



Lyme Disease

Information for environment sector organisations
on raising awareness among staff and visitors

Liz O'Brien

Introduction

This Briefing Note is aimed at environment and land management organisations. Based on a literature review, it provides information on Lyme disease particularly in relation to communicating to the employees of these organisations, and to the visitors who use and enjoy the land these organisations are accessing or managing. The Briefing Note does not go into great detail; rather it gives some broad guidance on working with staff and visitors in order to raise awareness about Lyme disease and encourage specific behaviours to reduce the risk of tick bites. All references are listed in more detail at www.forestry.gov.uk/fr/Lymediseasebriefing

What is Lyme disease?

Lyme disease is transmitted by ticks infected with a bacterium, although only a small proportion of ticks carry this bacterium. Lyme disease is the most common tick-borne disease in Europe. The ticks are also known as sheep or deer ticks, and are small, spider-like, blood-feeding creatures. People can be bitten by ticks if they come into contact with vegetation or with animals on which ticks are not yet fully attached. This contact may occur in parks, gardens, woodlands or the countryside – anywhere with dense vegetation. In its early stages, Lyme disease can be identified by a ‘bull’s eye’ skin rash (Figure 1), and it is important to recognise, treat and cure this with antibiotics, although about a third of cases do not result in a rash (Public Health England, 2014).

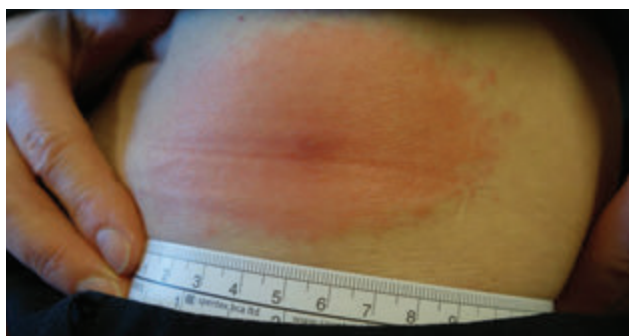


Figure 1 A sign of Lyme disease is a ‘bull’s eye’ rash around the site of the tick bite.

Although Lyme disease can be treated successfully with antibiotics in the first weeks after infection, if the infection is left untreated, later flu-like signs or symptoms such as headaches, tiredness, muscle pains, joint aches and fever (Marcu *et al.*, 2011) could indicate disseminated Lyme disease, i.e. spread throughout the body, and this may require intravenous antibiotics. This later stage of Lyme disease can, in some instances, lead to much more debilitating conditions, such as permanent damage to the central nervous system, facial palsy or viral-like meningitis. Lyme disease can be diagnosed by GPs through a history of tick exposure and

clinical signs (i.e. skin rash). Laboratory blood tests are not carried out for the early rash stage of Lyme disease but can be used for later signs and symptoms.

Ticks have a three-stage life cycle: larva, nymph and adult. The life stage most likely to bite humans is reported to be the nymph. Nymphs are very small, i.e. the size of a full stop or a dirt speck, so can be difficult to spot (Figures 2 and 3) (NHS Scotland, 2017).

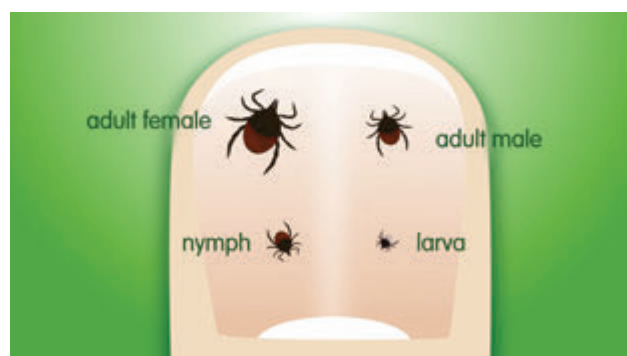
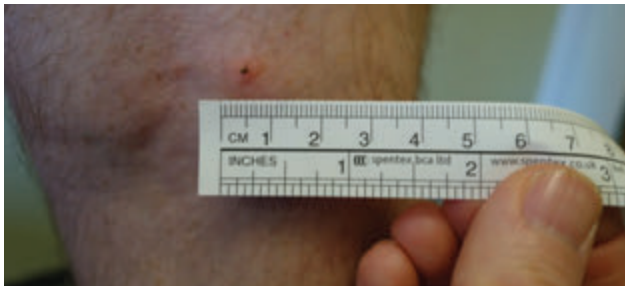


Figure 2 Size of various life stages of the tick.

