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Legionnaires' disease

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Introduction

Legionnaires' disease is an uncommon type of pneumonia caused by bacteria of the genus *Legionella* [1]. There are more than 40 species of *Legionella*, with *L. pneumophila* most commonly associated with Legionnaires' disease. Of the 16 serogroups of *L. pneumophila*, serogroup 1 is responsible for most cases.

The term "Legionnaires' disease" was used to describe an outbreak of pneumonia that occurred during an American Legion convention in Philadelphia, USA in 1976. The bacteria identified from this outbreak were subsequently named *Legionella pneumophila*.

Epidemiology

Global epidemiology

Legionnaires' disease occurs sporadically worldwide, but is mainly reported from industrialised countries. Information about Legionnaires' disease is not collected on a global scale, but by individual countries, and centrally within Europe. Clusters and outbreaks usually result from failures in control and prevention measures. Approximately 30% to 40% of cases reported in England and Wales are related to foreign travel.

In 2006, 2,834 cases of Legionnaires' disease were reported in the USA. There has been a sustained rise in the incidence of legionellosis in the USA since 2001. It is not clear if this is due to greater use of diagnostic testing and improved reporting or is a reflection of a true increase in transmission [2].

In 2006, 6,280 cases of Legionnaires' disease were reported from 35 countries in Europe [3]. The highest incidence was reported in Spain (30 cases per million population) followed by The Netherlands (27 per million) and Denmark (23 per million) [3]. The total number of cases may be underestimated, due to under-reporting or diagnostic errors.



In 2005, 755 cases of travel-associated Legionnaires' disease were reported by 20 European countries, to the European Working Group for Legionella Infections ([EWGLINET](#)) [4].

Legionnaires' disease in travellers from England and Wales.

Between 1996 and 2006 41% of Legionnaires' disease cases reported in residents of England and Wales were associated with travel abroad. In 2006, there were 160 cases associated with travel abroad and, amongst these cases, 21 deaths were reported, 16 men and five women [5]. All deaths were in persons aged 40 years or older [5].

In 2007, 165 (37.4%) of the reported cases of Legionnaires' disease in residents of England and Wales were associated with travel abroad [6].

Risk for travellers

The major risk to travellers is through exposure to contaminated air conditioning systems, cooling towers, and showers in hotels, camp sites, and cruise ships. In July 2007, a small outbreak of *L. pneumophila* occurred in elderly passengers on a Baltic cruise. Low levels of the bacteria were detected in the showers of two of these passengers and also in other parts of the ship [7].

Intermittent use of holiday accommodation, variations in temperature and seasonal fluctuations in water flow can increase the risk of exposure [8]. Outbreaks have also been traced to inadequately treated whirlpools, hot tubs and spas. Correct maintenance of hot and cold water systems is critical to the control and prevention of infection with *Legionella*.

Older age groups are more susceptible to Legionnaires' disease and men tend to be affected more than women [8]. Cancer, chronic lung disease, diabetes, hepatic or renal failure, immunosuppression and smoking all increase risk [9].

Transmission

Legionella bacteria are widely distributed in the environment. They are found in natural water sources such as rivers, lakes, and reservoirs and purpose built hot and cold water systems, air conditioning units and spa pools [10]. The bacteria can survive in a wide variety of ecological conditions and lie dormant in cool water, only multiplying when the water achieves a suitable temperature.

Temperatures between 20°C and 40°C provide optimum conditions to promote growth. Naturally occurring *Legionella* can colonise manufactured water systems. The presence of scale, sediment and sludge, together with bio-films, is believed to promote favourable growth conditions [11].

In order to be a hazard to human health, *Legionella* need to be present in the environmental source in sufficient numbers and to be pathogenic, as some strains are less pathogenic. Bacteria are transmitted in air via contaminated water sources that have become aerosolised. Infection is normally contracted by inhaling bacteria in tiny drops of water or droplet nuclei, for example via showers or air conditioning units [11]. Person to person transmission is not thought to occur [1, 11].



Signs and symptoms

The average incubation period for Legionnaires' disease is between two and ten days, although in rare cases symptoms may take longer to appear. Illness begins acutely with fever, muscle aches, headache, a dry cough and shortness of breath, leading on to pneumonia. Diarrhoea, vomiting, confusion and delirium can also be present.

Most patients will improve with support and antibiotics; however, severe illness resulting in respiratory or systemic failure and shock can develop, especially in the elderly and those with pre-existing lung disease or chronic illnesses. The mortality rate in otherwise healthy persons is 10% to 15%.

A non-pneumonic clinical syndrome, known as Pontiac fever, is also associated with *Legionella* bacteria. Generally a mild, flu-like illness, with a shorter incubation period, Pontiac fever has been caused by *L. pneumophila*, *L. feeleii*, *L. micdadei* and *L. anisa*. Reported outbreaks have been associated with inhalation of *Legionella* found in spa pools.

Treatment

It is difficult to differentiate Legionnaires' disease from other types of pneumonia based on clinical grounds. Therefore, there should be a high index of clinical suspicion, so that appropriate treatment can be initiated. The definitive diagnosis must be made by detection or culture of the organism in sputum, finding antigen in the urine, or detecting specific antibodies in the blood. The urinary antigen detection method will confirm infection during the acute phase of the illness and is a rapid diagnostic test.

All positive results should be confirmed by the [Respiratory and Systemic Infection Laboratory](#) at the Health Protection Agency, Centre for Infections. Personnel at the laboratory will discuss clinical and diagnostic issues and can be contacted via 020 8200 4400 for specific advice.

Treatment should be initiated with erythromycin, azithromycin or a fluoroquinolone antibiotic. Rifampicin may be added in severe illness.

Prevention

In Europe, there are guidelines in place for ensuring that water systems in hotels, holiday accommodation and on cruise ships, are regularly checked, cleaned and conform to accepted standards. The guidelines can be downloaded from: <http://www.ewgli.org/index.htm> [12].

Those at increased risk of infection, such as the elderly or immunocompromised, should avoid high risk activities such as the use of jacuzzis and whirlpool spas [13].

Travellers should be aware of the risk, be advised about the mode of transmission and seek medical advice if they develop a pneumonia-type illness suggestive of Legionnaires' disease. There is no vaccine against infection with *Legionella spp.* and antibiotic prophylaxis is not effective [13].



References

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Reading List

Marrie T J, Hoffman P. Legionellosis. In: Guerrant RL, Walker DH, Weller PF, eds. Tropical Infectious Diseases. Principles, Pathogens & Practice. 2nd ed. Elsevier, Philadelphia. 2006:374-80.



Links

Health Protection Agency http://www.hpa.org.uk/infections/topics_az/legionella/menu.htm

European Working Group for Legionella Infections
<http://www.ewgli.org/>