Surveillance for Lyme Disease and Knowledge, Attitudes and Practices in Visitors and Employees, Greenbelt Park, Maryland, 2010

Zoonotic Disease Update
6/23/2011

Erin Jones, MS
Epidemiologist, Emerging Infections Program
Center for Zoonotic and Vector-borne Disease
Infectious Disease and Environmental Health Administration
Maryland Department of Health and Mental Hygiene

MISSION

To improve the health of Marylanders by reducing the transmission of infectious diseases, helping impacted persons live longer, healthier lives, and protecting individuals and communities from environmental health hazards

- We work in partnership with local health departments, providers, community based organizations, and public and private sector agencies to provide public health leadership in the prevention, control, monitoring, and treatment of infectious diseases and environmental health hazards.
Concern for Lyme Disease and Ticks in Greenbelt Park

- United States National Park Service (NPS) approached the Maryland Department of Health and Mental Hygiene (DHMH) to:
  - Address community concern
  - Aid in the expansion of the education campaign for employees and visitors
  - Determine additional measures the park should take to reduce risk of tickborne disease

Greenbelt Park

[Map of Greenbelt Park]
Measures Already In Place

- Confirmed presence of lone star and blacklegged ticks in Greenbelt (GREE)
- Prevention information shared with schools and other groups prior to visit
- Warnings posted:
  - Park website
  - Signs posted on bulletin boards
  - Lighted sign at entrance

Lighted sign warning park visitors about ticks, Greenbelt Park, Summer 2010

Methods

- Surveyed Employees, Visitors, and Campers for:
  - Knowledge, attitudes, and practices (KAP) regarding tickborne disease and prevention
  - Self-reported tickborne disease after visit to GREE

- Made surveys available to visitors:
  - Rangers and campground hosts distributed surveys
  - Campground check-in, Ranger Station, Park Headquarters
  - Online survey

- Posted survey flyers throughout park:
  - Bulletin boards at picnic areas, trail heads, and campgrounds
  - Link to the online survey
Methods

- Data were collected from July 2, 2010 through October 31, 2010

- All surveys were voluntary and anonymous
  - Employee surveys linked with a unique identifier

- Microsoft Excel 2007 and SAS v.9.2 were used for analysis

- The DHMH Institutional Review Board and National Park Service Research Permit System approved the study
Ellen Stromdahl, Department of Defense (right), trained (from left) DHMH, NPS, and Greenbelt Park staff about ticks and tick habitat in Greenbelt Park, 2010

Erin Jones, DHMH (center left) trained DHMH, Greenbelt Park, NPS, and Prince George's County Health Department staff for survey administration in Greenbelt Park, 2010

<table>
<thead>
<tr>
<th>Characteristics of GREE Employees</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent pre-training surveys completed (n=32)</td>
<td>100</td>
</tr>
<tr>
<td>Percent post-training surveys completed (n=19)</td>
<td>59</td>
</tr>
<tr>
<td>Percent Male</td>
<td>81</td>
</tr>
<tr>
<td>Percent &gt;45 years old</td>
<td>42</td>
</tr>
<tr>
<td>Percent worked at GREE for &gt;10 years</td>
<td>52</td>
</tr>
<tr>
<td>Percent worked outdoors &gt;20 hours per wk</td>
<td>68</td>
</tr>
<tr>
<td>Percent reported previous LD (n=5)</td>
<td>16</td>
</tr>
<tr>
<td>Percent reported previous LD while employed at GREE (n=4)</td>
<td>80</td>
</tr>
<tr>
<td>Percent used &gt;1 repellent-based preventive measure per week</td>
<td>81</td>
</tr>
<tr>
<td>Percent used &gt;1 clothing-based preventive measure per week</td>
<td>88</td>
</tr>
</tbody>
</table>
Employee Tickborne Disease Knowledge
Pre- and Post-training Linked Survey Analysis

Multiple Choice: Ticks must be attached at least ___ hours to transmit LD?

- Correct (>24 hrs): 31.6% (Pre-training), 78.9% (Post-training)
- Incorrect (>2, >4, >12 hrs): 15.8% (Pre-training), 15.8% (Post-training)
- Don't know: 52.6% (Pre-training), 5.3% (Post-training)

Employee Tickborne Disease Knowledge
Pre- and Post-training Linked Survey Analysis

True/False: Erythema migrans (bullseye rash) is always present with Lyme disease?

