

APPENDIX 1

Legionellae, Potting Soils and Compost Facilities

Legionellae and Health

Legionella is a gram-negative bacterium that may cause a range of diseases known collectively as legionellosis, ranging from mild febrile disease (Pontiac fever) to a potentially fatal pneumonia (Legionnaires' disease). Illness occurs after inhalation of contaminated aerosols. Legionellae bacteria are common in many environments. The principal reservoir of these micro-organisms is water. The origin of the infection is often unidentified.

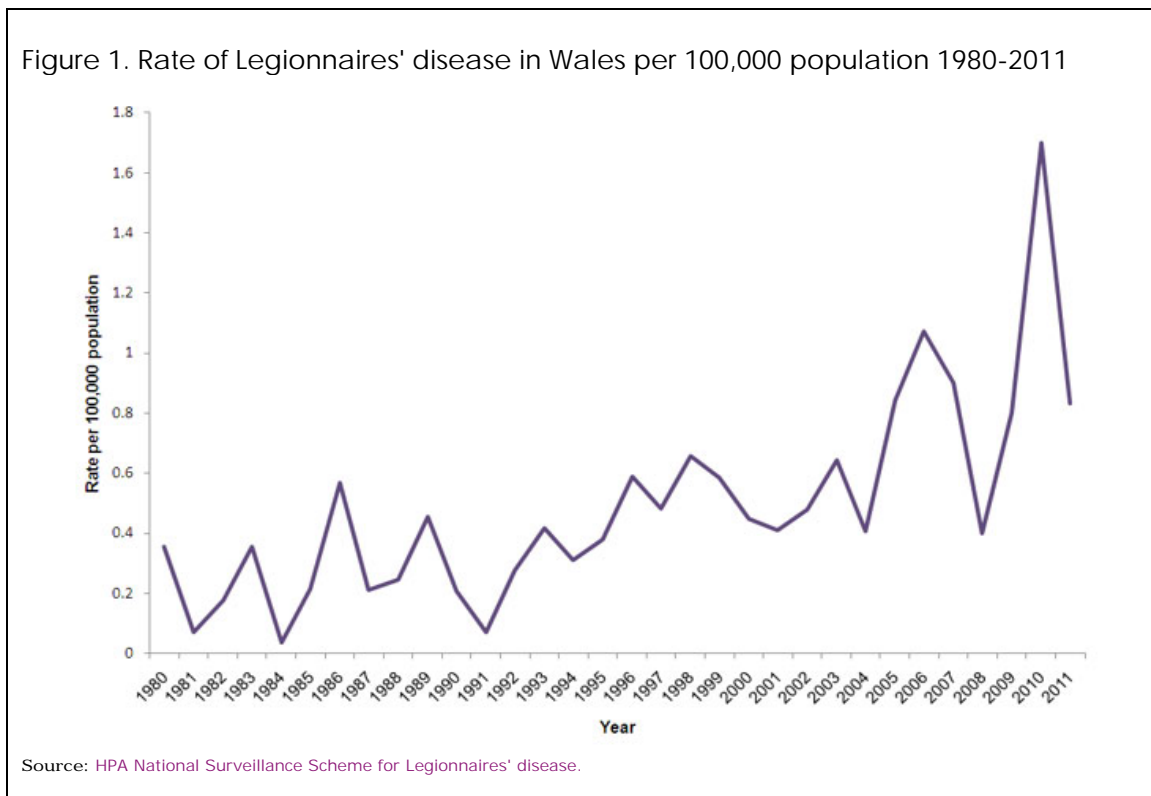
The vast majority of reported cases are infected with *L. pneumophila* by inhalation of aerosols containing the bacteria. However, in some instances cases are infected by other Legionella species including *L. longbeachae*.

Illnesses related to exposure cannot be passed from person to person but is only acquired through direct inhalation of viable cells from the environment.

Occurrence

Cases have been reported from all industrialised countries and are increasing in most countries on an annual basis. The disease is also more common in the summer months.

Between 230 and 370 cases have been reported in England and Wales in the last four of years. However, over one third of these cases were infected outside of England and Wales as a result of travel to another country. In Wales during 2011, there were 25 cases of Legionnaires' disease confirmed (Fig 1.). 100% of cases reported were *L. pneumophila*.



Sources

The most common sources of Legionellae and disease outbreaks are cooling towers (used in industrial cooling water systems), domestic hot water systems, and spas. Additional sources include large central air conditioning systems, fountains, domestic cold water, swimming pools and similar disseminators that draw upon a public water supply. Whilst hot water systems or cooling towers are considered to be the main source of infection, these cannot always be identified.

Alternative ecosystems that could act as a reservoir for Legionella spp. have been investigated more recently to identify unconventional substrates producing contaminated bioaerosols yet few data exist on the presence of Legionella bacteria outside the aquatic environment.

