Ticks and Lyme disease
Information for registered practitioners

June 2019
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- To ensure Scotland has a Health Protection service of the highest quality and effectiveness that is able to respond to short term pressures and to long term challenges.
- To oversee the co-ordination of Scotland’s health protection services under a network that promotes joint ownership and equitable access to a sustainable and consistent service.
- To minimise the risk and impact of communicable diseases and other (non-communicable) hazards on the population of Scotland and to derive long term public health benefits (outcomes) through the concerted efforts of health protection practitioners across Scotland.

In line with the above, SHPN supports the development, appraisal and adaptation of health protection guidance, seeking excellence in health protection practice.

Reference this document as:

Published by Health Protection Scotland and NHS Education for Scotland on behalf of the Scottish Health Protection Network.
SHPN, Meridian Court, 5 Cadogan Street, Glasgow, G2 6QE.
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1. Introduction
This information resource has been produced by the Lyme borreliosis subgroup of the Scottish Health Protection Network as a means of raising awareness of key practitioners such as GPs, Practice Nurses, clinical specialities and pharmacists in relation to Lyme disease.

Please note: This resource will continue to be updated by the group but does not replace the clinical judgement of practitioners.

2. Lyme disease - frequently asked questions and answers

2.1. Definition and transmission of Lyme disease

Q. What is Lyme disease?
   A. Lyme disease refers to infection with the gram negative spirochaete bacterium *Borrelia burgdorferi*. It is also known as Lyme borreliosis.

Q. How is it transmitted?
   A. It is transmitted during feeding by an infected tick (usually *Ixodes ricinus* in the UK). The exact time for tick attachment and infection transmission is uncertain, but may require around 24 hours.

Q. Do all ticks carry *Borrelia*?
   A. No. Current evidence indicates that between 0-10% of Scottish ticks carry *B. burgdorferi* infection. If someone has been bitten by a tick it does not mean they will get Lyme disease.

Q. Where and when are these ticks found?
   A. Infected ticks can be found throughout urban and rural Scotland. Ticks live in green spaces: grassy and wooded areas, such as gardens, parks, riversides, forests - not just in the mountains or Highlands. Greatest risk is found within forested areas at low altitude.

   Ticks can be found all year round. Ticks do not like dry conditions and are more active during the warmer months with the period between April to October traditionally being the peak months for tick numbers. During this period they seek mammalian hosts for feeding. This is called questing.

   Infection is also common throughout Northern Europe and USA. The websites Fit for Travel and Travax provide further information on how to stay safe and healthy when travelling abroad.

   https://www.fitfortravel.nhs.uk/home
   http://www.travax.nhs.uk/
Q. Who is at risk?
A. Anyone who uses green spaces either occupationally (e.g. forestry workers, gamekeepers, farmers) or recreationally (e.g. picnicking, rambling, dog walker, outdoor sports) can be exposed to ticks and therefore be at risk of Lyme disease.

Q. What about pets?
A. Cats and dogs can bring ticks into a household. It is assumed that if the tick has fed from the cat, dog or other pet that it is unlikely to search for another blood meal from a human. However, there are case reports of ‘pet transfer’ of ticks which have not fed from the animal but are brought in unfed on the pet's fur. Thus even relatively housebound patients with pet(s) may be at risk of Lyme disease.

2.2. Prevention

Q. What can be done to prevent being bitten by ticks?
A. Cover exposed skin, use insect repellents to protect against being bitten, stick to paths where possible and wear light clothing where ticks can be easily spotted and thereafter brushed off easily. However, the measures are unlikely to prevent all tick bites: ticks are small and tenacious and can crawl through or under clothing.

Q. How do you know if you’ve been bitten?
A. Ticks can attach anywhere in the body. Tick bites are typically painless and may go undetected especially in difficult to reach areas such as skin folds. It is quite possible for an adult or child to have several ticks at one time on different parts of the body. Members of the public should be advised to check themselves for ticks whenever they have been outdoors in green space where they may have been exposed. Children should be assisted to do this with special attention to skinfolds, hairlines, behind the ears, behind the knees and at the elbows.
Q. What advice should be given if someone has been bitten by a tick?

A. The risk of transmission of Lyme disease from an infected tick can be reduced if the attached tick is removed promptly and correctly. **It is important to remove the tick as quickly and effectively as possible.** The exact time for tick attachment and infection transmission is uncertain, but may require around 24 hours. Early tick removal remains the most effective intervention. It is best practice to check your body at the end of each day. There are several types of removal devices available e.g. use a plastic (card or twister) tick removal device or fine-tipped tweezers to remove (see diagrams). If fine tweezers are used make sure the pressure is applied behind the tick’s head as it is essential that the body contents of the tick are not squeezed by the fine tweezers into the host.

