Legionella Control & Management

by Rami E. Kremesti M.Sc., CSci, CEnv

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History

- the organism was first identified in 1976 during an outbreak at an American Legion Convention in Philadelphia. 34 attendees died.

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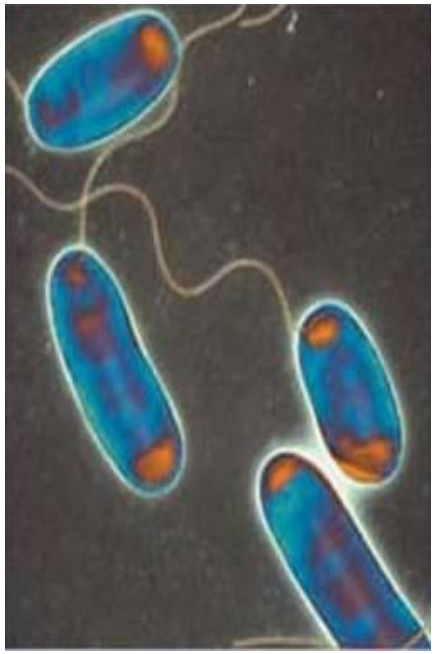
What is Legionella?

- A naturally occurring facultative bacterium
- rod-shaped cells (bacillus) 1-2 µm in length and 0.5 µm wide
- Found in most water systems and sometimes soil
- Often present in mains water
- Easily colonises most domestic water systems – hot and cold and cooling towers

Requirements for Growth?



- Optimum temperature range of 20 - 45 ^{o}C
- Food source (other bacteria, C/N/P & sediments)
- Facultative (“breathes” with or without O_2)
- Requires Cysteine and Iron
- Prefers stagnant conditions (forms Biofilm)
- Needs Water
- pH 5-8.5

Route of Infection?

- Primarily through inhalation of aerosols, fine droplets & mists
- Can be contracted by choking on contaminated water
- Inhalation or ingestion of potting soil
- Statistically most susceptible

  - 50 to 70 year olds/Males/ Smokers/Immuno-suppressed

How big a risk?

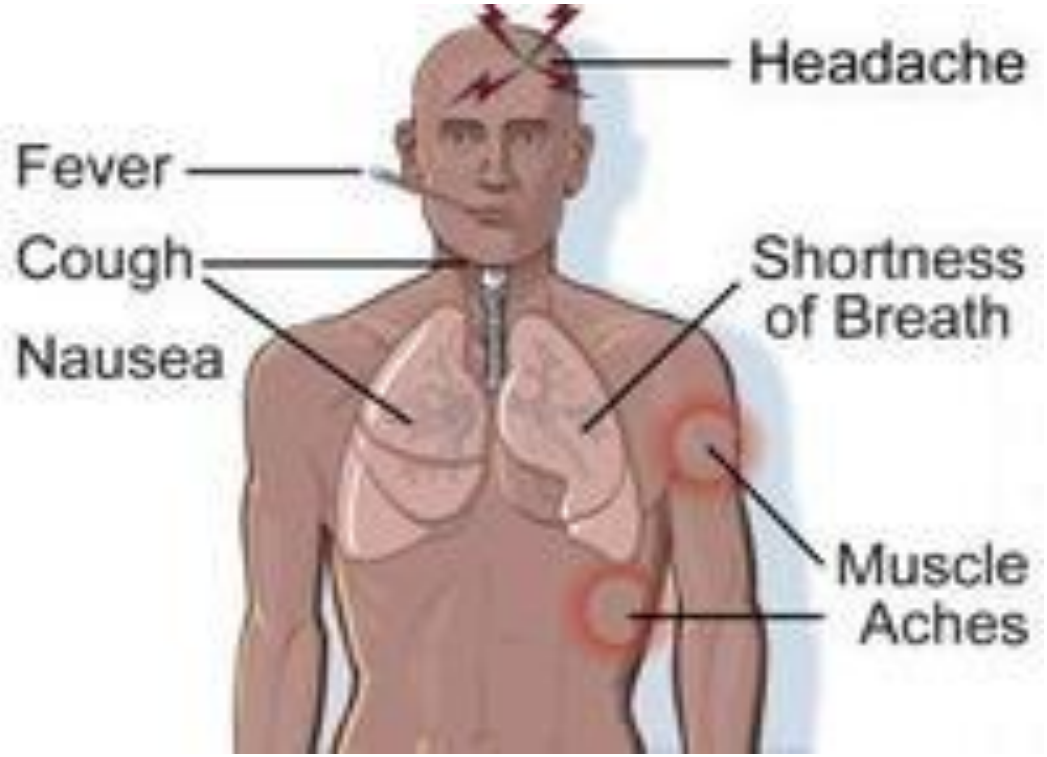
Legal Duty of Care in the UK

- “ Employers have a legal duty of care to ensure the safety of all their employees.”
- *HSE view Legionnaire's Disease as “preventable” assuming management failure*

