



Paul R. LePage, Governor Ricker Hamilton, Acting Commissioner

Department of Health and Human Services  
Commissioner's Office  
221 State Street  
11 State House Station  
Augusta, Maine 04333-0011  
Tel.: (207) 287-3707; Fax: (207) 287-3005  
TTY Users: Dial 711 (Maine Relay)

## Mosquitoes, Mosquito-Borne Diseases, & Repellent

Mosquitoes in Maine can carry and transmit disease. It is important to practice proper prevention to avoid mosquito bites. This is especially important at dawn and dusk when many mosquitoes are most active.

Prevention methods include:

1. Wear an EPA-approved repellent when outdoors. Always follow the label instructions.
2. Wear long-sleeved shirts, pants, and socks when outdoors.
3. Use screens on windows and doors to keep mosquitoes out.
4. Avoid being outdoors at dawn and dusk when mosquitoes are most active.
5. Get rid of places where mosquitoes can lay their eggs by draining artificial standing water around your school.

Maine CDC has several recommendations for schools relating to mosquitoes:

1. Schools located in counties with recent Eastern Equine Encephalitis (EEE) or West Nile virus (WNV) activity should reschedule events at dawn and dusk to protect their students. To find out if a county has EEE or WNV activity, please look at the weekly Arboviral surveillance reports.
2. Obtain authorization from parents or guardians to apply EPA-approved repellents to minors when children/students are outside especially at dawn and dusk.

The materials in this section include information on specific mosquito-borne diseases in Maine, prevention of mosquito bites, and repellents. You are welcome to display this information and share it with others. Materials in this section include:

- Fight the Bite Poster
- Eastern Equine Encephalitis (EEE) Fact Sheet
- West Nile Virus Fact Sheet
- Repellent Fact Sheet
- Health Update: Mosquito-Borne Illnesses and Schools

Additional materials for mosquito-borne diseases that may be helpful:

- Weekly Arboviral surveillance reports contain information on mosquito, animal, and human specimens tested for the presence of Eastern Equine Encephalitis and West Nile virus. These are available on Maine CDC's website at <http://www.maine.gov/dhhs/mecdc/infectious-disease/epi/vector-borne/arboviral-surveillance.shtml>.
- The Maine Arboviral (Mosquito-Borne) Illness Surveillance, Prevention, and Response Guidance for Maine Communities is also available on Maine CDC's website at <http://www.maine.gov/dhhs/mecdc/infectious-disease/epi/vector-borne/documents/2016-Arbo-Plan.pdf>.

If you have additional questions about mosquitoes that this material does not cover, please contact Maine CDC's Disease Reporting Hotline at 1-800-821-5821 or by email at [disease.reporting@maine.gov](mailto:disease.reporting@maine.gov). This email is not secure and personal information should not be sent.



go ahead  
**the fight  
bite**

**You can protect yourself against West Nile virus and Eastern equine encephalitis**

- ▶ Wear long sleeves and long pants.
- ▶ Use repellent on skin and clothes.
- ▶ Take extra precautions at dusk and dawn.
- ▶ Use screens on your windows and doors
- ▶ Drain artificial sources of standing water where you live, work and play.

For more information about mosquito-borne diseases visit **[www.mainepublichealth.gov](http://www.mainepublichealth.gov)**

# Eastern Equine Encephalitis Fact Sheet



Maine Center for Disease  
Control and Prevention  
*An Office of the  
Department of Health and Human Services*

## What is Eastern equine encephalitis?

Eastern equine encephalitis (EEE) is a rare but serious disease that is caused by a virus that can cause inflammation of the brain. It can infect humans, horses, birds, and other animals.

## How is the EEE virus spread?

The EEE virus is spread through the bite of an infected mosquito. The disease is not directly passed from person-to-person or from horse-to-horse.

## What are the symptoms of EEE?

People with mild cases of EEE experience fever, chills, body and muscle pain, and general weakness. Severe cases of EEE infection begin with sudden onset of high fever (103° to 106°F), headache, stiff neck, chills, and vomiting. The illness may then progress to altered mental status, seizures, and inflammation of the brain. The disease quickly worsens and can lead to coma and death. Around one third of the patients who get EEE die, and many of those who survive have mild to severe brain damage.

## Who is at risk for infection with the EEE virus?

Anyone who lives in or visits an area where EEE virus is circulating is at risk for infection. Persons over the age of 50 and under the age of 15 are at greatest risk for severe illness following infection.

## How soon do people infected with EEE get sick?

Symptoms of EEE usually begin 4 to 10 days after a bite from an infected mosquito.

## How is EEE diagnosed?

EEE can only be diagnosed by a health-care provider. If you think that you or a family member have signs of illness compatible with EEE you should speak with your provider as soon as possible. If your provider thinks you have EEE, he or she will take samples of blood and cerebral spinal fluid to be tested for EEE.

## What is the treatment for EEE?

There is no specific treatment for EEE. Severe illnesses are treated by supportive therapy which may include hospitalization, respiratory support, and intravenous fluids. These treatments help to relieve the symptoms of EEE infection.

