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FREQUENTLY ASKED QUESTIONS ON LEGIONNAIRE'S DISEASE

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1. What is Legionella?

Legionella bacteria are common and can be found naturally in environmental water sources, including rivers, lakes, natural pools and moist soil, but usually in low numbers. High numbers of bacteria may occasionally be found in natural water bodies, but more often occur in inadequately maintained man-made water systems (e.g. channelled water in towns, water systems in individual buildings). Water temperatures in the range of 20°C to 50°C favour the growth of the organism.

2. What types of disease does Legionella cause?

Legionella pneumophila is the most important species of Legionella that causes disease in humans, although other species can occasionally cause disease.

There are 3 main types of disease caused by *Legionella* spp:

- Asymptomatic infection: many people who are infected are asymptomatic and do not develop disease.
- Pontiac fever: a self-limiting flu-like illness
- Legionnaires' disease

3. What is Legionnaires' disease?

Legionnaires' disease is a serious form pneumonia that kills between 10 – 20% of otherwise healthy individuals infected. Symptoms include a flu-like illness, followed by a dry cough and frequently progresses to pneumonia.

Table 1: Main characteristics of Legionnaires' disease and Pontiac fever

Characteristic	Legionnaires' disease	Pontiac fever
Incubation period	2 – 10 days, rarely up to 20 days	5hrs-3days (commonly 24 – 48hrs)
Duration	Weeks	2 – 5 days
Case-fatality rate	Variable depending on susceptibility; in hospitalised patients can reach 40 – 80%	No deaths
Attack rate	0.1 – 5% of the general population 0.4 – 14% in hospitals	Up to 95%
Symptoms	• Often non-specific • Loss of strength • High fever • Headache • Non-productive, dry cough • Sometimes expectoration of blood-streaked sputum • Chills • Muscle pain (myalgia) • Difficulty breathing, chest pain • Diarrhoea (25 – 50% of cases) • Vomiting, nausea (10 – 30% of cases) • Central nervous system manifestations, such as confusion and delirium (50% of cases)	• Influenza-like illness (moderate to severe symptoms) • Loss of strength, tiredness • High fever and chills • Muscle pain (myalgia) • Headache • Joint pain (arthralgia) • Diarrhoea • Nausea, vomiting (in a small proportion of people) • Difficult breathing (dyspnoea) and dry cough
Clinical features	• Renal failure • Hyponatraemia (serum sodium <131 mmol/litre) • Lactate dehydrogenase levels >700 units/ml • Failure to respond to beta-lactam antibiotics or aminoglycosides • Gram stain of respiratory specimens with numerous neutrophils and no visible organisms • Chest X-ray: changes indistinguishable from other causes of pneumonia	

4. How is Legionnaires' disease transmitted?

People become infected by breathing in air containing the Legionella bacteria in aerosols. Aerosols are tiny droplets generated by spraying or bubbling air through water containing the bacteria. The smaller the droplets, the more dangerous they are since they can reach the lower airways more easily. Human-to-human transmission of Legionella has never been documented.

5. How common is Legionnaires' disease?

Legionnaires' disease is being increasingly recognised worldwide as an important cause of both community acquired and hospital acquired (nosocomial) pneumonia. It may manifest as sporadic cases, small clusters, or even outbreaks of disease that can involve hundreds of cases. It is also an important cause of travel-related illness, and may be acquired on cruise ships, or at hotels and resorts. Both sporadic cases and outbreaks of Legionnaires' disease (including outbreaks in hospitals) have been described in South Africa (SA). However, due to difficulties in diagnosis and lack of awareness of the disease, very few cases are diagnosed in SA at present. It is very likely that sporadic cases, clusters and even outbreaks occur and are missed.

6. What are the potential sources of infection?

Wherever water droplets can be created there is a risk of infection, including:

- Hot and cold water systems (e.g. showers and taps)
- Cooling towers and evaporative condensers of air conditioners (even if situated on the roof or in the ground)
- Spa baths (Jacuzzis) and whirlpool baths and natural pools or thermal springs
- Turkish baths and saunas
- Ornamental fountains (particularly indoors) and sprinklers
- Humidified food display cabinets
- Respiratory therapy equipment

7. Who is most at risk of acquiring the infection?

The risk factors for Legionella infection depend on numerous factors, and different patterns have been observed depending on the category of infection and the water reservoir (Tables 2 and 3).

