

A Camp's Role in Lyme Disease Prevention

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Abstract: The CDC estimates that more than 300,000 new cases of Lyme disease occur annually in the United States. People who live, work or play in these Lyme-endemic areas may be exposed to disease carrying ticks in a variety of settings – including camp. Given their goal of reconnecting children with nature, it is important for camp professionals to: 1) know the risk of tick-borne illnesses in their area, 2) recognize the risks associated with various camp activities, and 3) formulate and adopt preventative practices that minimize these risks.

Lyme disease is a bacterial infection that may develop after a bite from a Lyme-infected blacklegged tick. The CDC estimates that more than 300,000 new cases of Lyme disease occur annually in the US (Hinkley 2014), which is 10 times higher than the number of reported surveillance cases (CDC 2015).

Lyme Awareness: Risk

Many areas of the country are at high risk for Lyme disease; this is especially true for wooded or forested regions that provide suitable tick habitat. This map depicts regions (in yellow) with established blacklegged tick populations. People who live, work or play in these Lyme-endemic areas may be exposed to disease carrying ticks in a variety of settings – including camp. Given their goal of reconnecting children with nature, it is important for camp professionals to: 1) know the risk of tick-borne illnesses in their area, 2) recognize the risks associated with various camp activities, and 3) formulate and adopt preventative practices that minimize these risks.



Maloney E. (based on CDC blacklegged tick maps; http://www.cdc.gov/ticks/geographic_distribution.html)

Lyme Awareness: Disease Basics

Lyme infections can cause significant illness for some, producing serious and chronic symptoms that result in substantial short- and long-term disabilities (Cameron 2014). Lyme disease is multi-staged but not every patient experiences each stage. A wide variety of symptoms are possible and symptom patterns differ from person to person (Maloney 2009).

Most Lyme disease symptoms are nonspecific and may be seen in other illnesses. In a given individual, symptoms may vary in intensity, come and go, disappear entirely, or progress. These variations can make it difficult to recognize the infection.

- Early Lyme disease begins within 2-30 days of a bite and only the skin is infected. Of the cases reported to the CDC, 70% developed a rash at the site of the tick bite but 30% had no rash (Bacon 2008). Lyme rashes, common called EMs (short for erythema migrans), are usually oval-shaped and solid-colored (Smith). The classic “bull’s eye” is seen in less than 20% of cases (Smith, Tibbles). Patients may also have fever, chills, muscle and joint pains, neck stiffness, headaches, fatigue and swollen lymph nodes. When the EM rash is absent, these flu-like symptoms may be the only clue of the infection (Steere 2003). Some patients are asymptomatic in early disease.
- Late Lyme (or disseminated) disease develops weeks to years after a bite. In this stage, the infection has spread beyond the skin to other body sites (Henge). Within weeks, multiple EM rashes, fatigue, muscle and joint pain generalized pain, severe headaches and stiff necks (indicating meningitis), facial nerve palsy (looks like Bell’s palsy), sleep and/or concentration difficulties may be seen (Henge). A small percentage of patients experience abnormalities in their heart rate.

Months-years after the bite, patients may notice several seemingly unrelated problems, including arthritis, nervous system abnormalities, and non-specific problems such as fatigue, headaches, generalized pain, joint or muscle pain, recurrent fevers, difficulty thinking and changes in mood (Logigian).

- Persistent (or chronic) Lyme disease is marked by persistent, recurrent and/or newly developed symptoms that are compatible with Lyme disease. These symptoms occur despite prior antibiotic therapy and are not attributable to other disease or conditions (Cameron 2015).

Lyme Awareness: A Tricky Diagnosis

Because symptoms are variable and lab tests are not always reliable, Lyme disease can be a tricky diagnosis to make. Co-infections, other illness transmitted by blacklegged ticks, complicate the picture. The list of co-infections continues to grow and currently includes babesiosis, ehrlichiosis, anaplasmosis, Powassan disease, and *Borrelia miyamotoi* disease (Wormser 2006; Krause 2013). There is also evidence that blacklegged ticks also transmit bartonellosis (Billeter 2008). People who spend time in tick habitat or in areas known to harbor Lyme disease or co-infections and subsequently develop symptoms of these infections should seek medical care.

Most camps provide health care services where campers and staff can be assessed and/or treated for tick-borne illness. When individuals present with an EM rash, the diagnosis of early Lyme disease is easily established. However, when the rash is absent the variable nature of Lyme disease symptoms can sometimes make it challenging to distinguish Lyme from other health conditions or short-lived situations. For example, fatigue is common at camp and therefore it is important to have the ability to determine whether it is simply due to that day's nature hike or a more serious underlying issue, like Lyme disease.

Good record keeping can be a useful diagnostic tool. It allows the health center staff to see trends in visits, track changes in symptoms, and connect symptoms with the camper's or staff's activities of the day. Individuals with a single isolated incidence of headache, muscle pain, or other symptoms are commonly seen in the health center but rarely require an extensive work-up. In contrast, the camper or staff who repeatedly returns with persistent or recurrent symptoms needs further evaluation. Lyme disease evaluations should be done by individuals who understand the condition, recognize the limitations of lab testing, and are willing to treat based on their clinical judgment (Maloney 2009).

