metroSAFETY

Making compliance simple

Legionella Management:
Identifying and Controlling Risk

Agenda

- Legionella history
- Legionellosis
- Who's at risk?
- What do we do and how do we do it?
- Hot and cold water – What have we seen?
- Other systems – What have we seen?

What is Legionnaires' disease?

Legionella History

- July 21-24th 1976:

  58th Convention of the American Legion
- 221 cases, 34 deaths
- Causes were investigated, but no immediate causes were found
- Dec 1976:

  Dr Joseph McDade whilst looking at some samples noticed a cluster of bacilli which he isolated – and were later called *Legionella pneumophila*

Legionella History

1976: First outbreak in Philadelphia

1977:
- Legionella was isolated in samples from 1947
- UK's first outbreak documented from 1972 in Nottingham
- Surveillance within the UK commences

1978: First recognised UK outbreak in Corby

1983: Largest UK outbreak at Stafford General Hospital (175 cases, 28 deaths)

Legionella History

1987: EH48 produced, guidance notes only

1991: HSG70 produced, first legislative document

2001: L8 produced

2010: BS8580 launched

2013/4: L8 fourth edition produced which included HSG274 parts 1, 2 and 3

Legionellosis:

Any illness caused by exposure to Legionella

Legionella History: Legionellosis

Pontiac fever /
Lochgoilhead fever

- Short fevers, without pneumonia.
- 2-3 days incubation period for Pontiac fever. Up to 9 days incubation period for Lochgoilhead fever.
- Zero fatality.

Legionella History: Legionellosis

Legionnaires' disease

- Most frequently caused by *Legionella pneumophila* sero group 1
- Acute bacterial pneumonia
- Incubation period of 2 to 10 days
- Vomiting, diarrhoea, delirium are common
- Treated with antibiotics
- Very slow recovery
- 12% fatality rate

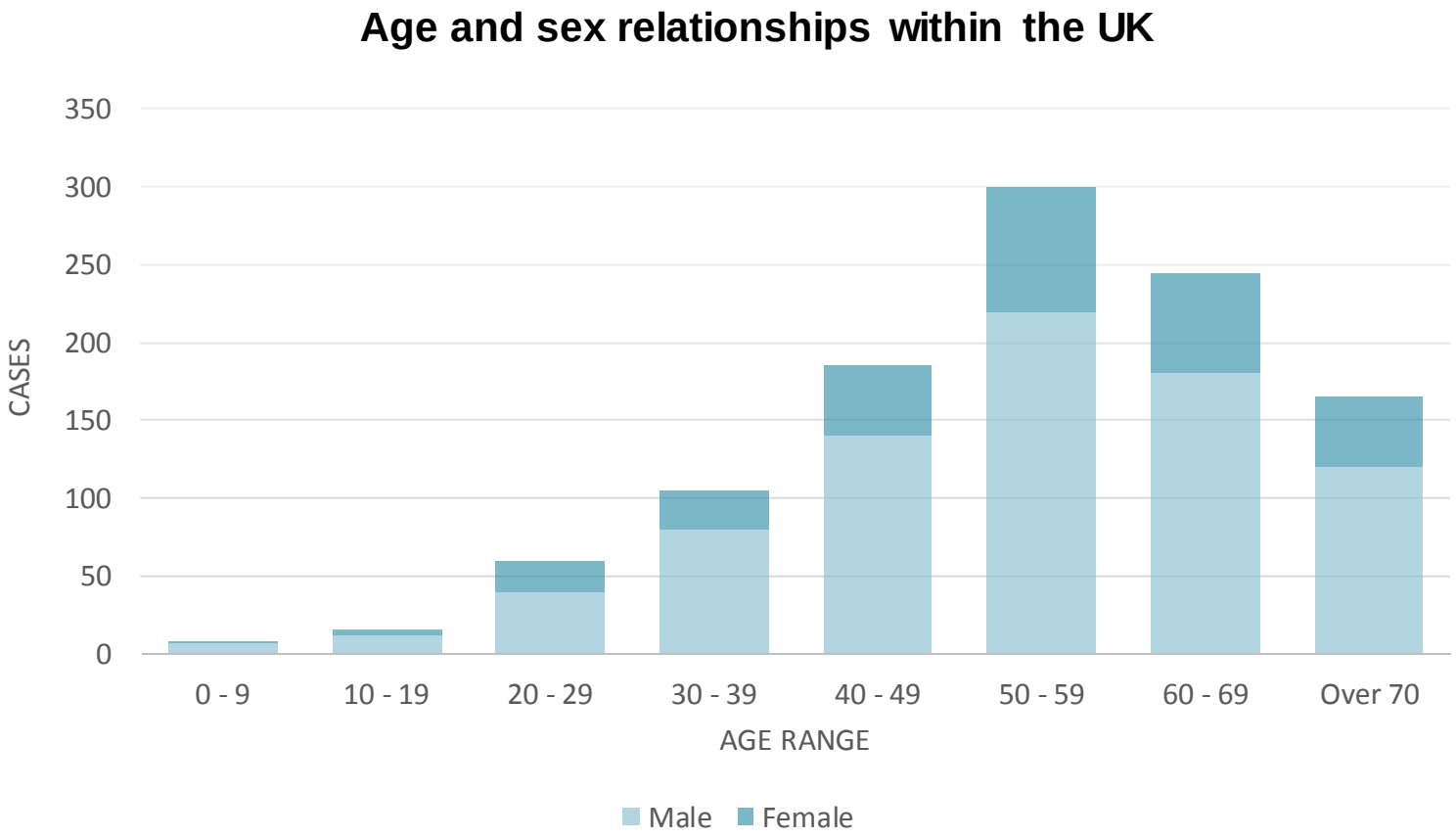
Who's at risk?

Legionella History: Legionellosis

Risk factors

- Men are statistically proven to be up to three times more likely to contract the disease than women
- Aged over 45
- A smoker
- Existing respiratory condition
- Cancer, diabetes, alcoholism, immunocompromised
- *Travel