Table 2: Rift factors for Legionella infection, by category

	Community acquired	Travel associated	Nosocomial
Modes of transmission	Inhalation of contaminated aerosol	Inhalation of contaminated aerosol	Inhalation of contaminated aerosol, aspiration, wound infection
Sources of *Legionella*	Cooling towers; hot and cold-water systems; spa pools, thermal pools, springs; humidifiers; domestic plumbing; potting mixes and compost	Cooling towers; hot and cold-water systems; spa pools, thermal springs and pools; humidifiers	Cooling towers; hot and cold-water systems; spa pools, natural pools, thermal springs; respiratory therapy equipment; medical treatment
Reservoir of *Legionella*	Industrial sites, shopping centres, restaurants, clubs, leisure centres, sports clubs, private residences	Hotels, cruise ships, camp sites, shopping centres, restaurants, clubs, leisure centres, sports clubs	Hospitals, medical equipment
Risk factors (environmental)	Proximity to sources of transmission, poor design or poor maintenance of cooling water systems, inadequate staff training	Stay in accommodation designed for short stays and seasonal use; intermittent room occupancy and water use; intermittent water supply and fluctuating water temperature control; complex water systems; lack of trained staff to manage water systems	Complex water distribution system, long pipe runs, poor water temperature control, low water flow rates
Risk factors (personal)	Age >40 years; male; underlying disease such as diabetes; chronic heart disease; smoking; immunosuppression (especially with corticosteroids and chronic debilitating illness); structural pulmonary comorbidity[a]; chronic renal failure; recent travel; haematological malignancy; iron overload; other immunosuppression	Age >40 years; male; heavy smoking, alcohol abuse; change in lifestyle; underlying disease such as diabetes; chronic heart disease, other immunosuppression	Age >25 years; transplant patient; other immunosuppression; surgery, especially head and neck; cancer, including leukaemias/ lymphomas; diabetes; treatment with respiratory devices; chronic heart/lung disease; smoking, alcohol abuse

[a.] A disease or disorder that is not directly caused by another disorder but occurs at the same time.

Table 3: Risk factors for *Legionella* infection, by reservoir

	Cooling water systems	**Hot and cold-water systems**	**Hot tubs, natural spa pools, thermal springs**	**Humidifiers and respiratory equipment**
Commonly implicated *Legionella* species	*L. pneumophila*	*L. pneumophila* and others	*L. pneumophila* and others	*L. pneumophila* and others
Modes of transmission	Inhalation of aerosol	Inhalation of aerosol, aspiration	Inhalation of aerosol, possible aspiration	Inhalation of aerosol
Disease outbreaks	Rapid onset over wide area, resolve within incubation period	Low numbers of cases over prolonged periods	Rapid onset confined to users and those in close proximity	Low numbers over prolonged periods. Rapid onset confined to users and those in close proximity
Risk factors (environmental)	Proximity of population, seasonal/ Climatic conditions, intermittent use, poor maintenance, poor design	Complex water systems, long pipe runs, poor temperature control, low flow rates/stagnation	Poor maintenance, stagnant areas in system	Use of nonsterile water, poor maintenance/cleaning, operation at temperatures conducive to *Legionella* growth

8. How is Legionella diagnosed?

For Legionnaires' disease a high level of clinical suspicion and prompt initiation of adequate antimicrobial therapy are critical to improve clinical outcomes. Clinicians should suspect Legionnaires' disease in patients with severe pneumonia who fail to respond to beta-lactam antibiotic therapy, or where no other causes/pathogens are identified. Clusters of patients presenting with severe respiratory illness who live in the same geographic area or possibly have other common water-source exposures must be investigated for Legionella infection.

