

Leptospirosis

General introduction

Leptospirosis is a zoonosis of worldwide distribution, endemic mainly in countries with humid subtropical or tropical climates and has epidemic potential. It often peaks seasonally, sometimes in outbreaks, and is often linked to climate changes, to poor urban slum communities, to occupation or to recreational activities. The clinical course in humans ranges from mild to lethal with a broad spectrum of symptoms and clinical signs. Leptospirosis is underreported in many countries because of difficult clinical diagnosis and the lack of diagnostic laboratory services.

Causal agent and main modes of transmission

Causal agent: Pathogenic leptospires belong to the genus *Leptospira* (long corkscrew-shaped bacteria, too thin to be visible under the ordinary microscope); dark-field microscopy is required. The more than 240 pathogenic serovars cannot be differentiated on the basis of morphology.

Main modes of transmission: Feral and domestic animals constitute the reservoir of the agent, transmitted through contact of mucous membranes or (broken) skin with water (swimming or immersion), moist soil or vegetation contaminated with the urine of infected animals; occasional infection occurs through ingestion/inhalation of food/droplet aerosols of fluids contaminated by urine. The incubation usually lasts about 10 days (2 to 30 days).

Clinical description and recommended case definition

Clinical description: The usual presentation is an acute febrile illness with headache, myalgia (particularly calf muscle) and prostration associated with any of the following symptoms/signs:

- Conjunctival suffusion
- Anuria or oliguria
- Jaundice
- Cough, haemoptysis and breathlessness
- Haemorrhages (from the intestines; lung bleeding is notorious in some areas)
- Meningeal irritation
- Cardiac arrhythmia or failure
- Skin rash.

Note. Other common symptoms include nausea, vomiting, abdominal pain, diarrhoea, arthralgia. The clinical diagnosis is difficult where diseases with symptoms similar to those of leptospirosis occur frequently.

Laboratory criteria

Presumptive diagnosis:

- A positive result of a rapid screening test such as IgM ELISA, latex agglutination test, lateral flow, dipstick etc.

Confirmatory diagnosis:

- Isolation from blood or other clinical materials through culture of pathogenic leptospires.
- A positive PCR result using a validated method (primarily for blood and serum in the early stages of infection).
- Fourfold or greater rise in titre or seroconversion in microscopic agglutination test (MAT) on paired samples obtained at least 2 weeks apart. A battery of *Leptospira* reference strains representative of local strains to be used as antigens in MAT.

Case classification (humans)

Suspected: A case that is compatible with the clinical description and a presumptive laboratory diagnosis.

Confirmed: A suspect case with a confirmatory laboratory diagnosis.

Surveillance

Rationale for surveillance

Surveillance provides the basis for intervention strategies in human or veterinary public health.

Recommended types of surveillance

- Immediate case-based reporting of suspected or confirmed cases from peripheral level (hospital/general practitioner/laboratory) to intermediate level. All cases must be investigated since investigation can identify environmental point sources of transmission and lead to control measures.
- Routine reporting of aggregated data of confirmed cases from intermediate to central level. Hospital-based surveillance may give information on severe cases of leptospirosis. Serosurveillance may give information on whether leptospiral infections occur or not in certain areas or populations.
- *International.* The International Leptospirosis Society* collects worldwide data:

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Recommended minimum data elements

Case-based record

- Age, sex, geographical information, occupation
- Clinical symptoms (mortality; severe clinical manifestations of jaundice, acute renal failure or haemorrhage)
- Hospitalization (Y/N)
- Date of onset
- Exposure (animal contact, flooding)
- Microbiological and serological data
- Date of diagnosis.

Aggregated data reporting

- Number of suspect and confirmed cases
- Number of hospitalizations
- Number of deaths
- Number of cases by type (causative serovar/serogroup) of leptospirosis.

Recommended data analyses, presentation, reports

- Number of cases by: age, sex, occupation, area, date of onset, causative serovars/serogroups, (presumptive) infection source, transmission conditions (graphs, tables, maps).
- Frequency distribution of signs and symptoms by case and causative serovar (tables).
- Reports of outbreaks, preventive measures, surveillance of the human population and populations of feral and domestic animals.

Performance indicators for surveillance

- Completeness and timeliness of reporting.
- Proportion of suspect and confirmed cases.
- Number of detected and investigated outbreaks.
- Number of reported cases compared with serosurveillance data.