## Is there a vaccine for EEE?

Currently there is no human vaccine approved for EEE. There is an effective vaccine for horses that can be obtained by contacting a licensed veterinarian.

## What can I do to protect myself from EEE infection?

The best way to prevent EEE is to avoid being bitten by the mosquitoes that transmit the disease.

- Use an EPA approved repellent when outdoors. Always follow the instructions on the label.
- Wear long-sleeved shirts, pants, and socks when outdoors.
- Use screens on your windows and doors to keep mosquitoes out of your house.
- Get rid of places where mosquitoes can lay their eggs by draining standing water around your house.
- Take extra care to avoid mosquito bites in hardwood swamps and woodland habitats where there is greater potential for exposure to infected mosquitoes.

## Where can I get more information?

For more information contact your healthcare provider or local health center. You can also contact the Maine Center for Disease Control and Prevention by calling 1-800-821-5821 or visiting the website [www.maine.gov/idepi](http://www.maine.gov/idepi). The federal Centers for Disease Control and Prevention website - <http://www.cdc.gov> - is another excellent source of health information.

# West Nile Virus

## Fact Sheet



Maine Center for Disease  
Control and Prevention  
*An Office of the  
Department of Health and Human Services*

### **What is West Nile virus?**

West Nile virus (WNV) is a potentially serious viral illness that is spread through the bite of an infected mosquito. In a small number of cases, WNV has been spread through blood transfusions, organ transplants, breastfeeding, and from mother to baby during pregnancy.

### **What are the symptoms of WNV?**

Most people who are infected with WNV will not show any signs of illness. Some people (up to 20%) who are infected will have mild symptoms such as fever, head and body aches, nausea, rash, and swollen glands. A small percentage of people infected with WNV will develop serious illness with symptoms that can include high fever, altered mental status, neck stiffness, convulsions, coma, and sometimes death.

### **How soon do people infected with WNV get sick?**

People usually begin to show signs of illness 3 to 15 days after a bite from an infected mosquito.

### **How is WNV diagnosed?**

WNV can only be diagnosed by a health-care provider. If you think you have signs of illness compatible with WNV you should speak with your provider as soon as possible. If your provider thinks you have WNV, he or she will take samples of blood and cerebral spinal fluid to be tested for WNV.

### **What is the treatment for WNV?**

There is no specific treatment for WNV. Most people who are infected recover without treatment. Severe WNV illness usually requires supportive treatment in the hospital. This treatment can include intravenous fluids, help with breathing, and nursing care.

### **Is there a vaccine to prevent WNV?**

No, currently there is no vaccine available to prevent WNV.

### **What can I do to protect myself from WNV infection?**

The best way to avoid WNV is to avoid being bitten by the mosquitoes that transmit the disease.

- Use an EPA approved repellent when outdoors. Always follow the instructions on the label.
- Wear long-sleeved shirts, pants, and socks when outdoors.
- Use screens on your windows and doors to keep mosquitoes out of your house.
- Avoid being outdoors at dawn or dusk when many mosquitoes are most active.
- Get rid of places where mosquitoes can lay their eggs by draining standing water around your house.

### **Why do people talk about dead birds and WNV?**

Mosquitoes become infected with WNV when they feed on infected birds. Some birds become very sick and die in large numbers from the WNV infection.

### **What should I do if I find group of 3 or more dead birds?**

Do not touch the birds with your bare hands. Contact Maine CDC for instructions on how to report and safely dispose of the birds.

### **Where can I get more information?**

For more information contact your healthcare provider or local health center. You can also contact the Maine Center for Disease Control and Prevention by calling 1-800-821-5821 or visiting the website [www.maine.gov/idepi](http://www.maine.gov/idepi). The federal Centers for Disease Control and Prevention website - <http://www.cdc.gov> - is another excellent source of health information.

# Repellent Fact Sheet



Maine Center for Disease  
Control and Prevention

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Department of Health and Human Services

## Why should I use repellent?

Repellents can help reduce exposure to mosquito and tick bites. These arthropods may carry pathogens like West Nile virus and Lyme disease, which can cause serious illness and even death. Using repellent allows you to continue to spend time outdoors with a reduced risk of insect bites.

## What are some general considerations to remember when using repellents?

Always follow all directions and precautions appearing on the product label.

- Use only enough repellent to cover exposed skin or clothing. Do not apply repellent to skin that is unexposed.
- Heavy application is not necessary to achieve protection.
- Do not apply repellent to cuts, wounds or irritated skin.
- Do not spray aerosol or pump products directly on to your face. Spray your hands and then rub them carefully on your face, avoiding contact with the eyes and mouth.
- Do not spray aerosol or pump products in enclosed areas or use them near food.
- After returning indoors, wash treated skin with soap and water.

## How often should repellent be reapplied?

In general, you should reapply repellent if you are being bitten by insects. **Always follow the directions on the product you are using.** Sweating, perspiration or getting wet may mean that you need to re-apply repellent more frequently. