Wisconsin Vectorborne Disease Toolkit

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Introduction

Purpose

The purpose of this toolkit is to provide information to local governments, health departments, and citizens in Wisconsin to prepare for and respond to vectorborne disease. The toolkit focuses on background information for Wisconsin and practical guidance, strategies, media releases, talking points, definitions, and useful reference materials related to vectorborne disease.

The guides in this toolkit may be copied onto agency letterhead for distribution to residents in your region affected by vectorborne diseases. Additional resources may be found in Appendix B: Additional Resources.

Background

Over the last 60 years, Wisconsin’s weather has generally been getting warmer and wetter.¹ The natural environment can change as our climate is projected to continue changing, and this can have an impact on the behaviors and distribution of vectors. A vector is a pathogen’s temporary home until it transmits disease between the original host and the end host. Vectors can be especially sensitive to temperature changes.⁴ Certain species of Wisconsin mosquitoes and ticks can transmit mosquito-borne and tickborne diseases. The warmer, wetter conditions in Wisconsin can affect the rate of reproduction of mosquitoes and ticks and potentially increase transmission of vectorborne disease, especially during warm weather months.²

Late spring through fall is the peak disease transmission time for Wisconsin vectors such as the blacklegged tick (commonly known as the deer tick).³ Ticks can be found in tall grass and wooded areas. Deer ticks are known vectors for Lyme disease and anaplasmosis, the most common vectorborne diseases found in Wisconsin. Most common mosquito species
in Wisconsin are not prone to carrying diseases; however, some mosquito species in Wisconsin can transmit West Nile virus (WNV) and several encephalitis pathogens.

**Climate Trends**

Long-term trend analysis of Wisconsin’s climate indicates that the state is becoming warmer and wetter.\(^1\) Wisconsin has experienced an increase in average annual precipitation, a longer growing season, and warmer annual average temperatures. The warmer weather allows the range of ticks and mosquitoes to expand north, which affects Wisconsin.\(^4\)

Increased temperatures in Wisconsin have important implications for vectorborne disease; studies have found a correlation between increased temperatures and increased vectorborne diseases.\(^2,4,5\) A warmer and wetter climate alters the habitats of vectors. Increases in precipitation can lead to increased breeding grounds and a wider distribution of arthropod vectors. Inclement weather patterns alter the life cycle of arthropod vectors. This can lead to a quicker maturation of larvae in warmer and wetter environments, like those found in Wisconsin.\(^6\)

In contrast to the warm and wet environment, extreme heat that causes drought can have the opposite effect on vectorborne diseases. Dry heat and low moisture can lead to a decrease in disease transmission rates for ticks due to their sensitivity and continuous exposure to elevated temperatures.

In the extreme heat experienced during the summer of 2012, an increased transmission of West Nile virus (WNV) disease occurred.\(^5\) Dry
heat and low amounts of moisture can lead to increased transmission of disease by strong vectors that can flourish in these conditions. This spike may be due to the reduced activity of other common nuisance mosquitoes. Those nuisance mosquitoes may have been too sensitive to endure the temperatures, and their absence may have affected the protective behavior of the population, reducing the use of protective repellants.

**Health Impacts**

Public health officials should prepare for a possible increase in vector activity and vectorborne diseases. During times of high vector activity, people need to be aware of the health risks associated with time spent outside, whether through work or recreation. Hikers, campers, and residents of areas with heavy tick and mosquito activity need to be aware of the illnesses associated with tickborne and mosquitoborne disease transmission.

Tickborne bacterial illnesses include Lyme disease, anaplasmosis and ehrlichiosis. Lyme disease is the most common tickborne disease and is primarily found in the northwestern part of Wisconsin, but cases occur in all counties. Common initial symptoms of these tickborne diseases include fever, chills, muscle and joint aches, tiredness, headache, redness or rash at the bite location, and swollen lymph nodes.  

Arboviruses are viruses transmitted by arthropods, such as mosquitoes and ticks. In Wisconsin, the most commonly reported arboviral diseases are West Nile virus, La Crosse encephalitis, and Powassan virus. Symptoms of arboviral diseases include fever, headache, body aches, joint pain, vomiting, diarrhea, rash and lethargy. In the case of severe arboviral infections, symptoms can include encephalitis (swelling of the brain), seizures, coma, paralysis, and meningoencephalitis (swelling of the meninges).

