11. Legionnaires' Disease

11.1 What is Legionnaires' Disease?

Legionnaires' disease is a severe form of pneumonia — lung inflammation usually caused by infection. It's caused by a bacterium known as legionella.

The legionella bacterium also causes Pontiac fever, a milder illness resembling the flu. Pontiac fever usually clears on its own, but untreated Legionnaires' disease can be fatal. Although prompt treatment with antibiotics usually cures Legionnaires' disease, some people continue to have problems after treatment.

Legionnaires' disease is caused by inhaling droplets of water containing legionella bacteria.

11.2 Causes and Common Sources of Infection

Legionella bacteria are found naturally in freshwater environments, like lakes and streams. The bacteria can become a health concern when they grow and spread in human-made building water systems like:

- Showerheads and sink faucets
- Cooling towers (structures that contain water and a fan as part of centralised air-cooling systems for buildings or industrial processes)
- Hot tubs
- Decorative fountains and water features
- Hot water tanks and heaters
- Large, complex plumbing systems
- Spray bottles

11.3 How It Spreads

People contract Legionnaires' disease by inhaling small droplets of water (aerosols), suspended in the air, containing the bacteria.

If a water source is contaminated to unsafe levels, anyone encountering that water source is placed at risk.

Any water system that produces a mist or spray poses a risk. The water temperature is a consideration, since legionella will multiply at temperatures of between 20-45 degrees Celsius.

Temperatures dipping lower than 20 degrees Celsius make the bacteria dormant. They are killed if the temperature goes above 60 degrees Celsius.

The fact that the water in a spa pool is often vigorously agitated (or aerated) results in aerosols and sprays containing water droplets being formed, from which the legionella bacteria can be inhaled.

Even if the water temperature is within safe limits at the point of emission, it may rise or fall to reach the 'ideal' temperature once in the air. This should be considered when assessing the risks.

Appendix 1

11.4 How Legionella Bacteria can be spread by Spa Pools and Hot Tubs

Legionella contamination of water can be a serious problem in spa baths for a number of reasons:

- The water in spa baths is typically heated to a temperature that is perfect for the bacteria to grow and multiply. The ideal temperature range for such growth is between 20°C and 45°C.
- Contaminants including dead skin cells and dirt from the people using spa pools provide an excellent food for the bacteria, aiding their growth.
- The spa's pipework for the water and air circulation ensures there is a large surface area for the bacteria to grow on.
- Many people can be put at risk of infection if hot tubs and spas are not disinfected and cleaned properly as legionella can grow and multiply quickly in hot water.

11.5 Legionnaire's Disease Symptoms

Legionnaires' disease usually develops two to 10 days after exposure to legionella bacteria. It frequently begins with the following signs and symptoms:

- Headache
- Muscle aches
- Fever that may be 104 F (40 C) or higher

By the second or third day, you'll develop other signs and symptoms that can include:

- Cough, which might bring up mucus and sometimes blood
- Shortness of breath
- Chest pain
- Gastrointestinal symptoms, such as nausea, vomiting and diarrhoea
- Confusion or other mental changes

Although Legionnaires' disease primarily affects the lungs, it occasionally can cause infections in wounds and in other parts of the body, including the heart.

A mild form of Legionnaires' disease — known as Pontiac fever — can produce fever, chills, headache and muscle aches. Pontiac fever doesn't infect your lungs, and symptoms usually clear within two to five days.

If left untreated, Legionnaires' disease can cause breathing problems and prevent the lungs from working effectively, resulting in less oxygen passing into the bloodstream.

If caught and treated early, most people make a full recovery and feel back to normal after a few weeks.

Appendix 2

11.6 When To See A Doctor

See your doctor if you think you've been exposed to legionella bacteria. Diagnosing and treating Legionnaires' disease as soon as possible can help shorten the recovery period and prevent serious complications.

A chest x-ray will confirm if pneumonia is present in a patient. Samples of both phlegm and urine can also be taken to test for the presence of the bacteria.