- Correct (False): 36.8% (Pre-training), 31.6% (Post-training)
- Incorrect (True): 47.4% (Pre-training), 57.9% (Post-training)
- Don't know: 15.8% (Pre-training), 10.5% (Post-training)
Employee Tickborne Disease Knowledge
Pre- and Post-training Linked Survey Analysis

**True/False: Ehrlichiosis is another tickborne disease?**

<table>
<thead>
<tr>
<th></th>
<th>Pre-training (N=19)</th>
<th>Post-training (N=19)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct (True)</td>
<td>10.5</td>
<td>52.6</td>
</tr>
<tr>
<td>Incorrect (False)</td>
<td>10.5</td>
<td>36.8</td>
</tr>
<tr>
<td>Don't know</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Proportion of Employees that Reported Various Tick Removal Methods**

- Any other method
- Remove/squeeze with fingers
- Burn with a match
- Twist out with tweezers
- *Pull straight out with tweezers
- Apply substance (e.g. Vaseline)

* Correct Method

--

6/24/2011
Visitors and Campers

Visitors:
- 127 responded (Jul through Oct, 2010)
  - 62% completed postage-paid paper surveys post visit
  - 38% completed online surveys post visit
- Paper surveys were available throughout the park, included link to online survey

Campers:
- 53 completed on-site survey
  - 5 occasions, July and August 2010
- 9 (17%) completed the follow-up survey one month after GREE visit

Characteristics of GREE Visitors and Campers, n=180

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent Male</td>
<td>53</td>
</tr>
<tr>
<td>Percent &gt; 45 years old</td>
<td>26</td>
</tr>
<tr>
<td>Percent spent &lt; half of the day in GREE</td>
<td>60</td>
</tr>
<tr>
<td>Percent reported previous LD</td>
<td>8</td>
</tr>
<tr>
<td>Number reported LD after visiting GREE</td>
<td>0</td>
</tr>
<tr>
<td>Percent responded on day of departure (Visitors only, n=81)</td>
<td>37</td>
</tr>
<tr>
<td>Percent responded &gt;30 days after departure (Visitors only, n=81)</td>
<td>17</td>
</tr>
<tr>
<td>Percent used &gt;1 repellent-based preventive measure per week</td>
<td>47</td>
</tr>
<tr>
<td>Percent used &gt;1 clothing-based preventive measure per week</td>
<td>78</td>
</tr>
</tbody>
</table>
Clothing and Repellent Prevention Measures
Always or Usually Taken While or After Working In (Employees) or Visiting (Visitors and Campers) GREE

- Repellent pretreated clothing
- Repellent on clothes
- Repellent on skin
- Light colored clothing
- Long pants
- Long sleeves
- Tuck pants into socks/boots

Tick Checking Prevention Measures
Always or Usually Taken While or After Working In (Employees) or Visiting (Visitors and Campers) GREE

- Check clothes
- Check body
- Check Coworkers/Family/Friends
- Bathe within 2 hours
- Launder clothing
Barriers to Taking Prevention Measures While in Greenbelt Park

Repellent Prevention Measures

- No Need
- Doesn't work
- Too troublesome
- Hard to remember to apply
- Unaware of this measure
- Concerned about repellent safety
- Don't like the way repellent smells or feels
- Don't have easy access

Percent

Campers
Visitors
Employees

Barriers to Taking Prevention Measures While in Greenbelt Park

Checking Prevention Measures

- Other
- No Need
- Doesn't work
- Too troublesome
- Hard to remember
- Unaware of this measure

Percent

Campers
Visitors
Employees
Barriers to Taking Prevention Measures While in Greenbelt Park

Clothing Prevention Measures

Prior Lyme Disease and Use of Prevention Measures

Prior self reported LD was not significantly associated with taking prevention methods in Visitors and Employees

<table>
<thead>
<tr>
<th>Prevention Measure</th>
<th>Employees</th>
<th>Visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applying repellent</td>
<td>0.35</td>
<td>0.76</td>
</tr>
<tr>
<td>Wearing protective clothing</td>
<td>0.55</td>
<td>0.12</td>
</tr>
<tr>
<td>Performing tick checks</td>
<td>1.00</td>
<td>0.28</td>
</tr>
</tbody>
</table>
Conclusions

- No new tickborne disease reported by visitors or campers
  - Limited number of visitor and camper surveys completed one month after the visit
- Visitors and Employees with previous LD diagnosis were no more likely to implement personal protective measures
  - Reassessment of best Lyme disease prevention strategies is warranted
  - Limited number of respondents who reported prior LD
- Limited understanding of risk factors
  - Few LD diagnosis reported

Conclusions

- Increased understanding of LD knowledge, misconceptions, and prevention measures
  - Reinforcement of prevention messages is warranted for employees
- NPS, with DHMH involvement, implemented an educational wayside panel and podcast for visitors regarding Lyme and other tickborne disease prevention
This study was supported in part by an appointment to the Applied Epidemiology Fellowship Program administered by the Council of State and Territorial Epidemiologists (CSTE) and funded by the Centers for Disease Control and Prevention (CDC) Cooperative Agreement Number 1U38HM000414

Acknowledgments

Greenbelt Park
Frederick Cunningham
Eli Alford
Robin Martin
Kevin Barry
Debbie Kirkley

National Park Service
Amy Chanlongbutra
David Wong

Department of Defense
Ellen Stromdahl

Prince George’s County Health Department
Angela Crankfield-Edmond

Maryland Department of Health
Katherine Feldman
David Blythe
SB Wee
Kimberly Mitchell
Kis Robertson
Byron Pugh
Mary Armolt

This study was informed by previous collaborative efforts of the NPS and public health departments conducted at Gettysburg National Military Park Cooperative Agreement Number 1U38HM000414