Preventive measures can help protect health, including use of insect repellents with DEET and permethrin that are recommended. See Guide 7 below for more information.
Vectorborne Disease Response and Recovery Guidance

The Wisconsin Electronic Disease Surveillance System (WEDSS) is one data source among several used to monitor vector-related communicable diseases in Wisconsin. WEDSS is an online system used by health care professionals, public health professionals, infectious disease professionals, clinical laboratories, and other professionals who report disease infection. This system was developed to create easy access for disease surveillance programs to document diseases in their jurisdiction.
**Definitions**

**Disease Vector**

A living intermediary (person, animal, or microorganism) that may carry and transmit disease-causing pathogens (e.g., viruses, bacteria) from one susceptible host to another.

**Zoonotic Disease**

A disease that can normally exist in animals and be transmitted from animals to people.

**Asymptomatic Carrier**

A living intermediary (person, animal, or microorganism) that has contracted an infectious disease but does not exhibit symptoms.

**Tickborne Diseases**

Diseases that are transmitted by a tick.

**Mosquitoborne Diseases**

Diseases that are transmitted by mosquitoes.

**Arboviral Diseases**

Short for arthropod-borne. Diseases transmitted by an arthropod such as a mosquito or tick.

**Pathogen**

An organism (e.g., virus, bacteria) that may lead to disease.

**Host**

An animal infected or infested by disease that may become ill from the disease.

**Reservoir**

An animal that can carry a disease without being infected by the disease.
Guide 1: Ticks in Wisconsin

There are at least 16 reported species of ticks in Wisconsin, only a few of which feed on humans. The most commonly encountered ticks in Wisconsin for tickborne diseases are the blacklegged tick (commonly known as the deer tick), and the dog (wood) tick. Ticks are vectors and can carry pathogens that cause diseases such as Lyme disease, human anaplasmosis, ehrlichiosis, babesiosis, and Powassan virus.
Guide 2: Lyme Disease

In Wisconsin, the statewide average incidence of Lyme disease has increased more than five-fold in the past 19 years, from an average of 8.0 confirmed cases per 100,000 people (1991-1995) to 41.8 confirmed cases per 100,000 people (in 2011). Wisconsin’s rate for both confirmed and probable cases of Lyme disease in 2011 was 61.8 cases per 100,000 people.

Lyme Disease

**FACTS**

Lyme disease is caused by the bacteria *Borrelia burgdorferi*.

Transmission of Lyme disease occurs when a female tick takes a blood meal.

A blacklegged (deer) tick must be attached for at least 24 hours but averages 36-48 hours before the bacteria can be transmitted.

**CLINICAL SIGNS**

**Stage 1**: Appears 3-30 days after tick bite. Symptoms include:
- Red, expanding erythema migrans (EM) rash at the site of the tick bite. An EM rash slowly expands outwards.
- EM rash is being seen more commonly than a "bull's eye" rash. Experts in the field are referring to EM rash rather than "bull's-eye" rash.
- Fever, chills, muscle and joint aches, tiredness, headache, and swollen lymph nodes.

**Stage 2**: Early, disseminated stage that occurs days to weeks post-tick bite. Symptoms include:
- Additional bull's-eye or EM rashes in other areas of the body
- Loss of muscle tone on one or both sides of the face
- Severe headaches, stiffness of the neck due to inflammation of the spinal cord (meningitis)
- Pain and swelling of large joints
- Dizziness or heart palpitations

**Stage 3**: Can occur months to years after the tick bite, and can become a severe problem if not treated. Symptoms include:
- Chronic fatigue
- Joint and muscle pain
- Neurological and cognitive defects
- Irregular heartbeat

**TREATMENT**

The use of antibiotic prophylaxis can be used to prevent Lyme disease in case of a bite.

Once acquired, Lyme disease can be treated with antibiotics.

Approximately 10%-20% of patients experience symptoms that last months to years after antibiotic treatment. This is called post-treatment Lyme disease syndrome (PTLDS) or chronic Lyme disease, and its direct cause is unknown. Most patients have reduced symptoms over time.
Guide 3: Anaplasmosis\textsuperscript{7,13}

Anaplasmosis is a common tickborne disease and the second most reported tickborne disease in Wisconsin. It is part of a category of bacteria that give rickettsial infections. Anaplasmosis is caused by the transfer of bacteria from tick to host. This disease was previously known as human granulocytic ehrlichiosis (HGE). Antibiotic treatment is available for anaplasmosis.\textsuperscript{7}

**FACTS**

Anaplasmosis is an illness caused by the bacterium \textit{Anaplasma phagocytophilum}.