11.7 How is Legionnaires' Disease Treated?

Legionnaires' disease is always treated with antibiotics. Treatment is usually started as soon as the disease is suspected, without waiting for confirmation. Prompt treatment significantly lowers the risk of complications.

Many people completely recover with treatment, but most will need care in the hospital. Elderly people and those with other health conditions are particularly vulnerable to the effects of Legionnaires' disease. While in the hospital, they may receive oxygen or other breathing support. They may also be given fluids and electrolytes through a vein in their arm (IV) to treat dehydration.

11.8 People at Increased Risk

Not everyone exposed to legionella bacteria becomes sick. You're more likely to develop the infection if you:

- Current or former smokers. Smoking damages the lungs, making you more susceptible to all types of lung infections.

- Have a weakened immune system or take drugs that weaken the immune system (like after a transplant operation or chemotherapy).
- Have a chronic lung disease or other serious condition. This includes emphysema, diabetes, kidney disease or cancer.
- Are 50 years of age or older.

11.9 Complications

Legionnaires' disease can lead to a number of life-threatening complications, including:

- **Respiratory failure.** This occurs when the lungs can't provide the body with enough oxygen or can't remove enough carbon dioxide from the blood.
- **Septic shock.** This occurs when a severe, sudden drop in blood pressure reduces blood flow to vital organs, especially to the kidneys and brain. The heart tries to compensate by increasing the volume of blood pumped, but the extra workload eventually weakens the heart and reduces blood flow even further.
- **Acute kidney failure.** This is the sudden loss of your kidneys' ability to filter waste from your blood. When your kidneys fail, dangerous levels of fluid and waste accumulate in your body.

When not treated promptly, Legionnaires' disease can be fatal.

11.10 Legionella Risk Factors

Legionella bacteria will inevitably enter man-made water systems and the degree of risk it poses will vary. All hot and cold-water systems need to be considered, including those at beauty salons.

Smaller hot and cold-water systems are generally lower risk than more complicated ones.

Legionella bacteria thrive at temperatures between 20°C and 50°C so one of the key control measures for minimising the risk is to ensure that your cold water is cold (i.e. below 20°C) and the hot water is hot (above 50°C). When water is below 20°C or above 50°C Legionella bacteria will not grow. However, water between these temperatures presents a greater degree of risk, particularly where it is left to stagnate. Generally, where water is left within a system without movement for more than a week then the risk of growth will increase.

Appendix 3

11.11 Identify and Assess Sources of Risk

Employers and people in control of premises, such as landlords, have a legal duty to take suitable precautions to prevent and control the risk of exposure to Legionella. This includes understanding what Legionella is, identifying and controlling risks associated with Legionella along with the proper maintenance of all water systems in their premises.

As a person responsible for premises, you'll need to conduct a risk assessment to identify and assess the sources of risk and put in place a plan to control those risks, such as maintenance programmes and staff awareness training.

Carrying out a risk assessment is your responsibility. You may be competent to carry out the assessment yourself but, if not, you should call on help and advice from either within your own organisation or from outside sources, e.g. consultancies.

You or the person responsible for managing risks, need to understand your water systems, the equipment associated with the system such as pumps, heat exchangers, showers etc, and its constituent parts. Identify whether they are likely to create a risk from exposure to legionella, and whether:

- the water temperature in all or some parts of the system is between 20–45 °C
- water is stored or re-circulated as part of your system
- there are sources of nutrients such as rust, sludge, scale, organic matter and biofilms
- the conditions are likely to encourage bacteria to multiply
- it is possible for water droplets to be produced and, if so, whether they can be dispersed over a wide area, e.g. showers and aerosols
- it is likely that any of your employees, residents, visitors etc are more susceptible to infection due to age, illness, a weakened immune system etc and whether they could be exposed to any contaminated water droplets

Your risk assessment should include:

- management responsibilities, including the name of the competent person and a description of your system
- competence and training of key personnel
- any identified potential risk sources
- any means of preventing the risk or controls in place to control risks
- monitoring, inspection and maintenance procedures
- records of the monitoring results and inspection and checks carried out
- arrangements to review the risk assessment regularly, particularly when there is reason to suspect it is no longer valid

If you conclude that there is no reasonably foreseeable risk or the risks are low and are being properly managed to comply with the law, your assessment is complete. You may not need to take any further action at this stage, but any existing controls must be maintained, and the assessment reviewed regularly in case anything changes in your system.