Control activities

Case management

- Early treatment with antibiotics. Severe cases usually treated with high doses of IV benzylpenicillin (30 mg/kg up to 1.2 g IV 6-hourly for 5-7 days). Less severe cases treated orally with antibiotics such as doxycycline (2 mg/kg up to 100 mg 12-hourly for 5-7 days), tetracycline, ampicillin or amoxicillin.
- Third-generation cephalosporins, such as ceftriaxone and cefotaxime, and quinolone antibiotics may also be effective. Jarisch-Herxheimer reactions may occur after the start of antimicrobial therapy.
- Monitoring and supportive care as appropriate, e.g. dialysis, mechanical ventilation.

Prevention

The large number of serovars and of infection sources and the wide difference in transmission conditions make leptospirosis an unlikely candidate for national eradication. Preventive measures should be based on knowledge of those groups at higher risk of infection and of local epidemiological factors; they include:

- Identifying and controlling the source of infection (e.g. open sewers, contaminated wells).
- Control of feral reservoirs is often not feasible but control measures can be highly effective in small, defined

- animal populations (dogs, certified cattle herds) Selective rodent control may be important.
- Interrupting transmission, thereby preventing infection or disease in the human host:
 - wearing protective clothes and equipment;
 - disinfecting contaminated surfaces such as stable and abattoir floors;
 - marking areas with increased risk exposure (warning signs).
- Preventing infection or disease in human hosts:
 - antibiotic prophylaxis of exposed persons in areas of high exposures may be effective, e.g. soldiers (doxycyclin 200mg in one weekly dose);
 - raising awareness of the disease and its modes of transmission.

Epidemics

Conditions under which epidemics may occur

- Conditions leading to an increase of contaminated surface water or soil, such as rain, floods and disasters increase the risk of leptospirosis and may lead to epidemics. During periods of drought both humans and animal reservoirs may be attracted to spare water places, hence increasing the risk of infection.
- Social and recreational activities that expose persons to a contaminated environment.

Management of epidemics

In a suspected outbreak, attempts to diagnose leptospirosis must be encouraged to enable prompt treatment. For outbreaks in remote or areas with poor access, local use of screening tests to detect antibody is helpful. When an outbreak of leptospirosis is suspected or identified, and if it has been possible to identify the serovar concerned, the source must be identified and appropriate environmental measures implemented, with public information to people at risk (including clinicians and health care workers and health authorities).

Drug-resistance monitoring

No reports of resistance for common antibiotics (see *Case management* above) and no guidelines for monitoring. Testing of antibiotic resistance in individual clinical cases is not useful since it requires considerable time.

Performance indicators for control activities

- Number of new cases per 100 000 population over time.
- Seropositivity in selected populations.

Other aspects

Procurement of equipment and laboratory services. Several levels of laboratory service can be considered:

- Primary level: simple screening methods for anti-*Leptospira* antibodies. Basic equipment: containers for serum, (Pasteur) pipettes, centrifuge, freezer.
- Limited provincial or national level: more complex serological methods and cultures. Additional equipment: dark-field microscope; also (optional) ELISA reader, pH meter, incubator, micropipettes.
- Elaborate provincial or national level: complex diagnostic methods, a quality control system with a check of activities at second level, provisional typing of isolates. Additional equipment: sterile syringes, millipore filters, autoclave (traditional pressure cooker), deep-freezer, automatic dispensers, accurate scales, PCR equipment.
- International/regional reference laboratory for culture collections, typing, outbreak investigations, reference strains, reagents and antisera, and quality checks on performance in other laboratories.

Special considerations/other interventions

- Leptospirosis is often confused with other diseases or not considered at all. In all cases of fever with unknown origin, leptospirosis must be included in the differential diagnosis. Exposure to infection sources may not always be obvious to the clinician or patient.
- It is advisable to include veterinary experts and departments in the control management team.
- Serology by microscopic agglutination test (MAT) may provide presumptive information on causative serogroups. If possible, isolate leptospire, type isolates so as to assess locally circulating serovars.
- Questioning patients may provide clues to infection source and transmission conditions. Animal serology may give information on serogroup status. Isolation followed by typing gives definite information on serovar.

Contacts

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