Limited information is available about the distances that these bacteria can travel from source. It is plausible to assume that, as is considered the case for bioaerosols, numbers typically return to background by 250m from source.¹

Legionellae links with potting compost use

In a soil survey performed in 1989 to 1990 in Australia, 33 of 45 (75%) of potting soil samples tested positive for Legionella; 26 (79%) of these contained *L. longbeachae*.²

¹ Taha MPM, Drew GH, Tamer A, Hewings G, Jordinson G, Longhurst PJ, Pollard SJT (2007). Improving bioaerosol exposure assessments – comparative modelling of emissions from different compost ages and activities. *Atmospheric Environment*; 41(21): pp. 4504-4519.

In a case-control study performed in Australia investigating if *L. longbeachae* infection was associated with recent handling of commercial potting mix, an increased risk of illness was observed (OR 4.74, 95% CI 1.65-13.55, P=0.004) in bivariate analysis only.³ However, better predictors of illness in multivariate analysis included poor hand-washing practices after gardening, long-term smoking and being near dripping hanging flower pots. Awareness of a possible health risk with potting mix protected against illness.

In Japan, the distribution of *L. longbeachae* and *Legionella* spp. in potting soils has also been examined. In one study, a total of 46 strains of Legionellae were isolated from 22 of the 24 samples (13 composted wood products, 11 potting mixes). *L. longbeachae* was isolated from 9 samples but Legionellae were not isolated from peatmoss samples.⁴

In Scotland, four cases of legionellosis caused by *L. longbeachae* were reported between 2008 and 2010.⁵ All case patients had exposure to commercially manufactured growing media or potting soils, commonly known as multipurpose compost (MPC), in greenhouse conditions, prior to disease onset.

In Australia and New Zealand, labels on potting soils advise to minimise risk, avoid stirring up dust, avoid inhaling dust, dampen the soil/compost before use, wear a dust mask that fits tightly over nose and mouth.

A recent Scottish paper suggests that these recommendations may now also be valid in Europe but there is some debate about this due to potting soils in Europe being made from different products.⁶ In Australia, potting soils tend to consist of composted waste products such as sawdust and hammer milled bark while in Europe peat moss is a major component. It should be noted, however that some studies from Switzerland have shown that *Legionella* spp. could also be present in potting soils containing peat moss.⁷

Legionellae links with compost facilities

One study carried out in Switzerland considered eight green waste collection sites including three composting facilities.⁸ *L. pneumophila*, *L. bozemanii*, *L. cinclinatiensis*, *L. jamestowniensis*, *L. micdadei* and *L. oakridgensis* were isolated from samples taken at six of the eight sites. The authors concluded that compost facilities appear to comprise reservoirs of Legionellae and recommended that

² Steele TW, Moore CV, Sangster N (1990). Distribution of *Legionella longbeachae* serogroup 1 and other *Legionella* in potting soils in Australia. *Appl Environ Microbiol*; 56(10): pp. 2984-8

³ O'Connor BA, Carman J, Eckert K, Tucker G, Givney R, Cameron S (2007). Does using potting mix make you sick? Results from a *Legionella longbeachae* case-control study in South Australia. *Epidemiol Infect*; 135: pp. 34-39.

⁴ Koide M, Arakaki N, Suito A (2001). Distribution of *Legionella longbeachae* and other legionellae in Japanese potting soils. *J Infect Chemother*; 7: pp. 224-227.

⁵ Lindsay DSJ, Brown AW, Brown DJ, Pravinkumar SJ, Anderson, Edwards GFS (2012). *Legionella longbeachae* serogroup 1 infections linked to potting compost. *Journal of Medical Microbiology*; 61: pp. 218-222.

⁶ Pravinkumar SJ et al. (2010). A cluster of Legionnaire's disease caused by *Legionella longbeachae* linked to potting compost in Scotland, 2008-2009. *Euro Surveill*; 15(8): pii=19496.

⁷ Casati S, Giora-Martinoni A, Gaia V (2009). Commercial potting soils as an alternative infections source of *Legionella pneumophila* and other *Legionella* species in Switzerland. *Clin Microbiol Infect*; 15(6): pp. 571-5.

⁸ Casati S, Conza L, Bruin J, Gaia V (2010). Compost facilities as a reservoir of *Legionella pneumophila* and other *Legionella* species. *Clin Microbiol Infect*; 16: pp.945-947.

sources of infection other than the aquatic environment have to be considered and other ecosystems such as the composting chain, the soil products derived from them, and commercial potting soils could play an important role in the transmission of Legionellae.

No studies were identified pertaining to the potential for, and/or impact from, exposure to Legionellae amongst people living near industrial composting facilities.

Conclusions

Data on the presence of Legionellae outside the aquatic environment are scarce.

There is evidence to suggest that Legionellae are present in some (mostly non-European) types of potting soil. The true risk to health this represents remains unknown but the associated precautionary advice suggested to minimise any risk applies only to those who directly handle significant quantities of potting soil on a regular basis. Certainly, these precautions do not apply to those living near composting waste management facilities since the exposure scenarios are entirely different.

Uncertainties remain about the source term (release characteristics) of Legionellae at waste management facilities as well as dose-response and dispersion characteristics.