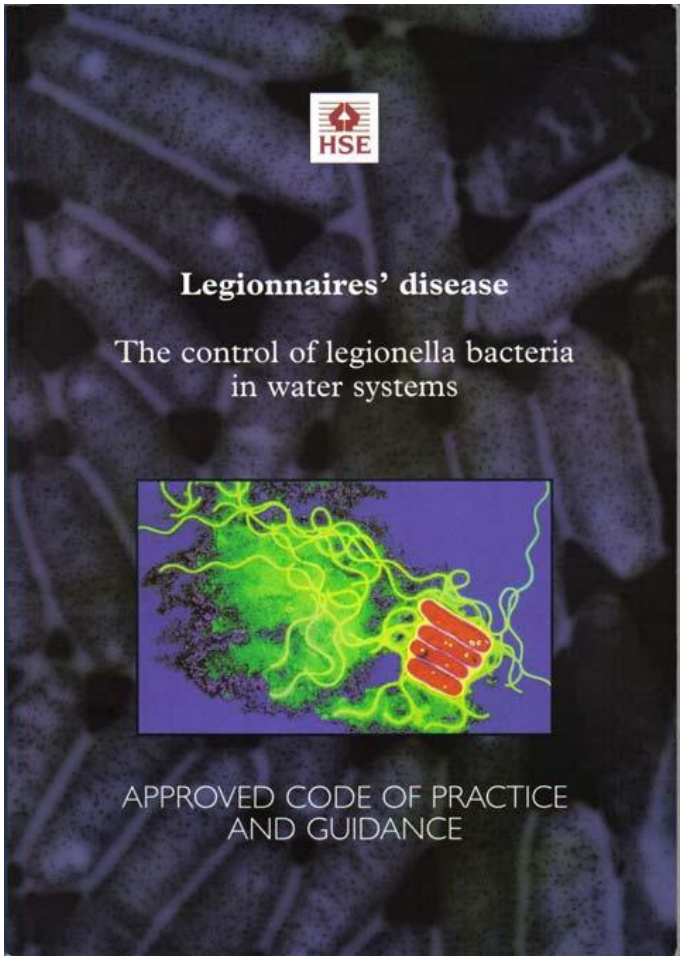
Legionnaire's Disease

- Potentially fatal form of pneumonia – 5-30% fatality rate
- 200-300 cases of infection in England & Wales annually
- Incubation period 2-10 days - typical 3-6 days
- *Legionella pneumophila – 23 sub types*
- *Long term effects (confusion, memory loss, fatigue)*

Legionnaire's Disease Symptoms



Legislation



- The Health and Safety at Work Act 1974
- Management of Health & Safety at Work Regulations 1999
- COSHH 2002
- HSE L8 ACOP

L8 ACOP Guide to Successful Control

Requires:

- Management regime in place
- Risk Assessments
- Control/operation regime
- Maintenance and upgrade
- Review
- Response Plan

Risk Assessments should:

- Identify & quantify relevant wet systems plus equipment holding /circulating water/air
- Assess potential for Legionella growth
- Identify who is at risk
- Assess the potential for bacterial transfer
- Quantify and prioritise the risks
- Determine suitable means of control/prevention/response

Responsibilities

- Appointed Responsible Person for day to day management
- Deputy Responsible Person to cover holidays and illness
- Responsibility cannot be delegated

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Responsibilities cont'd

- Policy for the Control of Legionella bacteria
- Management structure in place with contractor charged with carrying out:
  - Legionella Risk assessments of all buildings
  - Treatment of water assets where required
  - Sampling and analysis of water systems
  - Remedial works incl. removing "dead-legs"

Typical Systems at Risk

- Cooling Towers (ours has Max T_h = 57 and T_c = 37)
- Condenser (cooling water side)
- FF System
- Domestic hot & cold water systems
- Equipment producing aerosols, mists or droplets from stored water sources including showers & humidifiers
- HVAC
- Potable water system/Emergency Showers
- Equipment holding / circulating water at 20 - 45^{o} C

Examples of Lab & Workshop Equipment at Risk

- Water tanks & baths
- Spray taps
- Water recirculation systems for cooling
- Rarely used taps & showers (even at home)
- Misting equipment
- Oil / water emulsions for lubricating lathes
- Mobile AC equipment with water
- Metalworking Systems

Controlling Legionella bacteria

- Temperature monitoring
- Controlled release of water spray
- Avoid temp. conditions 20 - 45^{o} C
- Avoid water stagnation - empty & clean regularly
- Avoid materials which harbor bacteria (ex. Rubber gaskets)
- Maintain cleanliness of spray outlets
- Water treatment program (disinfection, scale and corrosion control)
- Point of use (POU) Membrane filter (0.2 µm)

Controlling Legionella bacteria cont'd

- Ensure correct & safe operation of system
- Flushing regime for rarely-used outlets
- Maintain low levels of bacterial counts in the MCW, FF network and showers
- Maintain good water chemistry to eliminate scale formation/fouling/corrosion
- Scheduled maintenance of the cooling tower Fill especially in case of fouling/biofouling
- Scheduled inspection of Drift eliminators to prevent mist
- PPE (FFP3 breathing mask)

Treatment / Remedial Options

- Monitor temperatures; 20-45^{o}C = risk range
- Every 2 weeks - heat water to 60^{o}C for 5 mins in showers
- Add disinfectants / NaOCl/dispersant as advised
- Clean & disinfect shower spray heads every month
- Flush rarely-used outlets weekly
- Arrange with Engineering for removal of “dead-legs” and rubber gaskets in MCW system
- Arrange with Specialist for samples to be taken if risk exists (sampling is NOT a control measure)
  - it takes 10 days for results to be sent through
  - it monitors whether your controls work)

Drinking Water Coolers

- 2 types generally available:
  - Using large bottles of mineral water
  - Plumbed-in units
- Legionella is not reported to be a problem with water bottle coolers, usually work outside “critical temperature range”,
- 1 reported instance of Legionella bacteria being isolated from Activated Carbon filters in a plumbed-in unit in New Zealand – replace as recommended by manufacturer.

References

- HSE L8 ACOP
- **BS 8580:2010** *Water Quality. Risk Assessments for Legionella. Code of Practice*
- www.legionella.org
- HSE Legionnaires' disease: Technical guidance
- ASHRAE Standard: Minimizing the Risk of Legionellosis Associated with BWS (Building Water Systems)
- *OSHA Technical Manual:* Section III: Chapter 7
- www.UpToDate.com
- http://www.legionellacontrol.org.uk/

Finally

We hope you found this presentation useful!

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