Incidence of Lyme disease in Britain

It is estimated that there are 2000–3000 new cases of Lyme disease occurring in England and Wales every year (NHS Choices, 2015). The peak times for being bitten by a tick are generally March to October, but ticks can still be active at other times of year. Studies generally predict increasing numbers of cases of Lyme disease in the UK in the future as a result of complex relationships between the climate, tick behaviour and human behaviour (Quine *et al.*, 2011). Data on the prevalence of the disease in the UK is incomplete as only positive blood tests from laboratory studies are recorded. This does not capture those people treated successfully in the early rash stage of Lyme disease.

Health Protection Agency data shows an increase in incidence of the disease in England and Wales, by 384% over the period 1997–2008 (to 813 cases in England



Courtesy of J. Douglas.

Figure 3 Tick attached to a person's leg and being removed using a tick removal device.

and Wales in 2008). In Scotland, the number of cases increased by 1500% between 2000 (37 cases) and 2009 (605 cases) (Quine *et al.*, 2011, p. 6). It is unclear to what extent this increase is attributable to improved diagnosis or greater awareness. However, a number of observers have suggested that infection is still under-reported. Nevertheless, the recorded prevalence is much lower than in mainland Europe.

Current evidence

Management of the environment

Dobson *et al.* (2011) found that habitats with trees presented the highest densities of ticks in three different recreational sites in England (Richmond Park, the New Forest and Exmoor National Park). Similarly in the Netherlands forests are associated with an increase in tick bites along with other factors such as sandy soil, numbers of roe deer and tourism (Den Boon *et al.*, 2004). Also in the Netherlands (Mulder *et al.*, 2013), the incidence of ticks was not only reported in forests (43%) but also in gardens (31%) by respondents to a survey. Hjetland *et al.* (2013) found that the number of recent tick bites in Norway increased with the number of hours respondents spent outdoors during the summer, education level, and ownership of domestic animals, as well as time spent hunting.

The effects of climate change are also a driver in relation to the geographical expansion of the disease (Randolph, 2001; Milner *et al.*, 2009). Gilbert *et al.* (2012) outline that environmental factors associated with ticks include the climate, habitat and host, e.g. wildlife/livestock. They suggest an effective way to control ticks could be through deer management. However, vegetation and/or deer management can be costly, sometimes impractical, or could potentially affect existing conservation objectives. They also highlight that ticks are more active at warmer temperatures, so the risk is potentially higher on warmer days.

Behaviours and behaviour change

The actions people take can help to reduce their risk. Overall factors that affect the adoption of preventative measures in relation to tick bites are:

- knowledge about ticks or knowing someone who has or has had Lyme disease;
- exposure, e.g. living and/or working in a risk zone;
- risk perception (Aenishaenslin *et al.*, 2015).

A study found that visitors to two National Parks in England do not associate their visits with the risk of contracting Lyme disease (Marcu *et al.*, 2011). Much of the existing evidence suggests visitors to nature and green space are not taking personal prevention steps against tick bites (Mitschler *et al.*, 2004; Hook *et al.*, 2015; Valente *et al.*, 2015). Marcu *et al.* (2011) found that taking precautions was seen as a threat to interviewees in England and the social and restorative activities they enjoyed when in nature. Experience can be powerful, as those with a history of tick bites are the most informed and are more likely to take steps to better protect themselves. There are different points in time that can influence the behaviours and precautions taken against tick bites: pre-visit to a green space, during the visit, post-visit, post-bite by a tick and post-infection if the tick was carrying the bacteria (Quine *et al.*, 2011) (Tables 1 and 2).

Communication

Research suggests that visitors find information useful when it helps them to identify ticks, shows them how to pull them out with removal devices and where to seek help (O'Brien *et al.*, 2012). Mowbray *et al.* (2014) claim that message effectiveness can be increased if communication focuses on the self-efficacy of the

individual, i.e. what action a person can take. This finding is supported by Shadick *et al.* (1997), who found that confidence in finding a tick on oneself increased preventative performance. The University of the Highlands and Islands Rural Health and Wellbeing Research Team conducted pilot research with communities in the Highlands in Scotland to co-design awareness-raising communication materials, tick check cards (Figure 4) and a website.