The following link to the NHS Inform Outdoor bugs and germs page contains a short video on the removal of ticks using a tick removal device and other useful outdoor health information. 

https://www.nhsinform.scot/bugs-and-germs

Q. Should people curtail outdoor activities?

A. NO! Although preventing tick bites in the first place is the best way to prevent infection, we would not want to discourage people from enjoying spending time in green spaces and all the health benefits that it brings. People should be encouraged to be confident in what they do knowing that they can minimise risks by following the practical steps mentioned previously. Members of the public should be informed not to let ticks spoil their enjoyment of the outdoors.

2.3. Symptoms, clinical diagnosis and treatment

Q. Is a tick bite or Lyme disease a medical emergency?

A. No. Self care with tick removal and understanding to look out for a rash or other symptoms of Lyme disease should be the initial advice in NHS triage systems. If the patient has developed a spreading rash following a tick bite or tick exposure they should be directed to their GP or Out of Hours service within 48 hours. Early treatment with a 21 day course of antibiotics should be curative at this stage.
Q. Should individuals receive treatment if they are bitten by a tick?
A. No. Treatment should only be given if they have symptoms. Most ticks do not carry infection. A tick bite on its own is not an indication for treatment.
https://www.bmj.com/content/bmj/suppl/2018/04/12/bmj.k1261.DC1/crum090318.wi.pdf

Q. What should be included in a clinical history relating to tick exposure?
A. A detailed history of tick exposure (that is, definite tick bite or tick exposure), likely time on the body and removal method should be undertaken to determine the likelihood of disease transmission of Lyme disease.

Q. What are the common presentations and symptoms of Lyme disease?
A. A rash called Erythema Migrans (EM) may develop at the site of the bite which is diagnostic of Lyme disease. It appears up to a week after a tick bite and the key point in the history is that it is a spreading redness. In text books and on-line pictures EM looks like a clearly defined target with a central circle of redness and an outer ring of redness. However, the rash evolves and is usually a spreading area of redness around the tick bite. It can fade quickly into a mottled rash and patients should be encouraged to capture pictures on their mobile phones. In most patients the rash will fade completely.

It is important to note that rashes often do not necessarily fit this classic pattern. Atypical rashes are shown below.

Photos courtesy of Dr James Douglas.
Q. What are other possible causes for a rash?
   A. Important differential diagnoses include the following:
      • localised reaction to an (any) insect bite
      • spreading *Staphylococcus aureus* skin infection (common)
      • dermatophyte infection (ringworm)- typically itchy but not always
      • sweat rash (skin folds)
      • Erythema multiforme (classical target lesions) following infection or drugs or idiopathic
      • Erythema marginatum (major criteria of rheumatic fever now very rare in UK)

Q. Does the rash always appear at the site of the tick bite?
   A. No. Spatial lesions have been reported at a different site from the initial tick bite. This may mean that the infecting tick has not been identified and has dropped off unnoticed after feeding. Multiple EM rashes may occur simultaneously.

Q. A patient’s rash is quite small but itchy. Is this Lyme disease?
   A. Not likely. A localised reaction around the site of the tick bite (<5cm in diameter) may be due to a local reaction to the tick saliva. It will come up almost immediately and fade over 48 hours without spreading.

Q. Do you always get a rash in Lyme disease?
   A. No. Only around 50% of patients with Lyme disease will develop a rash. Therefore Lyme disease should still be considered in patients with a history of tick bite, or potential exposure to ticks, who present with non-specific symptoms (see below).

Q. What are the difficulties in the patient history?
   A. The rash may have been there but has now disappeared. Patients should be encouraged to photograph their rash. A blood test is indicated but interpretation can be difficult.

Q. What acute, non-specific symptoms are seen?
   A. Non-specific symptoms may include flu-like illness, fever, sweats, lymphadenopathy, malaise, fatigue, neck pain/stiffness, migratory joint pains/stiffness, cognitive impairment (e.g. memory problems and difficulty concentrating), headache and paraesthesia.
Q. What are the focal presentations of Lyme disease?
   A. Focal presentations may be neurological e.g. facial palsy / other unexplained cranial nerve palsies, meningitis, mononeuritis multiplex, unexplained radiculopathy, encephalitis, neuropsychiatric presentations or unexplained white matter changes on brain imaging. Eye problems have been observed and include uveitis and keratitis.
   Lyme disease may also present as an inflammatory arthritis affecting one or more joints and may be fluctuating and migratory.
   Lyme carditis should be considered in patients presenting with cardiac problems, such as new heart block or pericarditis following potential exposure to ticks.
   Skin manifestations of Lyme disease may be evident include acrodermatitis chronica atrophicans (ACA) and/or borrelial lymphocytoma.

