Legionellosis
Cause and Controls

The *Legionella* bacteria—and the associated Legionnaires' disease—became famous in 1976 when several hundred illnesses and 34 fatalities occurred at the time of the American Legion convention. Since then, there have been several identified outbreaks in Ontario, including one in Waterloo where two construction workers became critically ill after performing renovations on a hospital roof.

What diseases can I get from *Legionella*?
Legionella causes mainly two types of diseases: Legionnaires' disease and Pontiac Fever. Legionnaires' disease is far more severe than Pontiac Fever. Both diseases are considered cases of "Legionellosis".

- **Legionnaires' disease** usually develops two to 10 days after exposure. Symptoms include cough, fever, chills, diarrhea, and confusion. In severe cases, pneumonia and organ failure can develop. Legionnaires' disease can be treated with specific antibiotics.

- **Pontiac Fever** is a mild flu-like illness, which develops one to three days after exposure. Recovery usually occurs within two to five days without medical treatment. A healthy person exposed to *Legionella* is a far more likely to develop Pontiac Fever than Legionnaires' disease.

What is the route of exposure?
Legionellosis can develop after a worker inhales mist of contaminated water into the lungs.

> *Note*
> - *Legionella* bacteria are not transmitted from person to person.
> - People **do not** get Legionellosis from drinking contaminated water.

Who is at greater risk?
People who are at greater risk of developing the more serious Legionnaires' disease are those

- with a compromised immune system
- with a pre-existing lung disease
- who have cancer or diabetes
- who are older
- who are heavy alcohol drinkers
- who smoke.

Outbreaks commonly occur in health care facilities because many patients have some of these risk factors.

Where is the bacteria found?
Legionella bacteria are found in groundwater lakes, rivers, ponds, and man-made water systems. From these sources, the bacteria enter plumbing systems and cooling towers. The film, slime, scale, and corrosion that develop in plumbing systems and cooling towers protect the bacteria from normal water-treatment efforts.

The low concentrations of *Legionella* found in nature and in municipal water systems are not generally associated with disease, but when conditions favour their growth, the bacteria can reach hazardous concentrations.

What conditions are required for growth?
Legionella grow best in sediment and slime in a temperature of between 20º and 50º C (ideally between 35º and 46º C). Places where warm water remains stagnant for more than 48 to 72 hours and parts of water plumbing systems that are used infrequently (less than once per week) may provide good environments for *Legionella* growth. Sediment, rust, scale, and sludge provide good food sources for the bacteria.

What type of construction work could expose workers to *Legionella*?
Workers who can come in contact with *Legionella* bacteria include HVAC maintenance technicians or installers, gas fitters, plumbers, and roofers.

All sources of misting water should be considered potential sources of transmission. The primary sources of exposure to contaminated water are

- cooling towers,
- evaporative condensers
- water spray humidifiers
- hot-water storage tanks.

Secondary sources of exposure include

- faucets and showerheads
- spray nozzles
- stagnant water in fire sprinkler systems
- eyewash stations and first-aid showers
- construction activity that causes standing water to break up into minute droplets.

Water mist can travel with the wind, so construction workers on a rooftop near a cooling tower should be vigilant about exposure. Recent analysis of an outbreak in France showed that some people who lived as far away as 6–7 km from the source of the outbreak became infected[1].

During construction and renovation projects, water supplies are often disrupted. *Legionella* contamination of the water may occur as the pipes are repressurized.

[1] A Community-Wide Outbreak of Legionnaires Disease Linked to Industrial Cooling Towers—How Far Can Contaminated Aerosols Spread? The Journal of Infectious Diseases 2006;193:102–111.

Who has legal responsibility?
An outbreak of Legionnaires' disease among workers usually has its origins in the community and may not be related to the work environment. In such cases the outbreak is both an occupational and a public-health concern.

Employers have a duty under the *Occupational Health and Safety Act*, Section 25 (1) (a) and (b) to ensure that equipment, materials, and protective devices that they provide are maintained in good condition. Section 25 (2) (h) requires the employer to take every precaution reasonable in the circumstances for the protection of a worker. This includes the maintenance of water systems and ventilation systems in buildings to protect workers from the hazard of *Legionella* exposure.

What precautions can a contractor take?
For most workers the risk of contracting Legionnaires' disease is very low, but the following protective measures are recommended:

1. If working in the vicinity of a cooling tower, find out if the water system is maintained in compliance with the guidelines of the **American Society of Heating, Refrigerating and Air-Conditioning Engineers** or the **Cooling Technology Institute** (listed below under "Want more information?").
2. Train your workers to recognize, assess and control the hazard:
    - In warm weather, instruct workers to avoid disturbing standing water and creating mists.
    - Provide fresh water to drink so workers do not drink from hoses or faucets that may have stagnant water.
    - Ensure fresh water is available for work that uses water and that creates mist (e.g., to cool saws or for dust control).
    - Drain and flush plumbing systems that may have stagnant water in them before putting them back into service.
    - Have procedures in place to handle materials (especially porous materials) that have been wet or damp for more than 48 hours. These materials should be treated as a potential source of *Legionella* and mould. Ensure appropriate personal protective equipment is used including impervious gloves and at least N95 respirators that are properly fit.
    - Clearly identify where workers should use at least an N95 respirator:
        - when water mist may be present, especially when it's likely that mists from standing water will be generated
        - when dealing with water from plumbing or fire sprinkler systems since the water may have been stagnant
        - when breathing dust from excavation work.
3. Cover water tanks to prevent contamination with construction dust.
4. Do not allow workers to eat, drink, or smoke in areas where there may be airborne dust, mist, or standing water.

How can workers protect themselves?
Workers maintaining systems, or those working in or nearby infected zones, should follow the following protective measures:

- Find out if the water system is maintained in accordance with one of the two major guidelines (or their equivalent) listed below under "Want more information?"
- Avoid stagnant water that has a film on it.
- Avoid aerosolizing stagnant water.
- If working in a cooling tower, wait 15 minutes after shutting it down before accessing it to allow mist to dissipate.
- Use appropriate personal protective equipment when necessary:
    - Wear leather gloves when handling equipment.
    - Wear rubberized gloves when using biocides or bleach.
    - Use a NIOSH-approved N100 filtering facepiece respirator if there are suspected or confirmed cases of Legionnaires' disease or if the system has significant contamination, i.e., where testing reveals the presence of *Legionella* bacteria above recommended limits (see the Occupational Safety and Health Administration's recommended limits for *Legionella*, found at www.osha.gov/dts/osta/otm/otm_iii/otm_iii_7.html#app_iii:7_3.)
    - Use a NIOSH-approved N95 respirator if there is potential for exposure (e.g., if there is a lack of water-system maintenance, if there is stagnant water around that will be aerosolized, if workers are concerned about being infected, or if there has been a report of indoor air-quality problems).
    - If the water system is maintained and there is no misting of water, then no respirator is required, but a NIOSH-approved N95 respirator is optional.

All workers should wash their hands with soap and water, or use an anti-bacterial hand sanitizer, before eating, drinking, smoking, or leaving the worksite.

Want more information?
There are two major guidelines for *Legionella* and related illnesses:

- Guideline 12-2000 – *Minimizing the Risk of Legionellosis Associated with Building Water Systems* (American Society of Heating, Refrigerating and Air-Conditioning Engineers)
- *Legionellosis – Guidelines: Best practices for controlling Legionella*. (Cooling Technology Institute)

In addition, Ontario's Ministry of Labour has produced:
Information Bulletin: Workplace Health and Safety Guideline—Legionella.
It can be accessed at: www.labour.gov.on.ca/english/hs/ib_legionella.html

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