Anaplasmosis is primarily transmitted through a bite from the blacklegged (deer) tick.

To transfer the bacteria, the tick must be attached for at least 12-24 hours.

Anaplasmosis is the second most reported tickborne disease in Wisconsin.

**CLINICAL SIGNS**

In humans, symptoms of anaplasmosis typically begin 1-3 weeks after being bitten by a tick infected with the bacteria.

Blood tests may not always identify the presence of the bacteria, and false negatives can occur. Treatment should continue for a suspected case. Symptoms include:

- Fever
- Headache
- Muscle pain
- Malaise
- Chills
- Nausea/ abdominal pain
- Cough
- Confusion

**TREATMENT**

Anaplasmosis can be treated with antibiotics; this disease is caused by bacteria and is therefore treatable with antibacterial medications.
Guide 4: Ehrlichiosis

Ehrlichiosis is an illness caused by several species of the bacteria, *Ehrlichia* (*E. chaffeensis*, *E. ewingii* and *E. muris-like*). Ehrlichiosis can be more severe than anaplasmosis, and may involve the central nervous system, causing life-threatening complications. The number of reported ehrlichiosis cases is much lower than the number of anaplasmosis cases in Wisconsin.\(^7\)

**FACTS**

To transmit the bacteria, the tick must be attached for at least 12-24 hours.

Ehrlichiosis is less common than anaplasmosis. *E. muris-like* (EML) bacteria were discovered in 2009 in Wisconsin and Minnesota.

*E. chaffeensis* is rare but has occurred in Wisconsin.

*E. ewingii* commonly occurs abroad.

**CLINICAL SIGNS**

In humans, illness usually occurs 5-10 days after being bitten by a blacklegged (deer) tick infected with the bacteria. Symptoms include:

- Fever
- Severe headache
- Muscle pain
- Chills
- Fatigue
- Nausea
- Vomiting
- Diarrhea
- Joint pain
- Confusion
- Rash (found in 60% of children and less than 30% of adults)

Clinical laboratory findings may include low blood count, low white blood cell count, and elevated liver enzymes.

**TREATMENT**

This disease is caused by bacteria and is therefore treatable with antibacterial medications.

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**Reported Total Cases of Ehrlichia chaffeensis, Wisconsin, 2008 - 2014 (n=133)**

Total number of cases include confirmed and probable. Revised 4/3/2015.
Guide 5: Babesiosis

Babesiosis cases have increased greatly in the past few years, with most occurrences being reported since 2011. Due to the severity of the infection, hospitalization is common in patients infected with babesiosis; 47% of babesiosis cases from 2011-2014 were hospitalized.

**FACTS**

Babesiosis is a disease caused by the parasite *Babesia*.

The disease occurs primarily in the upper Midwest and northeastern states.

The blacklegged (deer) tick is the most common vector for babesiosis.

In rare instances, the infection has been acquired through blood transfusions.

**CLINICAL SIGNS**

Symptoms of babesiosis tend to be more apparent and severe in the elderly population or in people with compromised immune systems. Symptoms include:

- Fever
- Fatigue
- Anemia, which can last from several days to several months

Infections can also occur without producing symptoms.

**TREATMENT**

There is no standard treatment for babesiosis.

The use of antibiotics combined with certain drugs used in the treatment of malaria has been found to be effective in some patients with babesiosis.
**Guide 6: Powassan Virus**

Powassan virus (POWV) is a rare tickborne arboviral infection. POWV is the only tickborne virus that is part of the arbovirus group. The presence of POWV has been documented in several tick species (Ixodes spp., Dermacentor andersoni).³

**Powassan Virus**

**FACTS**

Powassan virus (POWV) is the only known arbovirus in ticks occurring in Wisconsin.

The virus can take effect within 15 minutes.

Cases of POWV:

- 60 total U.S. cases in 2004-2013.
- 19 total Wisconsin reported cases in 2003-2014.

