, parts of the system will become stagnant, legionella activity will increase.*

▶ Not to travel unless absolutely necessary

*Public transport usage decreasing, water stagnation on planes and trains?*

▶ Social distancing – stay 2mtrs apart

*Again, low occupancy within buildings to accommodate social distancing. It is predicted that social distancing may be in place until the end of 2020, this may further exaggerate the problem of poor water turnover*

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Field Hospitals - hotels, conference centres, sports halls etc

*Being geared up to accept COVID patients, but are things being rushed? Changes to their water systems are happening rapidly to cope with expected demand (planning > installation > commissioning)*

*Have tail ends (deadlegs or blind ends) been left in place to allow for future additions to the water system?*

*With the main focus on the field hospital, has the hosting building been forgotten about? E.g. empty rooms which are holding stagnant water?*

*Consider how will these systems be returned to normal service afterwards to operate in a safe manor?*

*Ongoing PPM for Legionella control;*  

with the ongoing crisis we are finding it difficult to access some buildings due to outright refusal for access (lockdown), some of these buildings are care environments! How can they demonstrate legionella compliance?

*(balance between COVID and Legionella risk)*
Confirmed Legionnaires disease cases by month and year of onset: 2016-2019

Source: HPE Annual Report 2019

LCA – Escalation Procedure

**Stage 1 – Initial Report to Responsible Person**
Raise the concern in the normal way via the normal channels. Record in writing on the usual service documentation and seek a commitment to act.

**Stage 2 – Escalation to Duty Holder**
If no action is taken or planned within a reasonable timescale, repeat stage 1 and indicate that if no action is taken then a formal escalation will be initiated. If it is necessary to escalate the matter, write to the Duty Holder, formally outline the concerns and seek a commitment to act.

**Stage 3 – Report to the Regulator**
If after formal escalation of the issue and explanation in writing to your client they still continue to ignore the problem this process is required by the LCA for its Members;

When all other communication processes with your client have been exhausted and you feel there is still a risk of serious personal injury or risk to health, you should report your concerns to the relevant enforcing authority (i.e. HSE/EHO).
Temperature Regime – the traditional approach to *Legionella* control

- Thermal disinfection is undertaken at 70°C+ (assess scald risk first)
- Hot water should be stored at 60°C
- Hot water should be distributed, so that within one minute of running it reaches 50°C (55 °C in healthcare premises)
- Cold water should be stored at < 20°C (tanks)
- Cold water temperature at outlet should be < 20°C after running for 2 minutes

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Temperature – Traditional Approach to *Legionella* Control

- 70°C - Rapid Kill to 100%
- 60°C – 90% Kill Rate within 2 minutes
- 50°C - 90% Kill Rate within 2 hours
- >20°C & <45°C *Legionella* Bacteria will multiply rapidly
- <20°C - Bacteria are dormant but remain viable
Bacteria Nutrients

- Corrosion
- Scale
- Biofilm
- Sediment

Annual Inspection of CWS Tanks
Other Risk Systems - HSG 274 Part 3
- Cooling Towers (L8) – HSG 274 Part 1
- Hydrotherapy/Spa Pools (HSE/PHE Guidance)
- Portable/Room Humidifiers (NHSE SN (96)06)
- Non-potable water storage
- Deluge Showers
- Trolley Wash Procedures
- Potting Compost (BBC 2010)
- Air Washers / Wet Scrubbers
- Water Softeners
- Emergency Showers / Eyebaths
- Car windscreen washing fluid (Anders Wallénsten, Isabel Oliver et al. 2010)
- Lawn Sprinklers/Garden Hoses
- Horticultural Misting Systems
- Vehicle washing plant
- Ornamental fountains
- Sprinkler & Hose Reel Systems
- Respiratory nebulisers
- Industrial Process Water Systems
- Dental Coolant Systems (Coleman 2008)
- Rain Water Harvesting Tanks (BS 8515:2009)
- Heated Birthing Pools (BBC 2014)

Recommissioning

The requirements for recommissioning a building water system will vary and the level of work and investment should be appropriate for the risk.

For very simple buildings flushing alone may be sufficient but for most buildings some form of disinfection is likely to be needed.