Responsibility and communicating to environment sector employees

Environment sector employers have a responsibility to their employees in terms of their health and safety. All environment sector staff should be provided with information about Lyme disease, what it is and how they can protect themselves from being bitten by ticks in the course of their work. For example, all Forestry Commission staff are given a leaflet about Lyme disease when they start working for the organisation, no matter what position they hold.

For staff that work a lot outdoors and are likely to be at high risk of being bitten by a tick, the provision of insect repellent and tick removal devices (Figure 5) will be important. Preventative measures against tick bites and Lyme disease include covering up skin, e.g. with long-sleeved tops, tucking trousers into socks, avoiding contact with vegetation, using insect repellent, and checking for ticks after being outdoors in places where ticks may be present. Repellent-impregnated clothing might also be appropriate for staff that work outdoors regularly in areas where ticks are likely to

be. Organisations need to make employees aware of the benefits and any potential negative impacts of impregnated clothing. A number of Forestry Commission staff have recently been provided with impregnated clothing and early feedback so far suggests that users are finding fewer ticks on their clothing than previously. Data will need to be gathered to confirm this. Lyme disease is a RIDDOR (Reporting of Injuries, Diseases and Dangerous Occurrences Regulations) reportable disease and this places a duty on employers to report incidences (Health and Safety Executive, 2013). Table 1 outlines a framework for communicating risk to employees, enabling them to consider the different behavioural actions they could take before they work outdoors, during their work and afterwards. It provides a range of options for employers and employees. The 'how' section provides information for both employers and employees on the actions (behaviours) they can take to minimise risk.

The key to reducing Lyme disease is to remove any attached ticks within 24 hours to reduce the likelihood of bacterial transmission. Plastic removal devices such as tick 'cards' or 'twisters' (Figure 5) are the only reliable way of reducing bacterial transmission as they lift the tick off the skin and avoid squeezing its stomach.

NHS Scotland advises that early Lyme disease be treated with either doxycycline or amoxicillin for 2-3 weeks. Some urban-based GPs may be unaware of current information about and treatment for Lyme disease. Therefore employees, if visiting a GP or consultant about suspected Lyme disease, can provide this NHS information (British Infection Association, 2011).

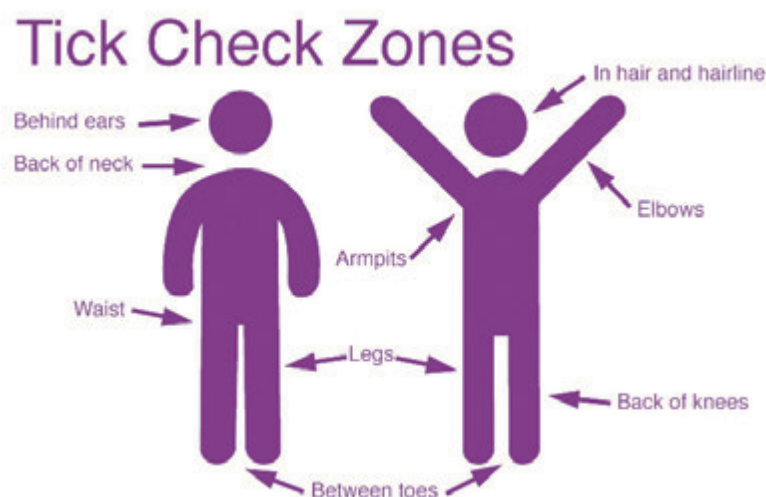


Figure 4 Key areas to check for ticks, i.e. warm and moist areas of the body.

