Prevention and control of tick-borne diseases in Europe

Information to healthcare professionals

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Introduction

Tick-borne diseases are infectious diseases transmitted by the bites of infected ticks.

As the incidence of tick-borne illnesses is rising, it becomes increasingly important that health professionals are able to distinguish the diverse clinical presentations of these diseases.

In Europe, tick-borne diseases to be aware of include:

- Lyme borreliosis
- Tick-borne encephalitis (TBE)
- Tick-borne relapsing fever (TBRF)
- Crimean-Congo haemorrhagic fever (CCHF)
- Mediterranean spotted fever (MSF)

Introduction

Ticks

- Small ecto-parasites, vary in colour (reddish to dark brown or black).
- Two important groups: hard ticks and soft ticks.
- Climb up plants or/and walk on the ground.
- Latch on to a passing animal host by using hooks on their legs.
- Preferred habitats of hard ticks: shady and humid woodland, clearings with grass, open fields and bushes (can vary depending on the tick species).
- Preferred habitats of soft ticks: burrows and nests as well as stables (can vary depending on the tick species).
- Present in urban and rural areas.
- Most active from spring to autumn, but present all year round.

Hard ticks

Soft tick

Introduction

Stages of the tick life-cycle:

1. **Egg** - not parasitic and immobile.

2. **Larva** - to the naked eye they look like specks of dust.

3. **Nymph** - size of a pinhead or a poppy seed.

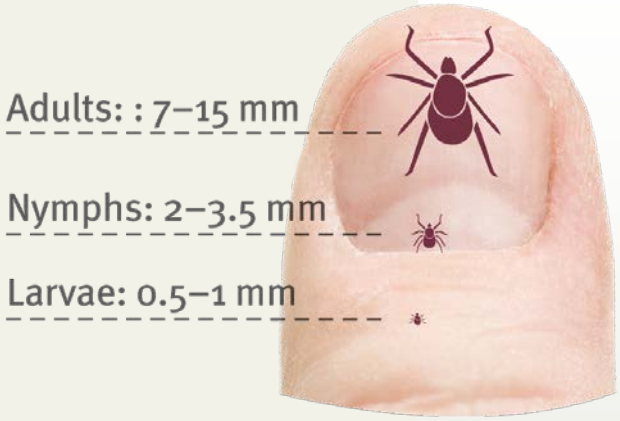


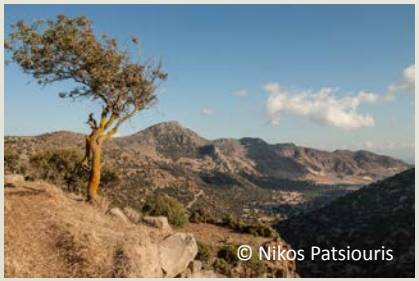
Illustration is only indicative. Sizes can vary from 0.5 to 15mm, depending on tick species.

4. **Adult** - eight legs, size of small spiders.
    - Once fed, a female tick can grow to the size of a pea, as its body fills with blood.

Note: Ticks can transmit disease during the three last life-cycle stages.

Risk Areas

- Ticks are second only to mosquitoes for transmitting disease to humans.
- Due to various factors, there are now more ticks in many parts of [country] and Europe.
- In [country], the primary tick-borne disease to be aware of is [locally endemic tick-borne disease] which can occur in areas where infected ticks that transmit the disease are found.
- Ticks habitat significantly varies depending on the species, with most tick species thriving in shady and humid woodland, clearings with grass, open fields and bushes and others living in dry environments. They live in both rural and urban locations. The main risk zones are [endemic regions in country].

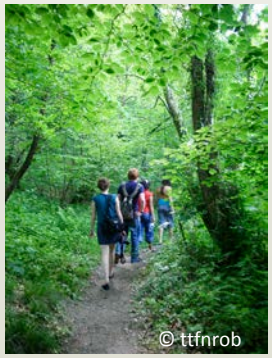


Preventing tick-bites

In areas where ticks are present it is important to know how to prevent and check for tick bites.

Main risk groups in endemic areas:

- People with recreational or occupational outdoor activities (e.g. hunting, fishing, hiking, camping, collecting mushrooms and berries, forestry and farming) are potentially at risk of infection by contact with infected ticks.



Preventing tick-bites

Key recommendations:

Avoid tick bites and remove the tick rapidly but safely!