**CLINICAL SIGNS**

The incubation period is from one week to one month. The disease may have no apparent symptoms. Symptoms include:

**Acute onset of:**

- Fever
- Muscle weakness
- Confusion
- Headache
- Nausea
- Vomiting
- Stiff neck

**Severe Symptoms:**

- Confusion
- Paralysis
- Speech difficulties
- Memory loss
- Meningoencephalitis (inflammation of the brain and meninges)

**TREATMENT**

There is no commercial test for viral detection of POWV; it can be tested at the U.S. Centers for Disease Control and Prevention (CDC).

There is no treatment at this time other than supportive care.

Image Source: Centers for Disease Control and Prevention (CDC)
Guide 7: Tick Prevention and Control

Although some effective therapies are available for Lyme disease and other tickborne diseases, preventative measures remain the best approach. Ticks are most active during the warmer months of the year. In Wisconsin, preventive measures are especially needed during the months of April through October.

People spending time outdoors include campers, anglers, hikers, hunters, farmers, and people in outdoor occupations; they may be more likely to encounter ticks and therefore are at a higher risk of acquiring tickborne diseases.

Personal Protection

**Repellents**

Use effective tick repellents and apply according to the label instructions. The Centers for Disease Control and Prevention (CDC) recommends that adults use repellents with 20%-30% DEET on exposed skin and clothing to prevent tick bites. Permethrin is also effective against ticks and lasts for days to weeks, but should only be applied to clothes and **not** directly to the skin.

**Clothing**

Wear long sleeves, long pants, and long socks to keep ticks on the outside of clothing. Light colored clothing will help you spot ticks. Tuck shirts into pants and pants into shoes or socks. If you are outdoors for an extended period of time, tape pant legs where pants and socks meet so that ticks cannot crawl under clothes.

**Tick Avoidance**

If possible, avoid wooded and bushy areas that contain high grass and leaf litter.

If you do go into wooded areas, stay in the center of a cleared trail to avoid contact with overgrown grass, brush, and leaf litter.
To help control the spread of infection from ticks, maintain the vegetation around your home. Take precautions to avoid ticks by reducing areas with high, tall grass surrounding your home. Ticks are commonly found in these areas.

**Tick Control:** Create tick-safe zones

- Clear overgrown grass, brush, and leaf litter from the premises or trails.
- Use wood chips or gravel as a barrier between lawns and wooded areas.
- Mow lawns frequently and remove cut grass and leaves.
- Keep tables, swing sets, play equipment, etc., away from woods, shrubs, and tall grass. Place in a sunny location, if possible.
- Discourage deer intrusion by constructing barriers and not feeding them.
- Remove woodpiles, or stack wood neatly in dry areas away from houses to prevent rodent harborage.
- Acaracides (pesticides that kill ticks) may be helpful to use during spring, but a professional pesticide company should be consulted prior to use.

Apply pesticides outdoors to control ticks. For more information, visit the Environmental Protection Agency's Pesticide Safety site (Appendix B).

- The Environmental Protection Agency (EPA) and each state have different rules and regulations related to pesticide application on residential properties; identify these before pesticide application.
- Consider hiring a professional pesticide company.
Body Check and Tick Removal

Check your body for ticks after being outdoors. Inspect all body parts carefully, especially the armpits, scalp, and groin. Remove any ticks from clothing, gear, and pets before going inside. Take a shower or bath as soon as possible to wash off any ticks that still might be on your body. Tumble clothes in a dryer on high heat for an hour to kill remaining ticks.

To remove an attached tick:

- **Grasp it with narrow-bladed tweezers or forceps as close as possible to attachment (skin) site.**
- **Pull upward and out with a firm and steady tension.** If tweezers are not available, use fingers shielded with tissue paper or rubber gloves. Do not handle the tick with bare hands. Be careful not to squeeze, crush or puncture the tick, as it may contain infectious fluids.
- **After removing the tick, thoroughly disinfect the bite site and wash hands.**
- **Avoid folklore remedies such as “painting” the tick with nail polish or petroleum jelly, or using heat to make the tick detach from the skin.** Your goal is to remove the tick as quickly as possible—not wait for it to detach.

If you develop a rash or fever and other symptoms described above within several weeks of removing a tick, see your doctor. Be sure to tell the doctor about your recent tick bite, when the bite occurred, and where you most likely acquired the tick.