When: The points in time at which behaviour may be influenced and actions taken					
	Pre-visit	Visit	Post-visit	Post-bite	Post-infection
What? (behaviours)	Provide/obtain impregnated clothing if available, insect repellent, tick removal devices	Provide/wear long trousers, tuck socks into trousers Use insect repellent on exposed skin Consider route and activity to reduce risk, brush and shake ticks off clothing and self during visit	Brush and shake ticks off clothing Check for ticks all over the body and particularly in areas identified in Figure 4 Remove any attached ticks promptly and safely	Be aware of the signs and symptoms of Lyme disease Monitor any bite location for a rash – take a picture or circle the bite Monitor health for any flu-like symptoms	Seek medical advice promptly if a rash or other signs or symptoms occur that cause concern
Who? (target audience)	Employer, environment sector staff	Employer, environment sector staff	Employer, environment sector staff	Environment sector staff	Environment sector staff as patient
Where?	At workplace	At outdoor site	At outdoor site/workplace/place of residence	At workplace/place of residence	GP surgery/healthcare setting
How? (4 'E's' behaviour change framework)	Encourage – give the right signals	Organisation to provide appropriate information on Lyme disease for staff	Organisation to encourage staff at risk to discuss actions and information needed	Organisation to provide information on how to check for ticks Staff to check for ticks	Staff to check tick bite areas for development of any rash and observe their general health
	Exemplify – lead by example	Organisation to engage with staff and take a professional approach to communicating and providing information on Lyme disease	Provide appropriate equipment and clothing for staff to use Staff to use equipment and clothing if at risk	Staff with experience of ticks identify risks in any briefings to other staff	Staff with knowledge of Lyme disease to make others aware of risks
	Engage – get people involved	Organisation to encourage staff discussion on health and safety including Lyme disease and discussion of approach to take in raising awareness	Seek staff views on what communication is most effective in raising awareness Talking head videos of staff who have Lyme disease can be an effective communication approach	Organisation to share best practice information with key stakeholders through networks such as the Visitor Safety in the Countryside Group	Share best practice information for staff to use with GP
	Enable – make it easier	Easy access to advice and information for staff Provision of tick removal devices	Provision of first aid kits with tick removal devices	Encourage staff to act as tick buddies for each other and check for ticks	Support staff in seeking GP advice if they show signs or symptoms of Lyme disease

Table 1 Framework for risk communication for environment sector organisations/staff.

Top ten tips for staff regularly exposed to ticks

These have been developed from evidence and talking to Forestry Commission employees bitten by ticks or with Lyme disease.

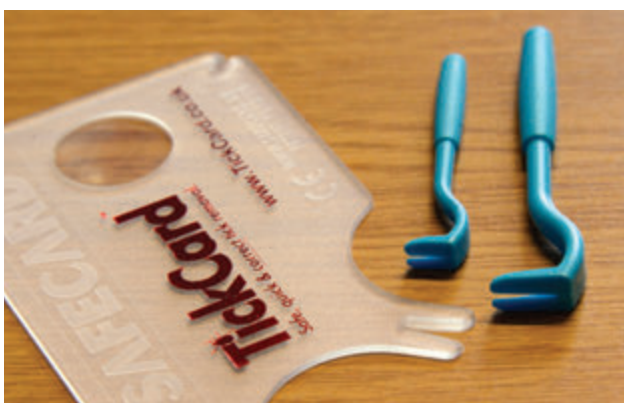
1. Use impregnated clothing (corporate if available).
2. Cover exposed areas of skin with clothing and/or insect repellent.
3. When out in the field near livestock avoid sitting on the ground.
4. Brush your clothing at the end of the day with a hard brush.
5. Check your body for ticks as soon as possible and remove any ticks within the first 24 hours (Figure 4).
6. Ask a tick buddy to check the places you find difficult to see, or use a mirror if a tick buddy is not available.
7. If you remove a tick take a picture of the bite area or circle it with a pen and monitor it with your camera/phone.
8. If you remove a tick crush it in a tissue or put it in a sealed container and dispose of it. Do not squash it with your bare fingers.
9. If you develop a 'bull's eye' rash or feel unwell visit your doctor, making it clear that you work outdoors in forestry/the environment and have or may have been bitten by a tick. Use your camera/phone to take a photograph if you have a rash in case it fades or changes.
10. Show your GP the NHS guidance on which antibiotics should be used for treatment.