Protection against ticks:

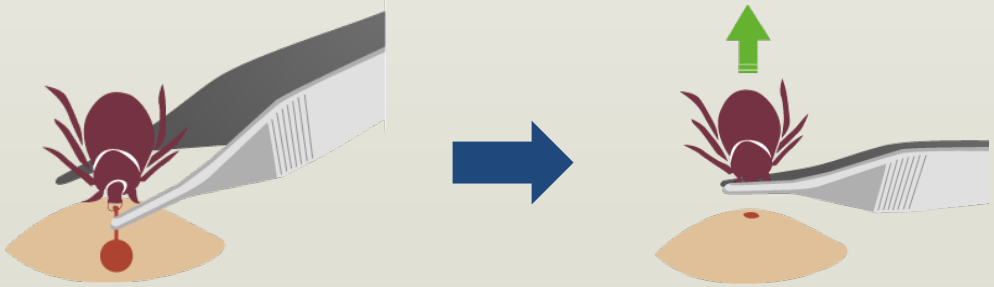
- Wear long-sleeved shirts and long trousers tucked into socks.
- Wear preferably clothes with light colours to make it easier to spot ticks.
- Use tick repellent on clothes and skin.
- Avoid areas with ticks**:** high grasses, ferns etc.

Preventing diseases

Detection and Removal

- Body inspection after outdoor activities.
  - Areas of particular attention: armpits, groin, legs, navel, neck and head.
  - On children: head at the hairline.
- Using tweezers or ticks-removal tools to remove the tick(s).
- Cleaning the wound afterwards and applying antiseptic.
- Still using tweezers, wrap the tick in some toilet paper and flush it in the toilet.

Note: Vaccine is available for TBE



Tick-borne diseases

Tick-borne diseases to be aware of in Europe include:

- Lyme borreliosis
- Tick-borne encephalitis (TBE)
- Tick-borne relapsing fever (TBRF)
- Crimean-Congo haemorrhagic fever (CCHF)
- Mediterranean spotted fever (MSF) *not covered in this presentation*

Lyme borreliosis

Lyme borreliosis (LB) is a tick-transmitted bacterial infection caused by some members of the spirochete group *Borrelia burgdorferi* sensu lato. LB is currently the most prevalent tick-transmitted infection in temperate areas of Europe, North America and Asia.

Lyme borreliosis - Symptoms

- Clinical presentation: *Borrelia burgdorferi* infection can be asymptomatic.

Early manifestations

- Erythema migrans, the early skin rash of localised infections, occurs in about 80-90% of cases.
- It is an erythematous rash that gradually expands from the site of a tick bite.
- Some patients may also have systemic 'flu-like' illness but without significant respiratory symptoms.
- *Borrelial lymphocytoma* is an uncommon skin manifestation of early infection.

Lyme borreliosis - Symptoms

Late manifestations:

- Neuroborreliosis is the main complication (occurs in approximately 10% of cases).
- Acute neuroborreliosis can present facial palsy, lymphocytic meningitis, radiculoneuritis (usually occurs withing aprox. 6-12 weeks of infection).
- Meningoencephalitis is a less common feature.
- Other manifestations or uncommon features may occur.
- Presentations of late (previously untreated) Lyme borreliosis can affect the skin, nervous and musculoskeletal systems.

Lyme borreliosis - Diagnosis

- No laboratory tests are required in the diagnosis of erythema migrans, which depends on a clinical evaluation and assessment of tick exposure risk.
- Laboratory tests are necessary to confirm a diagnosis of later stage infection.
- Antibodies to *B. burgdorferi* are usually detectable within 4-8 weeks of infection.
- Patients with late-stage infection are rarely seronegative and usually have very strongly positive antibody tests.
- False-positive tests can lead to misdiagnosis and inappropriate treatment.
- Other specialised investigations can be helpful (e.g. antibody testing and borrelial DNA detection on CSF from patients with suspected neuroborreliosis).

Lyme borreliosis - Treatment

- All patients with symptomatic *B. burgdorferi* infection should be treated with appropriate antibiotics.
- Early treatment can prevent the risk of developing late stage complications.
- Even patients with late stage Lyme can benefit from antibiotics, although clinical recovery may be incomplete.

Note: No licensed vaccine against Lyme borreliosis is currently available for prevention

TBE

Tick-borne encephalitis (TBE) is a viral infectious disease that attacks the central nervous system and can result in long-term neurological symptoms, and even death.

TBE - Symptoms

- Incubation period: 7 days on average (but can range from 3-28 days).

- Approximately two thirds of human TBE virus infections are non-symptomatic.

- In clinical cases, TBE often has a biphasic course.
  - **Viraemic phase**: lasts 5 (range 2–10) days, and is associated with non-specific symptoms (fever, fatigue, headache, myalgia, nausea).

  - **Asymptomatic interval:** lasting 7 (range 1–33) days on average that precedes the **second phase**, when the central nervous system is involved (meningitis, meningoencephalitis, myelitis, paralysis, radiculitis).

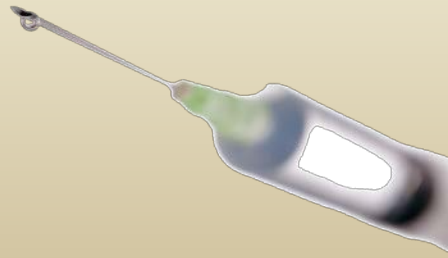
TBE - Diagnosis

- Based on the detection of specific IgM antibodies in cerebrospinal fluid (intrathecal production) and/or serum, mainly by ELISA.
- TBE antibodies appear 0–6 days after the onset. Are usually detected when neurological symptoms are present.
- Specific IgM antibodies can persist for up to 10 months in vaccinees or individuals who acquired the infection naturally.
- Detection by PCR methods could be valuable for early differential diagnosis of TBE.