HOW TO REMOVE A TICK

Image Source: Centers for Disease Control and Prevention (CDC)
**Guide 8: Mosquitoes in Wisconsin**

Mosquitoes are vectors that can transmit an arbovirus (an arthropodborne virus). Most mosquitoes don’t carry arboviruses, but those that do can infect with a bite. Many of the associated diseases can be prevented by the elimination of standing and stagnant water sources. Arboviral infections commonly reported in Wisconsin are West Nile virus (WNV), California encephalitis (CA), La Crosse encephalitis (LAC), and Jamestown Canyon (JC).

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**Mosquito Life Cycle**

Species: *Aedes*
Diseases include: LAC, CA, JC

Species: *Anopheles*
Diseases include: JC

Species: *Culex*
Diseases include: WNV

Images sources: Above-Environmental Protection Agency (EPA) and Right-Centers for Disease Control and Prevention (CDC)
Guide 9: West Nile Virus

The first case of WNV in the United States occurred in 1999 and human cases of West Nile virus (WNV) have been detected and investigated in Wisconsin since 2002. There have been 98 cases of WNV reported in Wisconsin during the years 2007-2014. The risk of WNV infection increases during summer, even during times of extreme dry heat and drought. Risk of infection is higher for those who work outdoors or spend a lot of time outdoors. Resilient species of mosquitoes, such as the *Culex*, a predominant carrier of WNV, can survive and thrive in very small amounts of stagnant water.

FACTS

- WNV infection is an illness caused by the Flavivirus.
- WNV is primarily transmitted through a bite from an infected mosquito of the species *Culex*.

CLINICAL SIGNS

- 70%-80% of infected people do not show signs or symptoms of the infection.
- In humans, symptoms of WNV typically begin 3-14 days after being bitten by a mosquito infected with the virus.
  - 1 in 5 people who contract WNV will develop symptoms:
    - Fever
    - Headache
    - Body aches
    - Joint pain
    - Vomiting
    - Diarrhea
    - Rash
  - Less than 1% of people with WNV become severely ill.

TREATMENT

- There is no specific treatment for WNV.
- No vaccine is available.
- Infection may provide lifelong immunity.

Source for both images: Centers for Disease Control and Prevention (CDC)
Guide 10: Other Arboviral Infections

Encephalitis is an acute inflammation of the brain that can be caused by an arbovirus. In Wisconsin, several types of mosquitoborne arboviruses can cause encephalitis, with two main California serogroup viruses: La Crosse encephalitis (LAC) and Jamestown Canyon (JC). These serogroups are part of the viral family Bunyaviridae. LAC is most likely to be the cause of an encephalitis-related case, compared to other serogroups.

Arboviral Encephalitis

FACTS

- Arboviral encephalitis is swelling of the brain caused by severe symptoms from California serogroup viruses such as La Crosse and Jamestown Canyon viruses.
  - A total of 51 California serogroup cases occurred in Wisconsin during 2008-2014.
  - La Crosse encephalitis (LAC):
    - It was first identified in 1963 in children from La Crosse, Wisconsin.
    - A total of 68 cases with an average of 10 cases per year occurred from 2002 to 2008.
  - Jamestown Canyon:
    - 19 confirmed cases from 2011-2014.

CLINICAL SIGNS

- The incubation period is 5-15 days. Some people may have no apparent symptoms. Symptoms include:
  - Acute Symptoms:
    - Fever
    - Headache
    - Nausea
    - Vomiting
    - Tiredness
  - Severe Symptoms:
    - Encephalitis
    - Seizures
    - Coma
    - Paralysis
    - Meningoencephalitis

TREATMENT

- There is no commercial test for viral detection of LAC or JC virus, but it can be tested at the CDC.
- No vaccine is available.
- Hospitalization: Supportive treatment should be provided.
Guide 11: Mosquito Prevention and Control

Use the appropriate mosquito repellant and apply according to the label instructions. It is recommended to use products registered with the Environmental Protection Agency (EPA). EPA registration means the EPA does not expect the product to cause adverse effects to human health or the environment when used according to the label.

Personal Protection

**Repellents:** It is recommended to use a strong repellent approved by the U.S. Environmental Protection Agency. Repellents recommended by the CDC contain permethrin or DEET. These repellents have been studied the most and have proven to offer extra protection. Additional natural products such as oil of lemon eucalyptus have also been studied.