Appendix 4

11.12 Preventing or Controlling the Risks

You should first consider whether you can prevent the risk of legionella by looking at the type of water system you need. The key point is to design, maintain and operate your water services under conditions that prevent or adequately control the growth and multiplication of legionella.

If you identify a risk that you are unable to prevent, you must introduce a course of action i.e. a written control scheme, that will help you to manage the risk from legionella by implementing effective control measures, by describing:

- your system, e.g. develop a schematic diagram
- who is responsible for carrying out the assessment and managing its implementation?
- the safe and correct operation of your system
- what control methods and other precautions you will be using
- what checks will be carried out, and how often will they be carried out, to ensure the controls remain effective

You should:

- ensure that the release of water spray is properly controlled
- avoid water temperatures and conditions that favour the growth of legionella and other micro-organisms
- ensure water cannot stagnate anywhere in the system by keeping pipe lengths as short as possible or removing redundant pipework
- avoid materials that encourage the growth of legionella
- keep the system and the water in it clean
- treat water to either control the growth of legionella (and other microorganisms) or limit their ability to grow
- monitor any control measures applied
- keep records of these and other actions taken, such as maintenance or repair work

11.13 Keeping Records

If you have five or more employees you have to record any significant findings, including those identified as being particularly at risk and the steps taken to prevent or control risks. If you have less than five employees, you do not need to write anything down, although it is useful to keep a written record of what you have done.

Records should include details of the:

- person or persons responsible for conducting the risk assessment, managing, and implementing the written scheme
- significant findings of the risk assessment
- written control scheme and details of its implementation
- details of the state of operation of the system, i.e. in use/not in use
- results of any monitoring inspection, test or check carried out, and the dates

These records should be retained throughout the period for which they remain current and for at least five years after that period.

11.14 Legionella and Covid-19

Beauty salons should carry out a detailed review of all aspects of their water management systems before reopening following the coronavirus (COVID-19) outbreak.

Regular flushing of your water system is advised throughout any lockdown period. If this cannot be achieved because the building is closed, or there is significantly reduced use, you will need to take additional steps beyond your current control measures to ensure this can be achieved so far as you can. This may include flushing the entire water system (all outlets) weekly and, if possible, dropping the level of stored water in tanks.

Prior to the reopening of your business, all aspects of your water management system need to be reviewed and will be dependent on the complexities of the system.

If you have already reviewed your risk assessment and implemented additional control measures, then it is unlikely you will need to take any further steps prior to reopening following a lockdown.

Additional steps to take prior to reopening could include:

- Flushing through simple hot/cold water systems with fresh mains water for several minutes
- Increasing the temperature of hot water systems to above 60°C if possible and drawing it through to all hot water outlets (a temperature over 60°C will kill Legionella bacteria over time)
- Flushing through larger hot/cold water systems (including those with tanks, showers, calorifiers etc.) for a significant period of time
- Ensuring that the system is capable of delivering water at safe temperatures by checking temperatures ahead of reopening
- Undertaking a chemical or thermal disinfection of the water system
- Undertaking microbiological sampling for Legionella bacteria

Something as simple as flushing taps can generate water droplets, so plan in advance how you can do this safely. This could include running taps at low velocity or flushing shower heads into a part filled container of water, ensuring that the showerhead is submerged under the water in the container.

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11.15 Further information

Appendix 5 - Legionnaires' disease

Appendix 6 - Control of legionella bacteria

Appendix 7 - Brief guide to duty holders

Appendix 8 - Sample recording document