Legionella History: Legionellosis

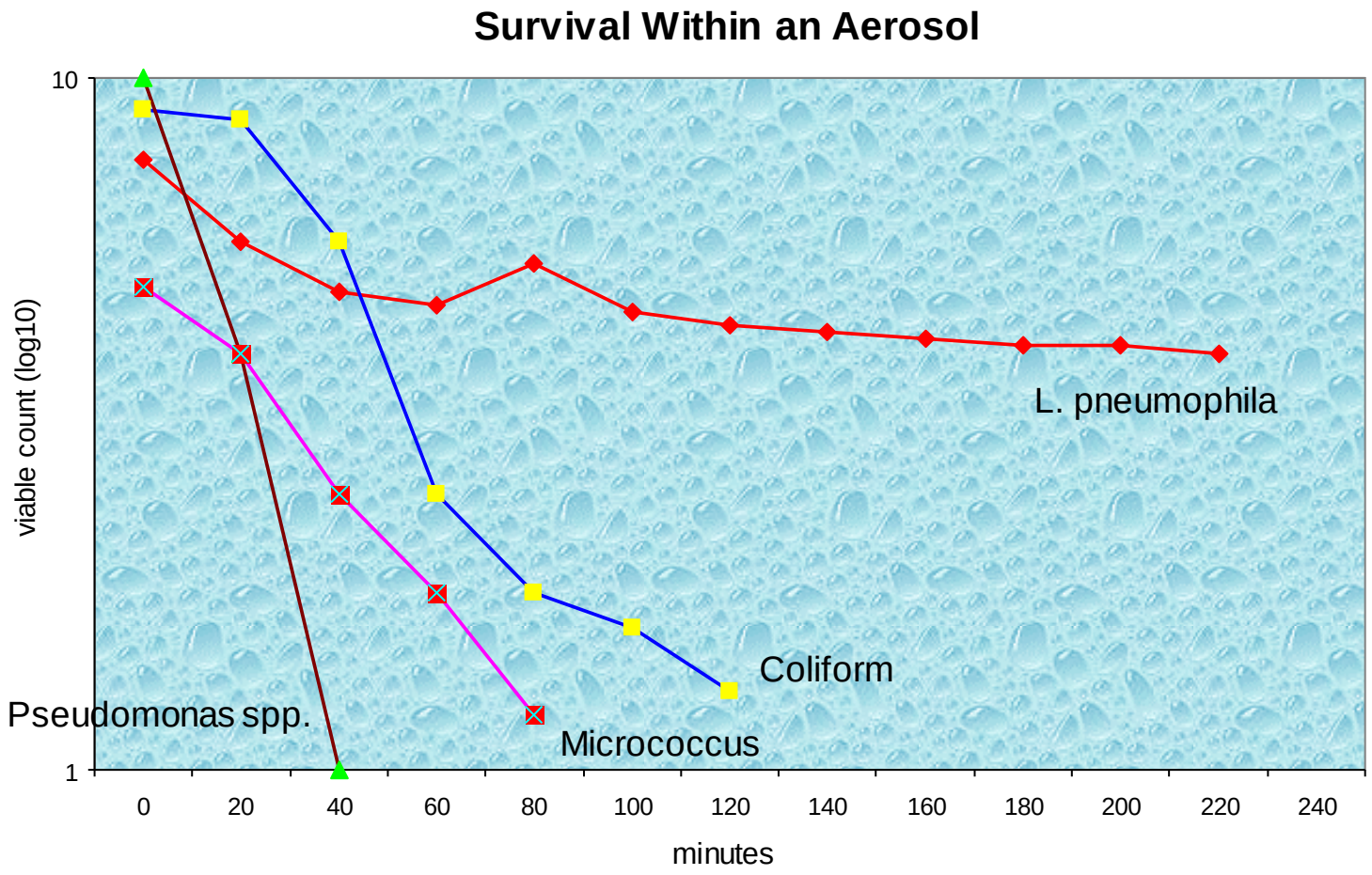


Legionella History: Legionellosis

Routes of infection

- Inhalation of the aerosol is the most likely route of infection
- <5µ aerosols may enter the alveoli
- Aerosol generation is more common than you think
- Legionella can survive for around four hours in a relative humidity of 65%
- Little evidence of person-to-person spread

Legionella History: Legionellosis

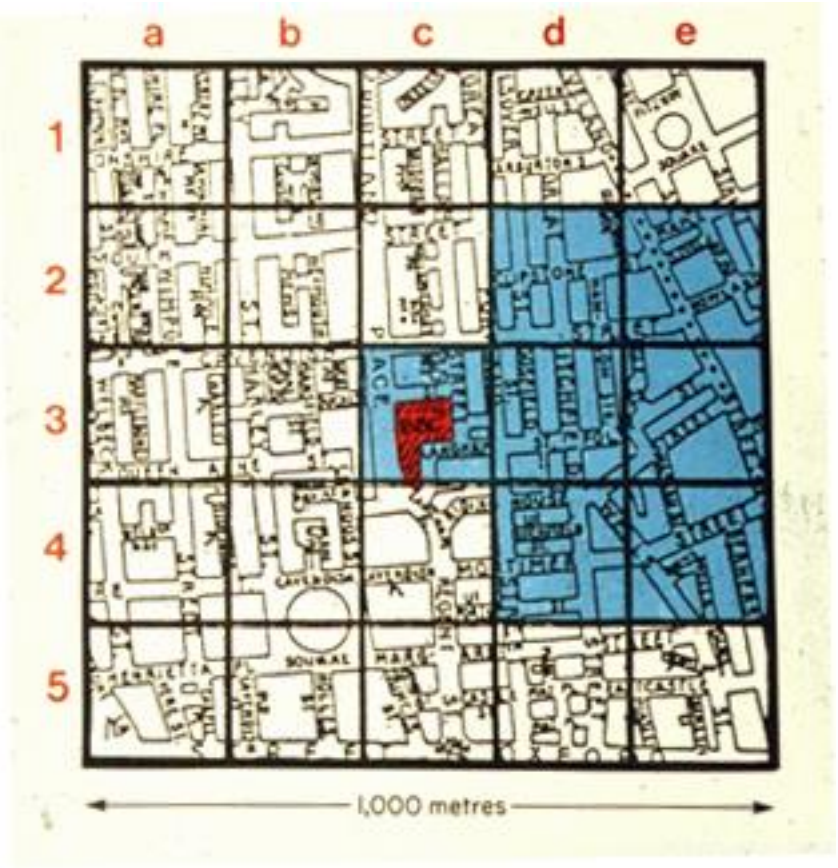


Legionella History: Legionellosis

How far away from the outbreak to be safe?

- BBC outbreak in London in 1988
- Cooling towers situated on the roof

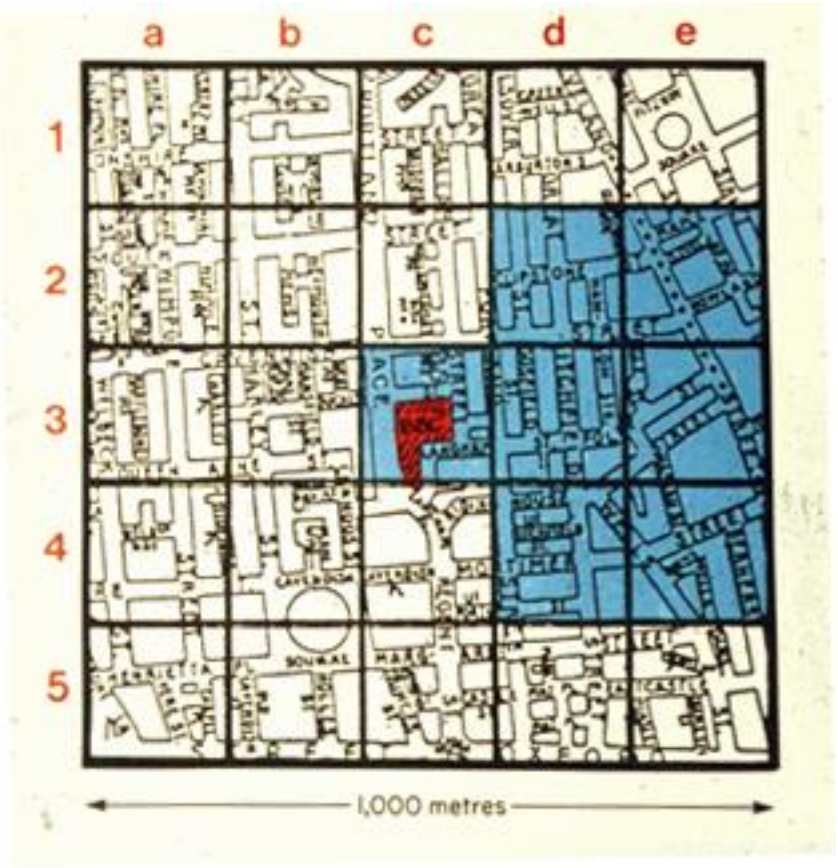
Legionella History: Legionellosis



How far away from the outbreak to be safe?

- The plume area can be shown on the right of the image and shows how extensive the ‘infected’ area was
- How far away from the outbreak might you expect to be safe?

