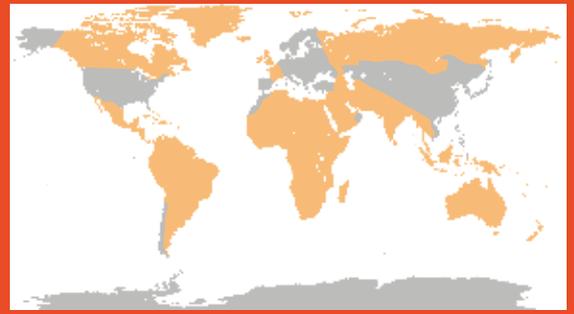


# *Leptospira*

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## Introduction

Leptospirosis is a disease caused by infection with pathogenic Gram-negative obligate aerobic spirochaete bacteria of the *Leptospira* genus. Leptospire are distinctively shaped helically coiled motile bacteria with a complex taxonomy. These bacteria are found worldwide and can cause clinical disease in most mammals, including cattle, horses, sheep and rodents. Dogs, and less commonly cats, can become infected with leptospirosis, which can cause a range of clinical signs. These signs can range from mild and non-specific, to severe, multi-systemic, fulminant disease that can lead to death. Both dogs and cats can also be asymptomatic shedders of this potential zoonosis in the urine, so awareness and control of the disease is important from a public health perspective

## Clinical signs

Clinical manifestations of disease may vary geographically, depending on the serovars circulating, and are determined by the virulence and load of the infecting serovar, environmental factors and the age and immune status of the host. Risk factors for clinical leptospirosis can vary with country, time of year and studies. Dogs that swim in or drink from outdoor water sources and/or hunt wildlife may be at increased risk. Clinical disease has also been associated with heavy rainfall and flooding

The disease presentation may be subacute, acute or peracute. The clinical signs can be non-specific and multi-systemic, and include vomiting, weakness, lethargy, fever, polyuria (PU)/polydipsia (PD) and jaundice. Dyspnoea may be present and in such patients leptospiral pulmonary haemorrhagic syndrome (LPHS) should be considered

Dogs at potential risk of exposure that present with icterus and/or signs of acute kidney disease may be considered as suspected leptospirosis cases until a definitive diagnosis is confirmed

## Diagnosis

A definitive diagnosis of leptospirosis is difficult and culture of the fastidious leptospire from blood, urine or tissue samples is time-consuming, technically demanding and not routinely available. Supportive findings on biochemical tests include:

- Increase in urea and creatinine
- Elevated alanine transaminase (ALT), alkaline phosphatase (ALP), aspartate transaminase (AST) and bilirubin levels
- Electrolyte abnormalities

Common haematological abnormalities include leucocytosis and thrombocytopenia, and both hypo- and hypercoagulable states have been reported. Isosthenuria and hyposthenuria have been described, as have proteinuria, glucosuria and granular casts

For the first 10 days following infection, leptospire are generally found in the blood (it should be noted that this timeframe is variable); after this time, they are intermittently shed in the urine.

- **Microscopic agglutination test (MAT)** – this is the most widely used diagnostic test for acute leptospirosis and can be used to demonstrate prior exposure in asymptomatic dogs. A single MAT cannot reliably differentiate between vaccinated and infected dogs, and samples submitted for testing before seroconversion may return a misleading negative result
- **Molecular testing (polymerase chain reaction, PCR)** – this can be used to detect leptospiral DNA in blood, urine and tissue samples. This test can be used instead of MAT in the acute phase of infection prior to seroconversion. A positive result from urine samples indicates renal shedding and can be used to detect carriers. Quantitative PCR is unaffected by previous leptospirosis vaccination
- **ELISA (in-house test kit)** – this test uses three drops of serum to detect antibodies to the

Lip32 antigen. The test can be used to provide a rapid assessment of leptospiral antibody status to the serovars Grippotyphosa, Canicola, Pomona and Icterohaemorrhagiae. However, the test cannot differentiate between the serovars or between those antibodies produced as a result of natural exposure and those resulting from vaccination. The manufacturers recommend interpreting the test result in line with their diagnostic algorithm considering history, clinical findings and other diagnostic tests

## Treatment and prognosis

Effective treatment is centred on appropriate supportive care in light of the potential multi-systemic manifestations of the disease. Given the potential risk of zoonotic transmission and fulminant disease, the European consensus statement on leptospirosis in dogs and cats (Schuller *et al.*, 2015) recommends early use of appropriate antibiotics in dogs with suspected leptospirosis. Typically, intravenous penicillin G, ampicillin or amoxicillin is administered until the dog can tolerate oral doxycycline, which is used to reduce renal shedding

## Prevention

Vaccination against leptospirosis in dogs is widely available. Although the 2015 WSAVA Guidelines for the vaccination of dogs and cats class leptospirosis as a non-core vaccination worldwide, BSAVA considers that leptospirosis is a core vaccine for dogs in the UK as they are at risk of contact with rodents and potentially contaminated water. Cases have also been identified in urban dogs with no access to wildlife or water sources

Serological and/or antibody titre testing is not appropriate way of determining protection, as the correlation between antibody levels and protection is poor, and because the antibodies do not persist from a long time. Current evidence suggests that post-vaccinal immunity lasts 12 months. It is not known whether natural infection results in life-long immunity

The European consensus statement recommends the use of annual quadrivalent vaccines for all at-risk dogs based on the widespread recognition of leptospirosis in European dogs that have received the bivalent vaccine. Decision-making regarding leptospiral vaccination should take into account the following:

- The availability of evidence of serovars in circulation in the locality
- Knowledge of the local area with regard to weather, flooding and environmental risks
- The lifestyle of the dog and travel plans with respect to the risk of exposure to leptospirosis
- The ability of the vaccine to provide effective coverage against the relevant serogroups and provide protection from clinical disease, renal carriage and urinary shedding
- The public health aspect, particularly with respect to the owner/family situation. Brown and Prescott (2008) state that the 'best protection for the family is to ensure that their dogs are vaccinated annually'

Further methods of reducing access to potential sources of exposure include ensuring dogs avoid drinking from or wading/swimming in fresh or stagnant water sources and marshland, controlling rodent populations and avoiding hunting or access to wildlife

## Public health implications

Leptospirosis is a known zoonosis, but transmission is poorly documented despite the same serovars affecting both dogs and humans. Owners, vets and laboratory personnel may be at greatest risk of zoonotic transmission from dogs. It is thought that pet rat owners may be most at risk of pet-associated leptospirosis as rats are the main reservoir for *Leptospira icterohaemorrhagiae*, the serovar which is most pathogenic to humans

Contact with livestock, wildlife and companion animal urine deposits, as well as with contaminated water or soil, have also been associated with the development of Weil's disease (renal and hepatic failure) in humans

It is important to reduce the risks of exposure, particularly in the young, elderly or immunocompromised by addressing hygiene standards and by educating people at a high risk of exposure

## Additional information

For further information on leptospirosis, see the BSAVA website at [www.bsava.com](http://www.bsava.com)