TBE - Treatment

- No specific antiviral therapy for TBE.
- Treatment relies on supportive management.
- Meningitis, encephalitis or meningomyelitis require hospitalisation and supportive care based on syndrome severity.

Note: Vaccine is available for prevention



TBRF

Tick-borne relapsing fever (TBRF) is caused by spirochaetes of the genus *Borrelia*.

TBRF - Symptoms

After incubation period (3 to 18 days after tick bite): High fever (> 39-40°C) suddenly appears and lasts 3-6 days.

Other symptoms include:

- Intensive asthenia, headache, arthralgia, myalgia, neck stiffness, stomachache and nausea.
- Splenomegaly and hepatomegaly, usually associated with jaundice, and elevated pulse and blood pressure are common.

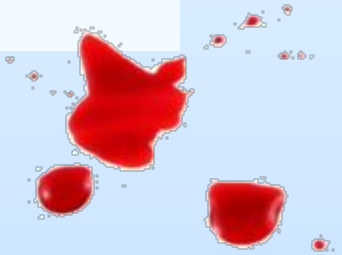
Following the initial fever episode further relapses will occur:

- Between 0–15 relapses.
- Normally shorter and milder.
- Interval between fever episodes ranges from 4-14 days.

TBRF - Diagnosis

Detection of spirochaetes in blood, bone marrow, or cerebrospinal fluid during a febrile episode, by:

- Thin- or thick blood smears with dark field microscopy or with conventional staining.
- Quantitative buffy coat (QBC) fluorescence analysis (requires technical expertise).
- Molecular methods (PCR detection) are sensitive and used with increasing frequency.
- Specific serological assays are to date not available for most of the known TBRF.



TBRF - Treatment

- Recommended treatment is tetracycline or doxycycline.
- When tetracycline is contraindicated, a macrolide antibiotic may be prescribed.
- Treatment may provoke a Jarisch–Herxheimer reaction within two hours of treatment.

CCHF

Crimean-Congo haemorrhagic fever (CCHF) is a viral infection. The causative agent belongs to the genus *Nairovirus*, Bunyaviridae family. **It causes severe disease in humans and a high fatality rate**.

Sources of infections are:

- Tick bites
- Handling infected ruminants
- Nosocomial transmission

CCHF - Symptoms

After incubation period, usually of 3–7 days (ranging from 1 to 13 days), the disease is characterised by:

- A sudden onset of febrile illness with headache, myalgia, backache and joint pain, abdominal pain and vomiting.

Frequently followed by:

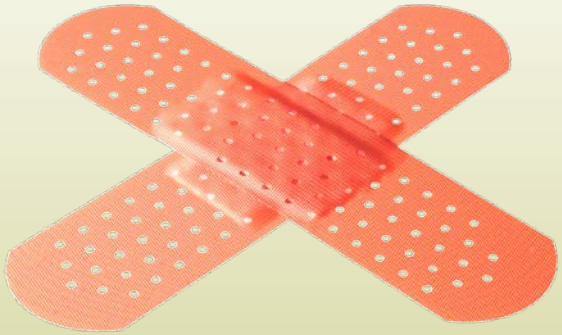
- Haemorrhagic manifestations that may range from petechiae to ecchymoses appearing on the mucous membranes and the skin.
- Most common bleeding sites: Nose, gastrointestinal system, uterus, urinary and respiratory tract.
- Necrotic hepatitis may occur.
- Large ecchymosis and uncontrolled bleeding from venipuncture sites are common features.
- The convalescent period begins in survivors about 10–20 days after the onset of illness.

CCHF - Diagnosis

- Direct diagnosis done by detection of viral genome by RT-PCR up to 10–15 days post onset of illness.
- Serological detection of specific IgM antibodies can be done starting day five.
- CCHF IgG seroconversion or 4-fold titre increase can help the diagnosis (but it is delayed).
- As CCHF is considered as highly hazardous pathogen sample shipment and handling require specific protocol.

CCHF - Treatment

- No validated specific antiviral therapy for CCHF.
- Treatment relies on supportive care, including administration of thrombocytes, fresh frozen plasma, and erythrocyte preparations.
- Oral or intravenous ribavirin has been used with reported success, although not confirmed benefit.
- Value of human immunoglobulins from recovered patients for treatment has to be re-evaluated.



Healthcare personnel safety - CCHF

Patients with CCHF should be nursed using strict universal precautions, including:

- Barrier nursing
- Gloves
- Masks
- Goggles

Additional Resources

For more information on tick-borne diseases, please consult the ECDC website.

http://ecdc.europa.eu

Or the website of [name of national health authority]

[Website of national health authority]

Information contained in this presentation may change as new evidence becomes available