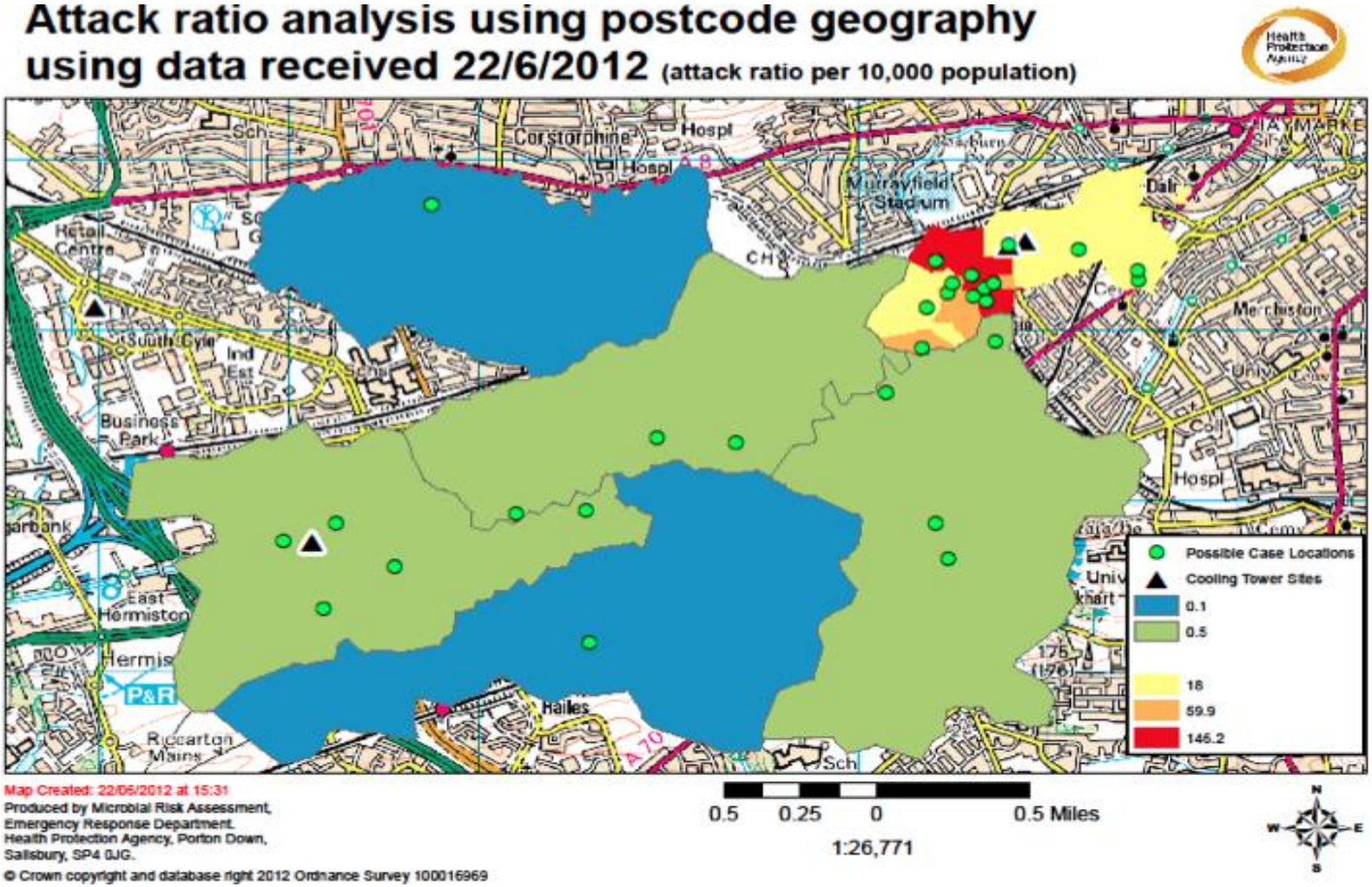
Legionella History: Legionellosis



How far away from the outbreak to be safe?

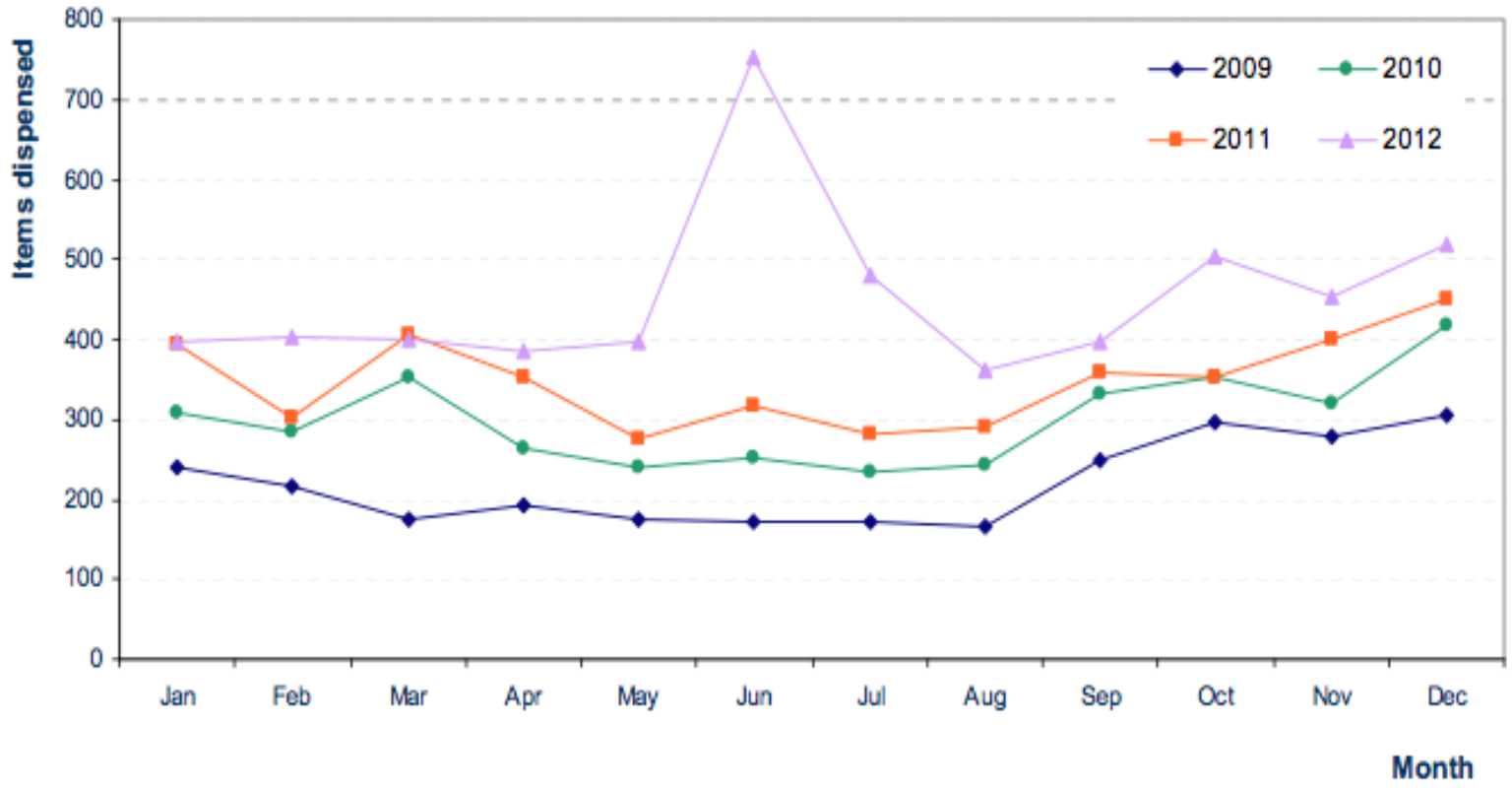
- Infected aerosols were found 500m downwind of the incident
- Further research showed that the infected aerosols can travel 12km from the incident