Q. What should I do if the patient presents with focal symptoms of Lyme disease?
   A. Serological testing for Lyme disease is carried out at the Scottish Lyme Disease and other Tick-borne Infections Reference Laboratory (SLDTRL) at Raigmore Hospital. Send 5 or 10ml clotted blood sample with history of exposure and symptoms. A referral to a specialist Infectious Diseases or sub-speciality (Neurology, Rheumatology, Cardiology) consultant may be indicated.

2.4. Laboratory Testing for Lyme disease

Laboratory tests are supportive of clinical diagnosis.

Q. How do I test for Lyme disease?
   A. Testing is based on detection of specific antibody to *B. burgdorferi*. A clotted sample of blood is required and will be initially screened by a screening EIA. Positive or equivocal samples will be confirmed by IgG and IgM immunoblots.

Q. Should a patient be tested who presents with erythema migrans or a spreading rash after a tick bite?
   A. No. Erythema migrans is diagnostic of Lyme disease and further testing is not required.

Q. Should a patient be tested who has non-specific symptoms after a tick bite?
   A. Testing is indicated. It is important to remember that there will be a window period of 3-10 weeks, whereby infection may be present, but the test negative. In these cases repeat testing at the end of the window period would therefore be needed to confirm diagnosis.
Q. What does a positive blood test for Lyme disease mean?
A. It means the patient has been exposed to *B. burgdorferi* at some time and has formed detectable, specific antibodies. Positive serology results support the clinical diagnosis of Lyme disease. However, a sero-prevalence study among Scottish blood donors showed that 4.2% of this population had evidence of previous exposure to *B. burgdorferi*.

Q. Are there any tests that can identify active Lyme disease?
A. No. Positive serology will confirm exposure to *B. burgdorferi* but there is not a test for active infection.

Q. How is neuroborreliosis tested for and diagnosed?
A. In patients with neurological presentations a lumbar puncture is often indicated. Serology testing can be performed on blood and CSF samples which must have been taken on the same day to identify intrathecal synthesis of Borrelia specific antibodies. Again a positive test is not diagnostic of neuroborreliosis but is helpful in supporting a clinical diagnosis. Other criteria are important too: presence of mononuclear cells and raised protein in CSF. These tests are usually requested by specialist clinicians (ID, neurology).

2.5. Treatment of Lyme disease

Q. How is Lyme disease treated?
A. Treatment will depend on the stage of infection. For further information, including the management of children, please refer to NICE guidelines on Lyme disease published 11 April 2018:

https://www.nice.org.uk/guidance/ng95/resources/lyme-disease-pdf-1837756839877

2.6. Key role of healthcare practitioners

Q. What is the most important thing Health Practitioners can do with regard to preventing and detecting Lyme disease?
A. Encourage your patients to enjoy the ‘great outdoors’ confident about encountering ticks and negating any health risks they may pose. There is much more chance of improving their general health and wellbeing by being outside in the countryside than any slight risk of Lyme disease.

Health practitioners have a crucial role in explaining tick prevention removal methods for children and adults and encouraging people to carry tick removers with them when using green spaces. Toddlers in gardens, active younger and older adults can also acquire ticks. We can’t get rid of ticks so we have to learn to live with them in our complex ecosystems.

https://www.nhsinform.scot/bugs-and-germs
2.7. Further advice

Q. Where can expert opinion be obtained?
   A. Referral to a specialist Infectious Diseases or sub speciality (Neurology, Rheumatology, Cardiology) consultant as indicated.

   The Scottish Lyme Disease and Tick-borne Reference Laboratory is available Monday-Friday, 9am-5pm for testing (01463 704206).

3. Key messages for practitioners

1. People of all ages, including children, are at risk of contracting Lyme disease if they have been exposed to infected ticks. Studies indicate between 0-10% of Scottish ticks may be infected. If someone has been bitten by a tick it does not mean they will get Lyme disease.

2. Prompt, correct removal of attached ticks greatly reduces the chance of infection and disease.

3. An enlarging rash around the bite or flu-like, neurological or joint symptoms after tick exposure/bite should prompt the clinician to consider Lyme disease. Ask whether the patient took a photograph of the rash.

4. Treat erythema migrans rash empirically according to NICE 2018 guidelines. A blood test is not routinely recommended. Code it correctly.

5. Unexplained Bell’s palsy, cranial nerve palsies, radiculopathy and arthropathies should prompt a ‘tick exposure history’.

6. Practitioners should reassure the public that the balance of public risk from tick exposure is much less than the wellbeing promoted by outdoor activity in all ages.

7. We all have to learn to ‘live with ticks’ and practitioners have a key role in educating the public on how to avoid being bitten by a tick but if they are bitten, how to safely remove ticks, and early symptom recognition of Lyme disease.

4. Further resources

Ticks and Lyme disease in Scotland - an overview for practitioners - Scottish Health Protection Network Slide set.


Outdoor bugs and germs page: https://www.nhsinform.scot/bugs-and-germs