Numerous diagnostic methods have been used for the microbiological diagnosis of Legionella:

I. Culture: Isolation of *Legionella* spp from clinical specimens (respiratory specimens) is the gold standard of diagnosis. However, this requires special processing and technical expertise in the laboratory, and the yield is often poor even when appropriately processed.
II. Serology: Diagnosis by serology (IgM and IgG) is NOT recommended as the clinical utility of serology is limited and the test is mainly useful as an epidemiological tool. A single positive serology result does NOT confirm active Legionella infection.
III. Legionella urinary antigen: This is a rapid test that detects Legionella antigens in urine, and has very good sensitivity and specificity. It is now the most commonly used diagnostic method.
IV. PCR: This molecular method of diagnosis is currently NOT recommended as a first-line diagnostic test as more experience is needed in the clinical use and interpretation of this method.

Currently, Legionella urinary antigen (together with culture of respiratory specimens where possible) is the recommended diagnostic test. This test is offered by the NHLS Infection Control Services Laboratory in Johannesburg, and all specimens submitted to any NHLS lab in the country will be referred there. Private laboratories can also refer specimens to this laboratory. The results are available within a few hours after the laboratory receives the specimen. If respiratory specimens (sputum, tracheal aspirates etc) are taken, the laboratory must be notified to culture specifically for Legionella spp.

Contact details for NHLS Infection Control Services Laboratory:

Tel: (011)489-8579/8580
Physical address: NHLS Infection Control Services Laboratory
Wits Medical School, Level 3, Room 3T09
7 York Road, Parktown
Johannesburg
2193

9. What is the treatment for Legionella infection?

Pontiac fever treatment is symptomatic, and no antimicrobial therapy is recommended. For Legionnaires disease, empiric antimicrobial treatment should be commenced as soon as possible. Empiric antimicrobial therapy must be comprehensive and should cover all likely pathogens in the clinical setting until a diagnosis is made. The recommended antibiotics for treating Legionnaires' disease are azithroymcin, levofloxacin or moxifloxacin (Table 4). No one drug has been shown to be superior to the others.

Table 4: Dosages and duration of therapy for treatment of Legionnaires' disease

Antibiotic	Dosage	Duration of treatment
Azithromycin	500 mg po daily	Usual duration: 7-10 days Severely immunosuppressed patients: 21 days
Levofloxacin	500 – 750 mg po daily	
Moxifloxacin	400 mg po daily	

Severely ill patients may initially require intravenous antibiotics, which can be changed to oral treatment when appropriate (Table 5).

Table 5: Dosages of intravenous therapy for treatment of severely ill patients with Legionnaires' disease

Antibiotic	Intravenous dosage
Azithromycin	500 mg IV daily
Levofloxacin	500 – 750 mg IV daily
Moxifloxacin	400 mg IV daily

10. How can Legionella be prevented?

Man-made water systems need to be monitored for presence of *Legionella* spp, and disinfected and cleaned regularly to discourage the growth of Legionella bacteria. Technical guidelines for the control and prevention of Legionella in water systems are available from the WHO[1] and EWGLI[2] documents referenced below.

11. What is the Public Health Response to Legionella?

Human infection with Legionella spp is a notifiable disease. The relevant department of health authority (Communicable Diseases directorate) needs to be notified immediately, to facilitate prompt investigation of possible environmental source/s. Environmental health practitioners conduct water system risk assessments and perform sampling of water sources.

12. Where can I get more information?

Information in this document has been obtained from the following resources:

- The World Health Organization (WHO): Legionella and the prevention of Legionellosis (2007). Available from: www.who.int/water_sanitation_health/emerging/legionella.pdf
- The European Working Group for Legionella Infection (EWGLI): European Guidelines for Control and Prevention of Travel Associated Legionnaires' disease (2005).). Available from: www.ewgli.org/ewglinet.htm
- Carratalá J, Garcia-Vidal C. An update on Legionella. *Curr Opin Infect Dis*. 2010 Apr;23(2):152-7.

There is a wealth of information about Legionella, prevention and control on the internet. We suggest visiting the following websites as well:

- The Centers for Disease Control and Prevention: www.cdc.gov/legionella/index.htm
- The UK Health Protection Agency: www.hpa.org.uk/HPA/Topics/InfectiousDiseases/InfectionsAZ/1191942128205/

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