Legionella History: Legionellosis



Legionella History: Legionellosis

Chart x: Clarithromycin dispensing - items dispensed - South West Edinburgh LHP

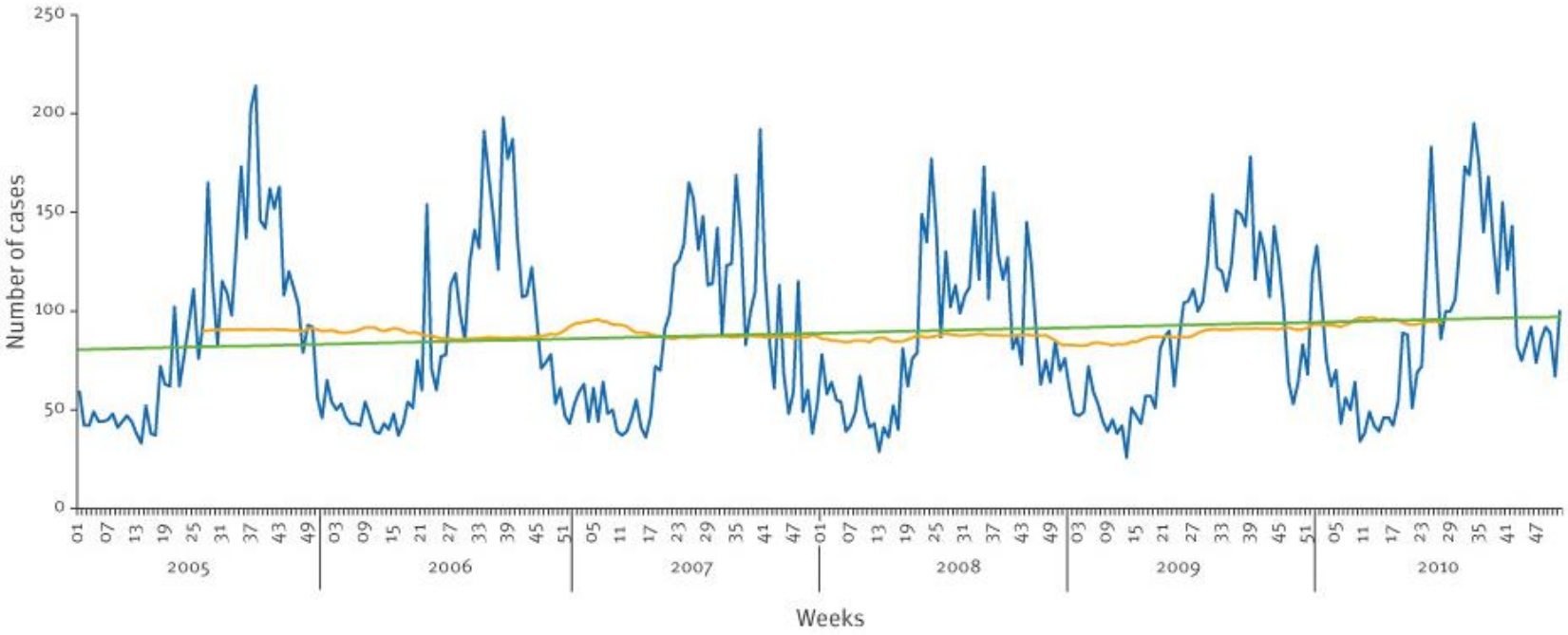


Legionella History: Legionellosis

- 359 cases of Legionnaires' disease were reported in England and Wales in 2010
- 116 of the 359 were suspected to be from travelling abroad
- Around 250-350 cases are reported per year
- It is suspected that there are more than 6000-10000 cases per year; most cases of Legionnaires' disease are documented as being pneumonia

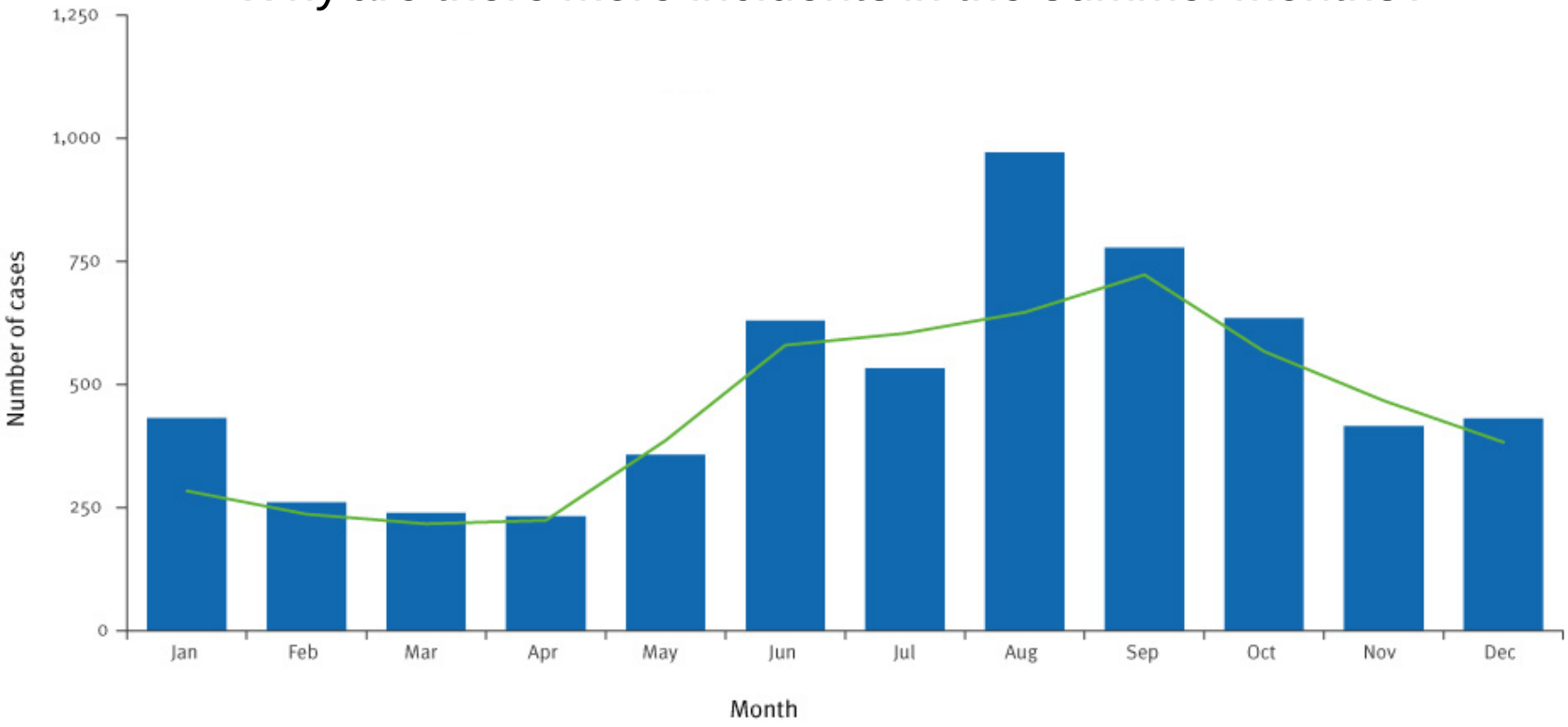
Legionella History: Legionellosis

Reported cases of Legionnaires' disease by week of onset, linear trend and 52 weeks moving average, France, Germany, Italy, Spain and the UK, 2005-2010



Legionella History: Legionellosis

Why are there more incidents in the summer months?

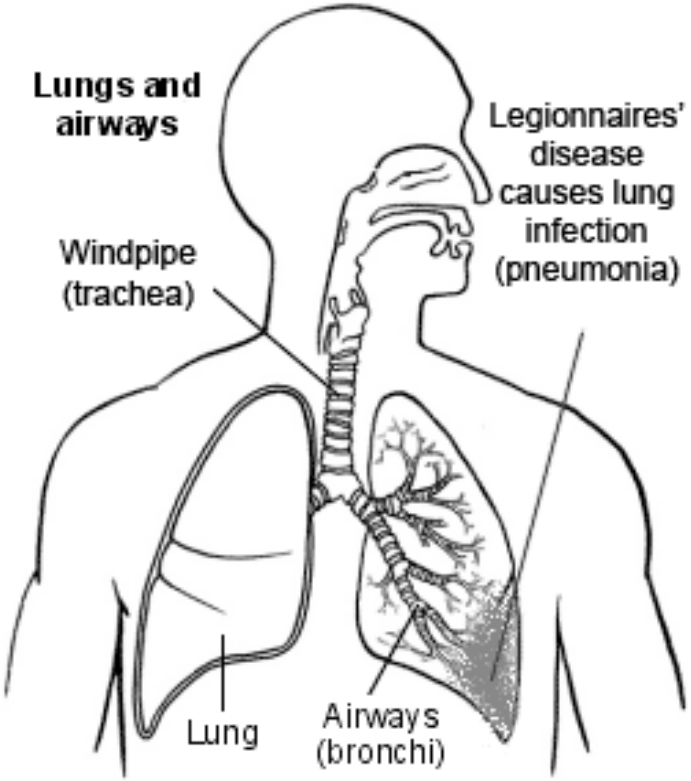


Legionella History: Legionellosis

The season is thought to have a significant impact on Legionella outbreaks:

- Higher domestic water temperatures
- Higher loft temperatures
- Cooling towers have to work harder

Legionella: How Do We Catch It?



