Understanding Legionella

In addition to the information below we have a power point presentation on Legionnaires' Disease, for further information please email: lizzie@legionnairesdisease.com

What is Legionnaires' Disease?

Legionnaires' disease, or legionellosis, is a potentially fatal form of lung infection (pneumonia) caused by the bacterium Legionella pneumophila. The disease was first identified in 1976 when a group of American Legionnaires contracted it at a convention in Philadelphia during which 34 of 221 persons died, the previously unrecognised bacterium was isolated from lung tissue samples. It has since been proved that the disease existed long before this discovery date, with the earliest isolation from preserved matter being dated back to 1947.

Where does Legionella bacteria occur?

Legionella pneumophila belongs to the Legionellaceae family which now includes 48 species and over 70 serogroups of which it is believed that half are susceptible to humans. Legionella organisms are residents of the aquatic environment with rare cases being recorded from soil.

Systems identified as sources of risk include:

- Cooling water systems
- Hot and cold water services
- Humidifiers, foggers, air washers & wet scrubbers
- Water softeners
- Emergency showers, eye wash sprays
- Sprinkler & hose reel systems
- Lathe & machine tool coolants
- Spa baths
- Horticultural misting systems
- Dental equipment
- Car washes and lorry tyre washes
- Indoor fountains & water features
- Vehicle screen washers

Other plant and systems containing water which is likely to exceed 20°C and which could release a spray or aerosol during operation or maintenance.

Under what conditions does Legionella bacteria grow?

Water systems may occasionally be contaminated with Legionella Bacteria which can enter the system in small numbers from the cold mains supply or any other water source. Under normal circumstances this low bacteria number may present very little risk, however the bacteria will grow and multiply in water systems and distribution pipe work where there are increased temperatures, appropriate nutrients and slow moving or stagnant water.

Good design and correct operation of a water system will keep the risk at a minimum, poor housekeeping and infrequent use of systems present Legionella Bacteria with the opportunity to proliferate.

Temperature

Water temperatures within the 20°C to 45°C range favour growth of Legionella Bacteria. The organisms do not multiply below 20°C and will not survive if exposed to temperatures in excess of 60°C. They will however remain dormant in temperatures lower than 20°C and proliferate in the event of a temperature rise. It has been discovered that bacteria held at the optimum temperature of 37°C will have greater virulence ability than those held at temperatures below 25°C.

ACKW House, Unit 3 East Street, Leek, Staffordshire Moorlands. ST13 6LF

Tel: 01335 347058

Understanding Legionella

Nutrients

As with any living organism Legionella Bacteria require a source of nutrients if they are to have the ability to proliferate. Some nutrients which Legionella Bacteria may find present and use to proliferate within a water system are:

- Rust
- Scale
- Sediment
- Slime
- Algae
- Other Bacteria
- Biofilms

Slow Moving or Stagnant Water

The presence of slow moving or stagnant water allows legionella bacteria the time it requires to grow and multiply, it will also provide areas within a water system where nutrients are allowed to build up. Some areas within a water system where slow moving or stagnant water can occur are:

- Cold Water Storage Cisterns
- Storage Calorifiers
- Little used outlet pipe work
- Redundant pipe work and dead ends
- Oversized pipe work

How is Legionnaires' Disease contracted?

The disease is usually contracted by breathing in infected water droplets, but highly susceptible individuals can also contract it by inhaling contaminated droplets while drinking water.

How many people contract Legionnaires' Disease each year?

The most up to date statistics can be seen on the Health Protection Agency site at www.hpa.org.uk. In the UK there are normally around 400 reported cases of legionnaires disease each year. This figure will not represent actual cases after factors such as mis-diagnosis are taken into account. It is also probable that some people contract the disease and recover naturally from it without ever knowing they had been infected. Legionnaires Disease will attack around 2 - 5% of people who are exposed to the bacteria in aerosol form, in areas where there are concentrations of highly susceptible people present then this figure will be significantly higher.

What are the symptoms of Legionnaires Disease?

Legionnaires disease typically incubates over a period of two to ten days. Initial symptoms are likely to include high fever with temperatures often greater than 39.5°C (103°F), chills, headaches and muscle pain. A dry cough may also appear and more often than not the patient will have difficulty breathing. In about one third of cases the patients will develop diarrhoea or vomiting and half will become confused or delirious. It is quite common for exposed people to avoid showing full blown symptoms and many will only get a mild flu-like infection. The disease is not however contagious.

How is Legionnaires' Disease treated?

The goal of treatment is to eliminate the legionella bacterium with antibiotics. Treatment is started as soon as Legionnaires' Disease is suspected. Because the bacteria are intracellular, antibiotics that can

ACKW House, Unit 3 East Street, Leek, Staffordshire Moorlands. ST13 6LF

Tel: 01335 347058

Understanding Legionella

penetrate infected cells must be chosen. Erythromycin is the most widely used, however, combinations of Erythromycin and Rifampin are often just as effective.

How does Legionella bacteria avoid the immune system?

Legionella rely on the aspiration (choking) to enter the respiratory tract. They escape the gag reflex, along with other foreign particles and are then able to reach the lung where they can infect. The bodies natural defence against these bacterium and other foreign bodies is to have a series of microscopic hairs lining the windpipe which work in motion to carry the unwanted body back to the mouth with the aid of lubricating mucus. Once in the mouth the foreign body mucus mix is then swallowed and lost in the digestive system.

Who can catch Legionnaires Disease?

The effectiveness of Cilia in ill, the elderly, heavy drinkers, smokers and people receiving medical treatment (e.g. chemotherapy) is dramatically reduced and they are therefore more susceptible to the disease due to the significantly lower number of legionellae required to cause an infection. Young, healthy people can still catch it however and there have even been cases of healthy children catching it. These susceptibility criteria not only affect the chances of catching the disease but also the probability of the disease being fatal if it is contracted.

What is the mortality rate?

The overall average death rate after infection is 12%, a mortality rate of over 50% has been reported however in certain outbreaks. Those that survive the disease, and have been discharged from hospital, have reported negative post infectual symptoms such as joint pain or muscle weakness that can last for up to 17 months after the infection was first diagnosed.

What are the implications for water systems?

If the conditions anywhere within a water system are favourable for the bacteria to multiply they will, dramatically increasing the chances of someone becoming infected. It is therefore essential that all water systems are maintained to a non-favourable condition for legionella. Favourable conditions for legionella include stagnant water, a suitable temperature, sediment to adhere to, and symbiotic microorganisms for growth.

ACKW House, Unit 3 East Street, Leek, Staffordshire Moorlands. ST13 6LF

Tel: 01335 347058