**Clothing:** Wear long-sleeved shirts, long pants, socks, and shoes. Mosquitoes may bite through thin clothing. It is recommended to spray clothes with a reliable repellent such as permethrin.

**Permethrin:** This repellent and insecticide used on clothing helps to repel and kill arthropods like mosquitoes. This product has been known to continually repel and kill insects even after several washings. Reapply product by following directions.

- Avoid direct skin contact with permethrin. Recommended for use on the following items when directions are followed:
  - Clothing
  - Shoes
  - Bed nets
  - Camping gear

- Avoid being outside during times of high mosquito activity (dawn and dusk).

- Avoid stagnant water sources.
To help control the spread of infection from mosquito vectors, maintain the area around your home. Avoid having areas with stagnant water sources, which are common breeding grounds for mosquitoes.

**Maintenance for Protection**

**Control**

- Keep window screens repaired so that mosquitoes cannot enter your home.
- Dispose of discarded tires, cans, or plastic containers left outside that may contain standing water.
- Drain standing water from pools or hot tub covers.
- Turn over plastic wading pools and wheelbarrows when not in use.
- Change the water in bird baths, pet dishes and wading pools at least every 3-4 days.
- Keep drains, ditches and culverts clean of trash and weeds so water will drain properly.
- Clean gutters to ensure they drain properly.

For more information on specific mosquito breeding grounds, please go to the following links:

https://www.dhs.wisconsin.gov/environmental/mosquito-habitat.htm

http://www.idph.state.il.us/envhealth/wnv_house/wnv_house.htm

Image from: http://cityhallblog.dallasnews.com/2012/08/
Guide 12: Talking Points

If you are approached by the media with questions about vectorborne disease in your jurisdiction, the following talking points may be helpful.

1. Blacklegged ticks (also known as deer ticks) can carry bacteria that cause Lyme disease and other diseases.
2. Use an insect repellent approved by the Environmental Protection Agency (EPA) and follow label instructions.
3. Wear light-colored protective clothing to better see ticks or mosquitoes.
4. Check yourself for ticks after walking in high grass, heavily wooded areas, and bushy areas with leaf litter.
5. If you find a tick embedded in your skin, to prevent infection remove it immediately, grasping with a tweezers at the head.
6. Prevent mosquito breeding by draining standing water from gutters, wading pools and old tires.

Any of the above can be followed up by these talking points:

7. If you are having symptoms or illness that you think is from an insect bite, contact your doctor [insert correct resource] right away.
8. For more information about ticks and mosquitoes, contact your local health department or visit the Wisconsin Department of Health Services web page on ticks at: https://www.dhs.wisconsin.gov/tickborne/index.htm or mosquitoes at: https://www.dhs.wisconsin.gov/arboviral/index.htm
Guide 13: Message Maps

Message mapping is one of the most important risk communication tools that public health agencies can employ. The goal of a message map is to convey important information in a concise and easy-to-understand fashion.

General guidelines to follow when creating a message map include:

- Stick to three key messages or one key message with three parts for each underlying concern or specific question.
- Keep key messages brief. The reader should ideally spend less than 10 seconds per line.
- Develop messages that are easily understood by the target audience. (For communications with the general public, use a 6th grade to 8th grade readability level.)
- Place messages within a message set. The most important messages should occupy the first and last positions.
- Develop key messages that cite credible third parties.
- Use graphics and other visual aids to enhance key messages.
- Keep a positive tone. Messages should be solution-oriented and constructive. Try to balance negative messages with positive ones.
- Avoid unnecessary uses of the words no, not, never, nothing, and none.¹⁶
The following is a message map that can be used when addressing the general public about ticks and mosquitoes.