- In order to contract the illness, the bacteria must reach the deepest part of the lung – the alveoli
- The infected droplet must be less than 5 microns

Legionella: Legionellosis

“Normal” healthy individual	On admission to hospital	Day 4	1 year post-infection	7 years post infection

X-Rays showing the long-term effects of Legionnaire’s disease

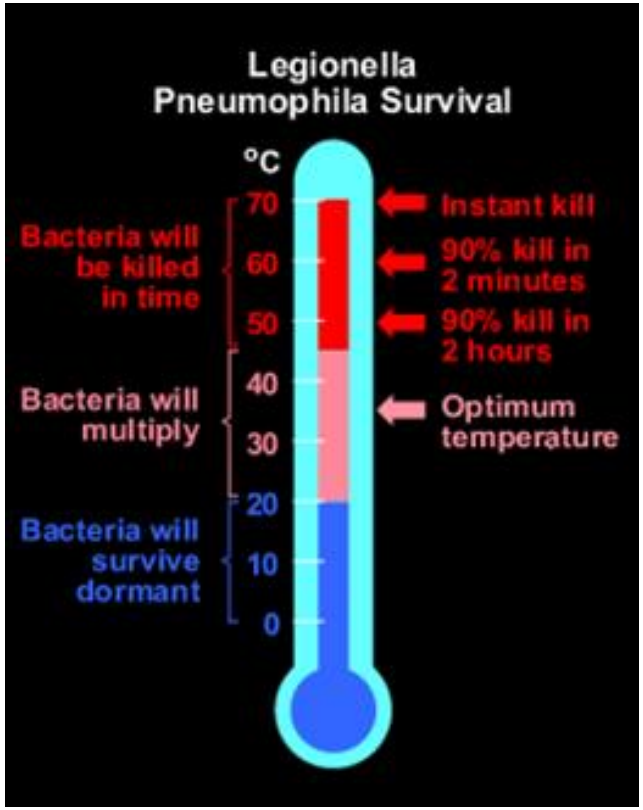
(Bartlett 1986)

Legionella: Legionellosis

Factors that are required for Legionella growth:

- Temperature between 20^{0}C and 45^{0}C is ideal for growth
- Nutrients: Legionella requires specific nutrients, including iron and L-cysteine
- Hospitable environment – sludge, rust, bio-films
- Oxygen, as Legionella is an aerobic bacteria

Legionella: Legionellosis



Legionella reaction temperatures

- > 70°C to kill amoeba
- 71.7°C for 15s causes 100% kill
- 70°C causes 100% kill in 10 mins
- 61.7°C for 30 min gives 100% kill
- 60°C for 2 min gives 90% kill
- 55°C for 27 min gives 90% kill
- 50°C for 2 hours causes 90% kill
- <20°C Legionella low activity

What Do We Do?

What Do We Do?

- The Health and Safety Executive considers Legionnaires' disease to be 'preventable' so requires all involved to have formal training (L8 paragraph 50-51)
- If you fail to take appropriate and adequate precautions you are highly likely to be breaking the law

What Do We Do?

Whatever the property is, whether a food factory, heavy industry plant, leisure facility, hospital, office block - we need to ask a number of questions:

- Can Legionella organisms enter the water system?
- Are there systems on the site that use/contain water?
- Would conditions allow bacteria to multiply in the water?
- Do these systems potentially create an aerosol?
- Could susceptible people be exposed to this aerosol and breathe in the droplets?

This is known as the **Causal Chain**

What Do We Do?

- We cannot generalise about a property
- We must ask the appropriate questions
- Keep systems clean, at the appropriate temperature and moving
- Follow the legislation and guidance

Legislation and Guidance

Corporate Manslaughter and Homicide Bill became law 2008

- The act is in addition to Health and Safety law
- Allows easier prosecution following a fatality
- Fines up to 10% of gross turnover
- Publicity order to name and shame company

Legislation and Guidance

What documentation is there?

Legislation:

- “Legionnaires’ Disease. The control of legionella bacteria in water systems” commonly called “L8” (Fourth Edition)
- COSHH
- Health & Safety at Work Act 1974
- Notification of cooling towers regulations 1992
- Corporate Manslaughter

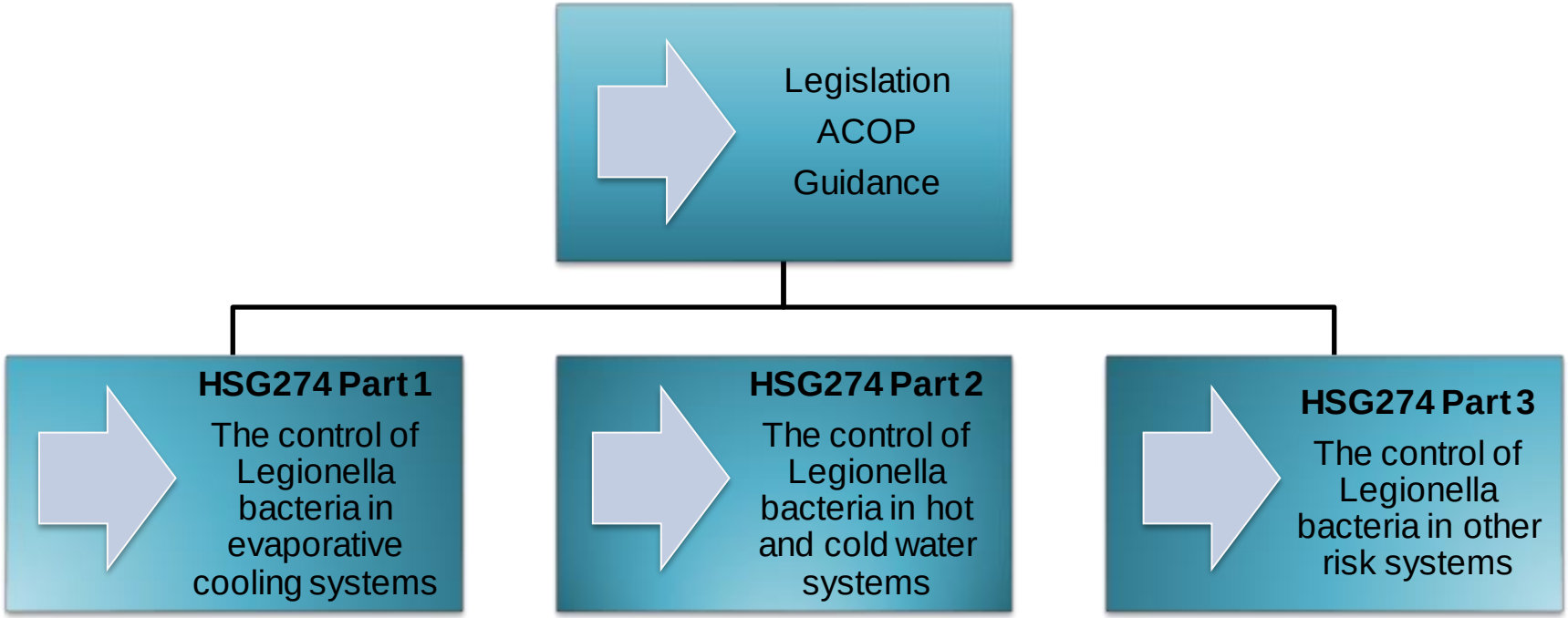
Legislation and Guidance

What documentation is there?

Guidance:

- HSG274 Parts 1, 2 & 3
- HTM0401
- HTM0105
- BS8580
- BS7592
- Industry bodies such as LCA, WMS

Legislation and Guidance



Hot and Cold Water Systems

Legionella sampling:
Do you need it?

Hot and Cold Water Systems

L8/HSG 274 does NOT require Legionella Sampling

Unless:

- There is doubt about the efficacy of the control regime or it is known that recommended temperatures, disinfectant concentrations or other precautions are not being consistently achieved throughout the system.
- Water systems treated with biocides where water is stored or distribution temperatures are reduced. Water systems where control levels of treatment regime not being consistently achieved. Once system brought under control by monitoring, frequency of testing should be reviewed.
- High-risk areas or where there is population with increased susceptibility.
- Water systems suspected or identified in a case or outbreak of *Legionellosis* where it is probable the Incident Control Team will take samples for analysis.

Hot and Cold Water Systems

What have we seen?

The next series of slides demonstrate potential problem areas that we have seen, many of which can lead to Legionella colonisation.