Lyme Prevention: Avoid Ticks

The best way to prevent Lyme disease is to avoid ticks. Encourage campers to stay out of tick habitat, especially areas with long grass, lots of brush, or leaf litter. When tick habitat cannot be avoided, campers should wear clothing that covers as much skin as possible. They should also stay in the center of hiking and biking trails and not sit on fallen logs. Clearing brush and fallen leaves, keeping grass short, and placing furniture and play structures in sunny areas reduces the risk of exposure. Bird feeders and wood piles attract tick-carrying mice, keep them far from camper areas. Similarly, camps should not feed deer and should landscape with plants that do not attract them (Stafford).

Lyme Prevention: Use Insecticides and Repellents

Insecticides and repellents reduce the risk of a tick bite. Insecticides kill ticks; repellents encourage them to leave before biting. The duration of a repellent's effectiveness varies widely between various products. The EPA has extensive information on all repellants sold in the US; a comparison table of these products can be found at <http://www2.epa.gov/insect-repellents/find-insect-repellent-right-you>. Users should look for products with:

- Permethrin – an insecticide essential to all prevention plans; its importance cannot be over-emphasized. Apply it to clothing, sleeping bags, tents, and other gear, but not skin, before entering tick habitat. It remains effective for 2-6 weeks and through multiple washings. Permethrin-embedded clothing retains its effectiveness through 70 washings; tick gaiters are also useful. Permethrin products are sold at outdoor stores and online.
- Picaridin – a newer repellent that's as effective as DEET. Use concentrations of 20%. Apply it to unbroken skin, fabrics, and materials. It is non-toxic and safe for children of all ages.
- DEET – the best known repellent; use concentrations of 30% or higher. DEET is safe to apply to unbroken skin, wool, cotton, but it can damage other fabrics and materials, such as leather and rubber. The EPA considers DEET to be safe for kids more than two months old but Canada's health department recommends against using DEET on children.
- IR3535 – a newer agent to the US, has been used extensively in Europe for many years.
- 2-undecanone – this natural compound is derived from wild tomato plants. It can be used as both a repellent and an insecticide. However, its insecticide properties are relatively short-lived when compared to permethrin.

Lyme Prevention: Tick Checks are Vital

The risk of contracting Lyme disease depends on how long the tick was attached and how likely it is to be infected. Few infected ticks transmit Lyme in less than 24 hours (Peisman). At 48 hours, roughly 20% will transmit; at 60 hours, 50% pass on the infection and when infected ticks feed until full, 94% will transmit Lyme disease (des Vignes). In many high-risk areas, more than half of the deer ticks are infected with Lyme and many are simultaneously infected with one or more co-infecting pathogens.

Campers should check for ticks frequently while in tick habitat and for 1-2 days after potential exposures. Attached ticks should be promptly removed and saved in a re-sealable container so they can be examined at a later date. Camps are

encouraged to have a “tick check” protocol that includes:

1. Checking for ticks immediately after leaving tick habitats.
2. Daily self-checks under adequate lighting. Bathing and showering are good opportunities for this.
3. A “peer check” system to look at body areas that an individual cannot examine for themselves (i.e. back, head, neck).

Lyme Prevention: Antibiotic Treatment of Deer Tick Bites

Certain antibiotics may reduce the risk of Lyme disease if taken within 48 hours of a bite. Antibiotic approaches are changing – a single dose of doxycycline is not very effective (Maloney 2011, Cameron 2014). Other treatment options exist and should be reviewed before prescribing treatment (Maloney 2011, Cameron 2014). Blood tests for Lyme disease look for antibodies to the bacteria and because it takes several weeks for an antibody response to occur, such tests will not be useful in this setting. Taking a “wait and see” strategy does not actively prevent Lyme disease. And, because 30% of patients never develop a Lyme rash (Bacon 2008), it is also risky.

Lyme Prevention: Camp Considerations

Camp professionals play a crucial role in preventing and managing Lyme disease in their campers. Camp leadership, counselors, and health staff need to understand their individual roles in minimizing the risk of Lyme disease and should participate in the following, as appropriate:

1. Determining if their camp is located in a Lyme endemic area and if it contains tick habitat.
2. Encouraging parents to pretreat all bedding, gear, and clothing with permethrin before their campers arrive at your facility.
3. Educating staff regarding tick habitats, appropriate use of insecticides and repellents, the need for tick checks and removal techniques. Some camps only allow health care staff to remove ticks so each camp must clearly identify which staff have responsibility for this task, bearing in mind that prompt tick removal is critical to disease prevention.
4. Practicing appropriate tick removal techniques. Typically this involves grasping the tick with small tweezers and using a gentle, steady motion that pulls in direction that is perpendicular to the skin. (A removal diagram is available on the CDC website. (<http://www.cdc.gov/lyme/removal/index.html>))
5. Having campers and/or staff seek health care services if symptoms arise after a known bite

or exposure to tick habitat. Document reported symptoms and consult with a physician or nurse practitioner if concerns arise.

6. Ensuring that treatment is readily available. Camps should consider whether they are capable of having treatment (antibiotics) on site for use in the case of a known bite. In most states treatment must be instituted under the direction of a prescriber (physician, nurse practitioner). Camp leadership should check their state’s regulations to ensure they are in compliance with them.
7. Clearly communicating with parents or guardians regarding whether the camp is located in a Lyme-endemic area and/or contains tick habitat and its procedures for managing a known bite. Let guardians know if and when they would be contacted regarding a known bite.

Camp experiences can have a significant and lasting impact on an individual. By enacting robust prevention practices, camps can reduce the risk of Lyme disease and its potential for producing serious causing long-term health consequences. Working together, leadership and staff can make camp a safe and fun experience for all.

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