<table>
<thead>
<tr>
<th>Key Messages</th>
<th>Supporting Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>(3 key messages)</td>
<td>(3 items of supporting information for each key message)</td>
</tr>
<tr>
<td>Message 1:</td>
<td>Supporting Information 1</td>
</tr>
<tr>
<td><strong>Be quick and remove that tick!</strong></td>
<td><em>Ticks often found in Wisconsin are the deer tick and the wood tick, which are most active during warm-weather months.</em></td>
</tr>
<tr>
<td></td>
<td>Supporting Information 2</td>
</tr>
<tr>
<td></td>
<td><em>A blacklegged (deer) tick must be attached for at least 12-24 hours before bacteria can be transmitted.</em></td>
</tr>
<tr>
<td></td>
<td>Supporting Information 3</td>
</tr>
<tr>
<td></td>
<td><em>If you find a tick burrowed into your skin, remove it immediately with tweezers and be sure the head remains intact.</em></td>
</tr>
<tr>
<td>Message 2:</td>
<td>Supporting Information 1</td>
</tr>
<tr>
<td><strong>Reduce exposure to mosquitoes!</strong></td>
<td><em>Mosquito-borne diseases are rare in Wisconsin, but people should still take steps to prevent being infected.</em></td>
</tr>
<tr>
<td></td>
<td>Supporting Information 2</td>
</tr>
<tr>
<td></td>
<td><em>Use insect repellents and avoid being outside at times of high mosquito activity (dawn and dusk).</em></td>
</tr>
<tr>
<td></td>
<td>Supporting Information 3</td>
</tr>
<tr>
<td></td>
<td><em>Wear light-colored, loose clothing when doing activities outdoors in dense mosquito areas.</em></td>
</tr>
<tr>
<td>Message 3:</td>
<td>Supporting Information 1</td>
</tr>
<tr>
<td><strong>Keep ticks and mosquitoes away!</strong></td>
<td><em>Avoid areas with high grass and heavily leafy areas where ticks and mosquitoes commonly live.</em></td>
</tr>
<tr>
<td></td>
<td>Supporting Information 2</td>
</tr>
<tr>
<td></td>
<td><em>Drain areas with standing water to eliminate mosquito breeding.</em></td>
</tr>
<tr>
<td></td>
<td>Supporting Information 3</td>
</tr>
<tr>
<td></td>
<td><em>If in areas with high tick and mosquito activity, wear protective clothing and use repellents with DEET or permethrin (follow product instructions).</em></td>
</tr>
</tbody>
</table>
Guide 14: Travel Disclaimer

The following vectorborne infections have been found in neighboring countries. Some of these diseases have also been detected in the U.S., though they are rare. Take precautions to protect yourself from these diseases when traveling.

- **Tickborne Diseases**
  - Rocky Mountain spotted fever (RMSF): Has not been reported in Wisconsin since 2010.
  - Typhus fever: Has been found in California, Hawaii, Texas, Asia, Africa and southern Europe.

- **Other Arboviral Diseases**
  - Chikungunya (CHIK)
    - Identified in 2013 in Caribbean countries and territories.
    - In 2014, local transmission occurred in Florida, Puerto Rico, and the U.S. Virgin Islands. Also occurs in Africa, Asia, Europe, and Pacific islands.
  - Dengue Fever (DEN)
    - Identified in Florida, Guam, Hawaii and Puerto Rico.
    - Common in tropical areas such as the Caribbean, Mexico, South and Central America, the Pacific, Asia, and parts of Africa.
  - Yellow Fever (YF)
    - Rare in U.S.
    - Occurs in Africa and South America
  - Saint Louis encephalitis (SLE)
    - Common in eastern and central states.
    - Has not been reported in Wisconsin since 2000.
  - Eastern and Western Equine Encephalitis (EEE, WEE)
    - Occur in eastern and western states.
    - EEE has not been reported in Wisconsin since 2011.

When traveling, stay aware of your surroundings and the potential for contracting disease. It is recommended that travelers bring EPA and CDC recommended repellents such as those containing **DEET or permethrin**, as it may be difficult to obtain these products abroad.
Appendix A: References


11. Preventing Tick Bites and Tick-borne Disease | Environment, Health & Safety, University of Wisconsin System, at https://www.wisconsin.edu/ehs/osh/ticks/


Appendix B: Additional Resources

Wisconsin Department of Health Services

https://www.dhs.wisconsin.gov/arboviral/index.htm
https://www.dhs.wisconsin.gov/environmental/mosquito-habitat.htm

Centers for Disease Control and Prevention (CDC)


List of Wisconsin Local Health Departments

https://www.dhs.wisconsin.gov/lh-depts/counties/index.htm

Illinois Department of Public Health

http://www.idph.state.il.us/envhealth/wnv_house/wnv_house.htm

United States Environmental Protection Agency

http://www2.epa.gov/mosquitocontrol

http://www2.epa.gov/pets/controlling-fleas-and-ticks-around-your-home