Hot and Cold Water Systems

Problem areas

- Heavily corroded steel cistern
- Toilet brush at the bottom

Hot and Cold Water Systems

Problem areas

- Heavily sediment
- Debris at base of cistern

Hot and Cold Water Systems

Problem areas

- Heavily corroded steel cistern
- Heavy stagnation

Hot and Cold Water Systems

Problem areas

- Heavily corroded steel cistern
- Dead birds

Hot and Cold Water Systems

Problem areas

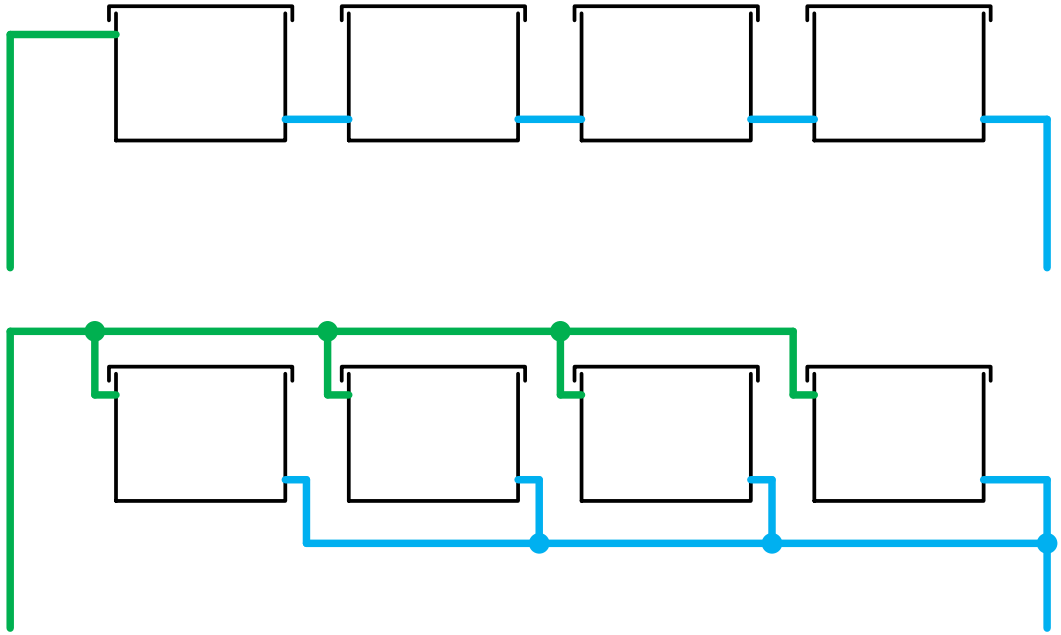
Hot and Cold Water Systems

Problem areas

- Parallel connection
- Open vents
- Uninsulated

Hot and Cold Water Systems

Problem areas

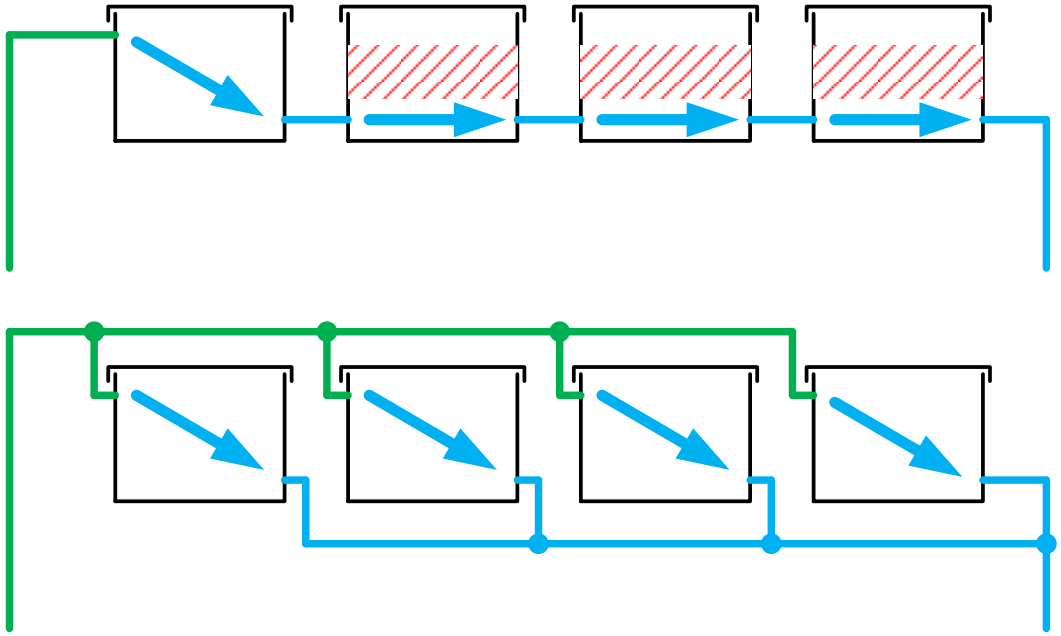


- Series

- Parallel

Hot and Cold Water Systems

Problem areas



- Series: can cause stagnation
- Parallel: must be balanced correctly

Hot and Cold Water Systems

Problem areas

- Corroded system
- Discoloured water

Hot and Cold Water Systems

Problem areas

- Corroded system
- Discoloured water

Hot and Cold Water Systems

Problem areas

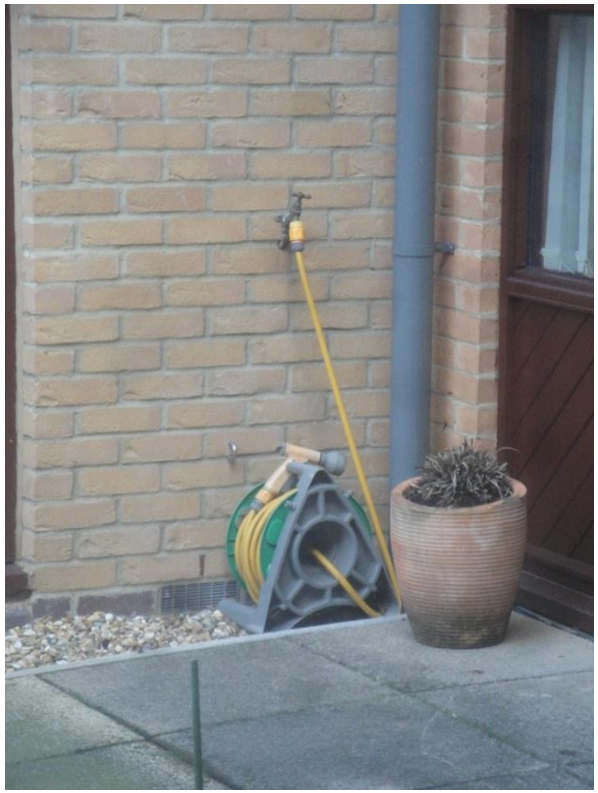
- Corroded system
- Discoloured water
- Flushing is VITAL

Hot and Cold Water Systems

Problem areas

- Little used outlet
- Shower being used as a coat-hanger

Hot and Cold Water Systems



Problem areas

- Garden hose left connected while not in use

Hot and Cold Water Systems

Problem areas

- Shower being able to reach the bidet
- Mixing fluid categories

Hot and Cold Water Systems

Problem areas

Dead-end:

Not only was this a dead-end for cold water, but those wires were live!

Hot and Cold Water Systems

Problem areas

Dead-ends:

Caused by removed sinks or wash hand basins or other redundant systems.

Hot and Cold Water Systems

Problem areas

- Expansion vessels
- Potential stagnant water

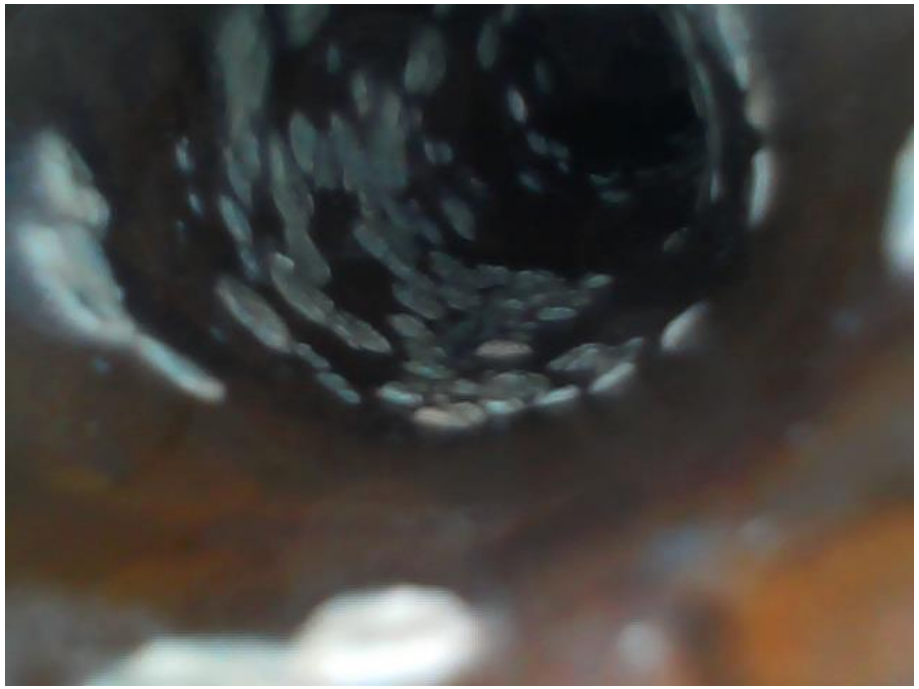
Hot and Cold Water Systems

Problem areas

Heavy scale:

Provides a safe harbour and hiding place for the Legionella bacteria.