Communicating to visitors

There is a range of research evidence suggesting that visitors are not keen or are even unwilling to take preventative action before or during their visit to nature, such as covering skin up with long trousers or sleeves, and using insect repellent to reduce the risk of being bitten by a tick. Taking these preventative measures is also not a guarantee that visitors will not be bitten by a tick. Therefore the suggestion made here for communicating with visitors is to focus on the key behaviours of checking for and removal of any ticks post-visit to nature. This enables simpler messaging and communication, i.e. look for ticks, if you find one remove it quickly and safely, make a record of the area bitten and if a rash develops or flu/fatigue signs or symptoms occur then visit a GP (Table 2).

In communicating to visitors, remember to frame messages positively so as not to create alarm:

- This could include highlighting the diversity of life in nature and outlining that ticks are part of this diversity.
- Focus on post-visit action, i.e. checking for ticks and seeking medical help if any rash or signs and symptoms arise. This gives visitors easy information on what action they can take.
- Help people to identify what a tick looks like, and how to safely remove a tick.
- Provide links to easily accessible follow-up health information for visitors.



Courtesy of SpeakEasy

Figure 5 Tick card for removing ticks.

When: The points in time at which behaviours may be influenced and specific actions taken			
	Post-visit	Post-bite	Post-infection
What? (behaviours)	Check for ticks all over Particularly check for ticks in key areas of the body (Figure 4) Check children for ticks Check dogs for ticks	Prompt removal of any ticks, monitoring of the bite location	Seek help and appropriate treatment promptly if any symptoms arise
Who? (target audience)	Outdoor visitors, environment sector organisations	Outdoor visitors, environment sector organisations	Outdoor visitor as a patient
Where?	Place of stay/residence	Place of stay/residence	GP surgery
How? (4 'E's behaviour change framework)	Encourage – give the right signals	Organisations provide information on what a tick looks like and how to check for ticks Encourage parents to check their children Encourage people to check their pets	Encourage prompt removal of ticks Provide information on checking for a rash Provide links to information at health sites
	Exemplify – lead by example	Environment sector staff to identify risks in any briefings to visitors who are going to be undertaking activity on their land Notices in car parks outlining post-visit precautions to take	Encourage visitors who may have symptoms to tell their GP that they have spent time outdoors and may have been bitten by a tick
	Engage – get people involved	Involve visitors in evaluation of communication and awareness raising to learn and adapt approach Engage volunteers, schools and key visitor groups to raise awareness and what to look out for	Staff make others aware of risks
	Enable – make it easier	Provision of tick removal device or information of where they can be easily obtained	Share best practice information with visitors on tick removal Provision of information about what to do if a rash or flu-like symptoms develop
			Provide links to NHS information that visitors can take to their GP Engage with health professionals to raise awareness Engage with health professionals to raise awareness

Table 2 Framework for risk communication for visitors.

There is also potential to remind visitors:

- that ticks prefer the warm moist places of the body so they should look for anything as tiny as a freckle or speck of dirt;
- that young children are more commonly bitten on the head and scalp so encourage visitors to check their children here and around the neck and ears;
- to check their pets, particularly if they are a regular dog walker – check around the muzzle, neck and behind the ears and then the rest of the body;
- that not all ticks carry Lyme disease and if they are bitten by a tick, the tick may not be infected;
- that even if the tick is infected they have time to remove the tick and prevent themselves catching the disease;
- to visit their GP if they show any of the signs or symptoms associated with Lyme disease.

Environment sector organisations can also draw on the knowledge and information provided by the Visitor Safety in the Countryside Group (VSCG). This group is made up of organisations that manage land and property and encourage public access. The VSCG website has useful information on a range of health and safety topics including Lyme disease.

Further information:

All references can be found in more detail at www.forestry.gov.uk/fr/Lymediseasebriefing

Forestry Commission Scotland: www.forestry.gov.uk/checkforticks

Public Health England: www.gov.uk/government/uploads/system/uploads/attachment_data/file/552740/Ticksandyourhealthinfoabouttickbites.pdf

Visitor Safety in the Countryside Group: <http://vscg.org/good-practice/published/ticks-and-lyme-disease>

National Health Service: www.nhs.uk/conditions/lyme-disease

NHS Inform: www.nhsinform.scot/illnesses-and-conditions/infections-and-poisoning/lyme-disease

University of the Highlands and Islands: www.checkforticks.org.uk

If you need this publication in an alternative format, for example in large print or in another language, please send an email request to: diversity@forestry.gsi.gov.uk.