In the worst cases, repeat disinfection and extensive cleansing flushing may be required to clear contamination.

*After a period of prolonged stagnation it is possible for a single disinfection to be unsuccessful and the process may need to be repeated. When scoping this type of service it is important to agree the process, and not to guarantee the result.*
What can I do to reduce the risk?

**LOW OCCUPANCY BUILDINGS**
Where a building is still occupied, albeit at a lower occupancy then flushing should continue, but the additional low use outlets that may now exist should be included.

Given the current situation with Coronavirus, maintenance staff or specialist contractors may not be able to attend site to undertake monthly temperatures etc, in this case consider opting for twice weekly flushing as a short-term measure to increase water turnover.

Water temperatures still need to be maintained, but accessing buildings, especially those at higher risk of COVID-19 such as care environments may be difficult. In these cases, consider taking flow & return temperatures from the calorifier(s) and sentinel outlets only to minimize building footfall by contractors. Where there are site dedicated staff (maintenance) monthly temperatures should be taken as normal. Action any non-conforming temperatures.

*Consider validation sampling for legionella*

*These are short term measures during the pandemic*

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What can I do to reduce the risk?

**START-UP PROCEDURE (MOTHBALED BUILDINGS)**
Building re-occupation after prolonged periods of no use is where the greatest risk lies if certain procedures are not followed:

2-3 weeks prior to occupation
- Consider conducting a building chlorination, especially where cold water storage tanks are in place. The volume of stored water will have become stagnant and may have suffered thermal gain (>20°C)
- Consider validation sampling (Legionella samples) to confirm if the bacteria exists, this allows time for action prior to building re-occupation. **Samples should be taken 2-7 days after disinfection.**
- If the quarterly showerhead cleaning and disinfection was due within the shutdown period, bring this up to date asap
- Pseudomonas sampling should be considered in buildings with COVID patients or COVID cases as an additional measure
What can I do to reduce the risk?

START-UP PROCEDURE (MOTHBALLED BUILDINGS)

2-3 days prior to occupation

- Raise temperature of the calorifier(s) / hot water storage vessel(s) to 60°C and draw through to all associated outlets
- Flush and purge all outlets until the temperature at the outlet stabilizes and is comparable to supply water and purge to drain
  
  *Caution* - Minimise exposure to aerosol by removing shower heads, covering spray taps with a clean cloth or placing a clean plastic bag over fixed showerheads and cutting the corner of bag. Once flushing has started it should be continued until all outlets are back in regular use (twice weekly flushing in healthcare buildings)

*Document all actions in site logbook*

What else should I do?

UPDATE YOUR PROCEDURES

LEGIONELLA RISK ASSESSMENT

As we know this should be a live document, so please update if any changes are made to the water system or its operation and carry out a full review if one of your buildings is being used as a field hospital. If susceptibility of those exposed to the water system has increased due to COVID-19

WRITTEN CONTROL SCHEME

The HSG guidance issued by the HSE clearly states that a written control scheme should be in place for the safe operation of the system, this written scheme should also be updated if control measures change;

- What you will do?
- Who will do it?
- How often you will do it?
- What you will do if it goes wrong?

included start-up and shut-down procedures for the water system
Stephen Clements, a granddad from Cromer, Norfolk, was a keen gardener who died just a week after he inhaled the toxic bacteria.

The 63-year-old is thought to have breathed in poisonous spores that had grown in stagnant water inside the hose.

Stephen had cleaned the patio earlier in the year and left the hose out across the lawn filled with water.

“In the winter sun, it was the perfect temperature for the bacteria to breed. He was cleaning the terrace with a stiff broom and the garden hose on spray. The sweeping of the broom caused the perfect aerosol.”

Mrs Clements said her husband had a heart condition but was otherwise “active and well”, explaining that within a week symptoms of an upset stomach had rapidly developed into pneumonia.
Resources & Downloads
www.vector-airandwater.co.uk

Advisory Services
- Legionella
- Start-up Procedures in Low Occupancy & Multi-Occupied Buildings
- Coronavirus - Fogging & Disinfection

DAP Analysis Checklists
- Legionella
- Fire Safety
- Smoke & Fire Detection
- Electrical Safety

Contact Details

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