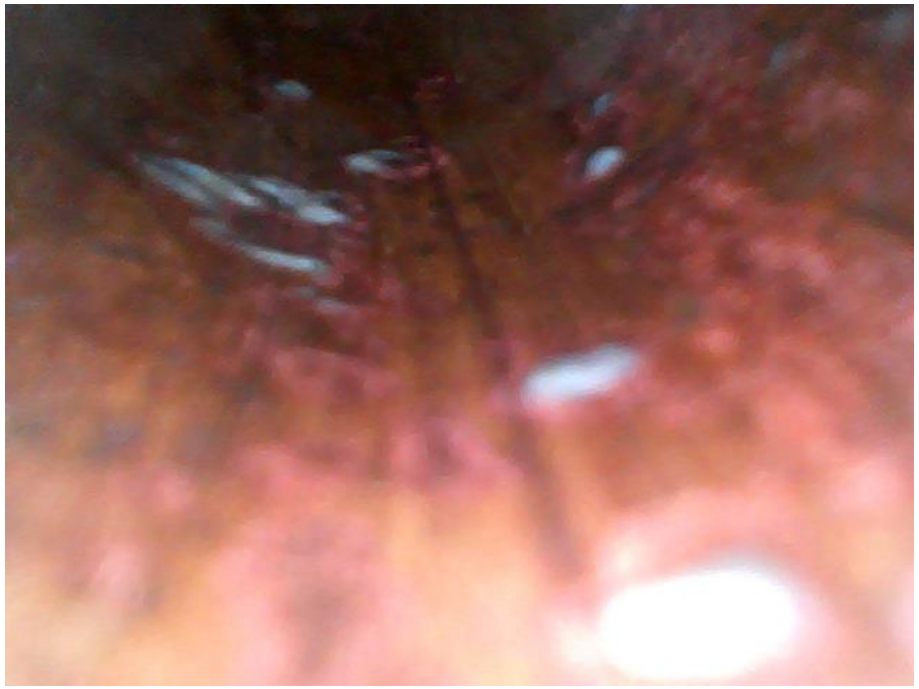
Hot and Cold Water Systems



Problem areas

Scale building up on the inside of pipework just as much as the outside.

Hot and Cold Water Systems



Problem areas

Scouring on the inside of a ‘swan-neck’ style mixer tap.

Hot and Cold Water Systems

Problem areas

Heavy scale:

Generally forgotten showers, kitchen washers.

Hot and Cold Water Systems

Problem areas

Sensor taps:

If not cleaned carefully can harbour Legionella bacteria due to increased complexity and have been implicated on outbreaks.

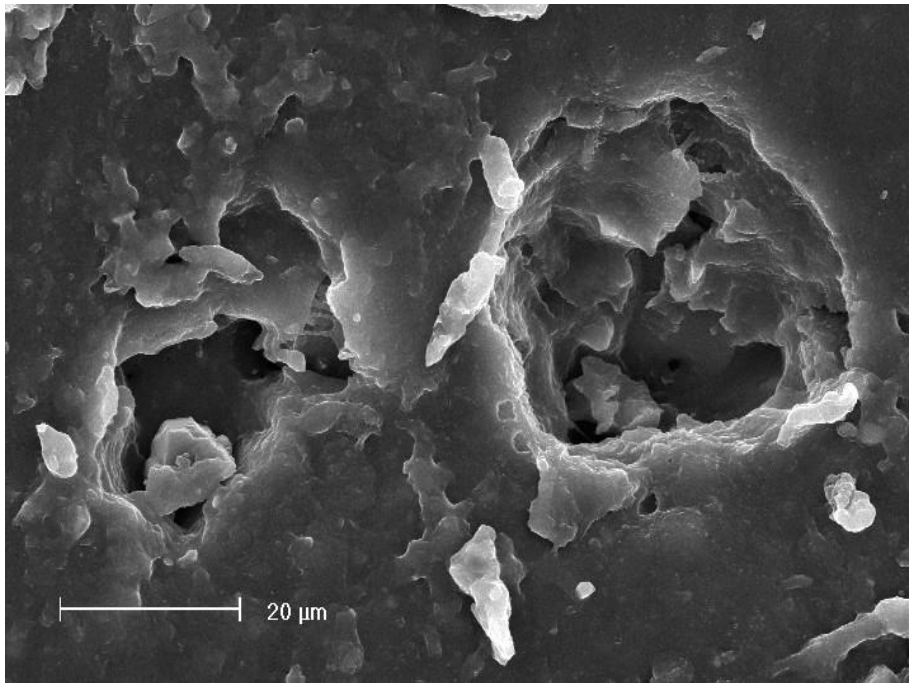
Hot and Cold Water Systems

Problem areas

Flexible hoses:

If their construction material is EPDM then there is an increased risk of bacterial growth.

Hot and Cold Water Systems



Problem areas

Flexible hoses:

The surface of the EPDM flexible hose shows large areas for bacteria to hide and proliferate

Hot and Cold Water Systems

Problem areas

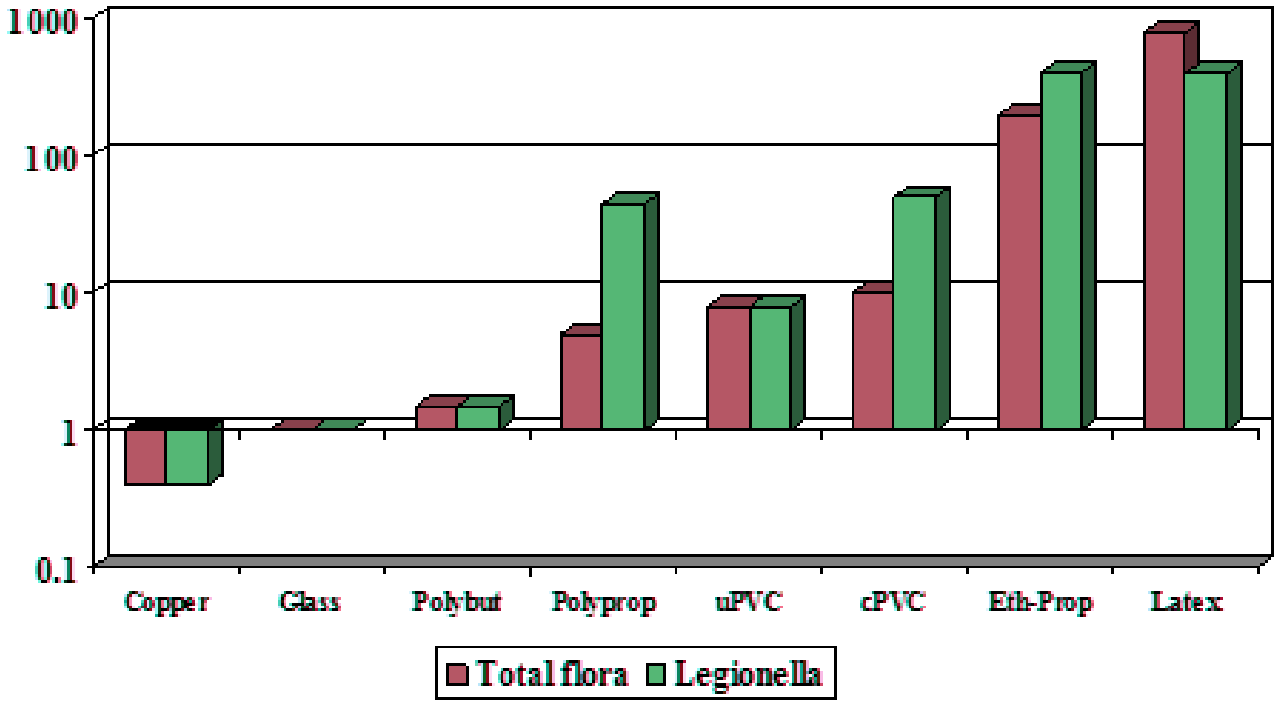


Chart to show growth rates compared to glass

Legionella:
Other Risk Systems

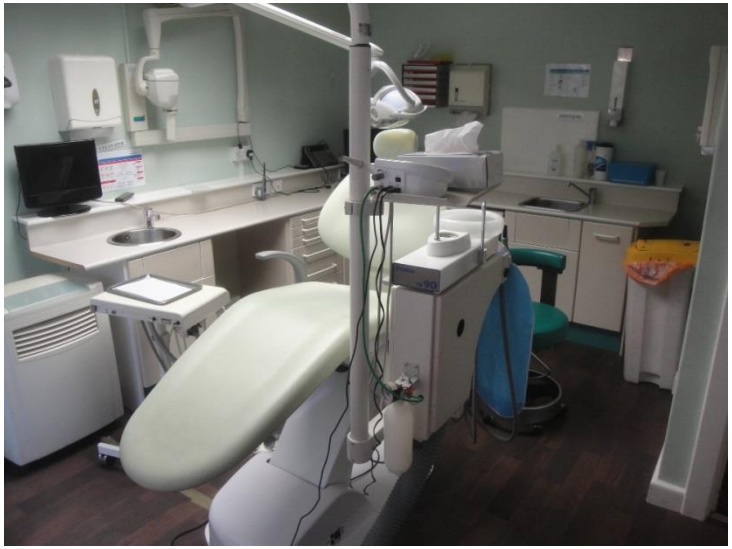
Other Risk Systems

An example list of systems (there are many more!):

- Misting devices for food
- Spray humidifiers
- Air washers, wet scrubbers, particle, trivial gas scrubbers
- Water softeners
- Emergency showers, eyebaths, facewash fountains
- Sprinkler & hose reel systems
- Spa pools
- Whirlpool baths
- Horticultural misting systems
- Vehicle washers
- Powered dental equipment
- Fountains & water features
- Non-disposable nebulisers used for respiratory therapy
- Industrial effluent treatment plants
- Irrigation systems
- Fire, dust & odour suppression systems
- Paint spray preparation equipment
- Tunnel pasteurisers

Other Risk Systems

Dental drills use water to operate



Other Risk Systems

Jet wash spraying for cleaning equipment

Other Risk Systems

Water features

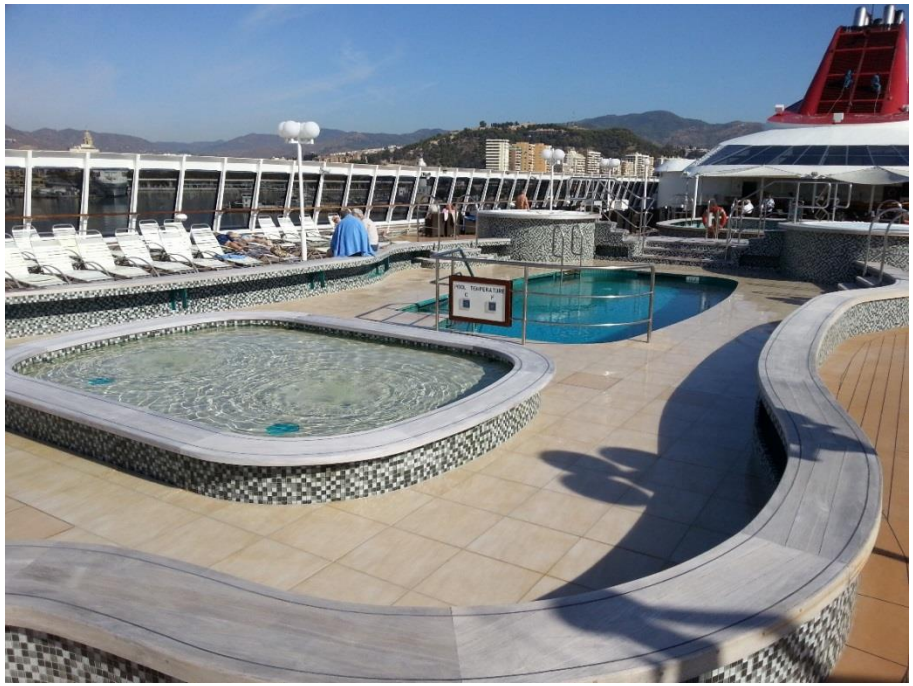
Other Risk Systems

Fire hose testing

Other Risk Systems

Misting fans

Other Risk Systems



- Swimming pool
- Whirlpool bath

Other Risk Systems

4 August 2012 | Health

Hot tubs are known to be effective mechanisms for spreading legionella infection, an official at the Health Protection Agency said this week.

Hot tubs should be cleaned and disinfected regularly to prevent the spread of infections

That statement followed the death of one person from Legionnaires' disease and 18 further cases in Stoke-on-Trent since 24 July.

A hot tub displayed in a store in the town is thought to be the "probable" source after samples from it were found to match those taken from the patients.

Hot tubs or spa pools are popular in gyms, hotels and increasingly in people's back gardens - but experts say they can be a health risk if they are not looked after.

The water in hot tubs is kept at between 30 and 35 degrees, close to body temperature, which is the ideal environment for legionella bacteria to grow.

The bubbling and frothing of the aerosols in a hot tub can then throw the bacteria into the air for several yards around the tub.

So you don't have to be sitting in the hot tub to inhale the bacteria.

* BBC Website

Spa baths

Other Risk Systems

Spa baths

- Complex pipework
- Natural dead-legs
- Flexible / corrugated pipework

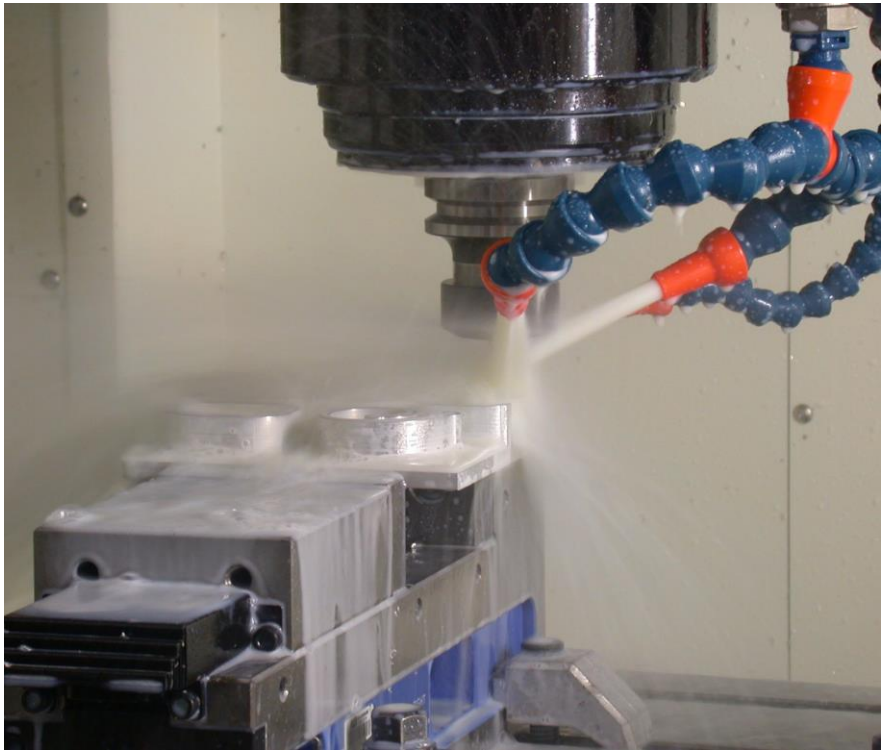
Other Risk Systems

Football field sprinklers

Other Risk Systems

Vehicle wash systems

Other Risk Systems



Water base lubrication for lathes and other cutting machines

Other Risk Systems

Windscreen
washer bottles

Other Risk Systems

19 June 2011 Last updated at 11:05

Lincolnshire lorry driver Adrian Denniss is still recovering after contracting Legionnaires' disease while working in France.

Mr Denniss, from Boston, was diagnosed after a chance visit to hospital following a minor road accident.

It is believed that he was infected by droplets from his lorry's contaminated windscreen water bottle which had blown through an open window in to his cab.

Edmund King, president of the AA, said: "About 350 cases of Legionnaires' disease are reported in the UK each year and around 20% of those can be put down to stagnant water in washer bottles."

He added that people should use a suitable additive in their washer bottles to prevent the spread of the bacteria.

It does happen!

Thank you.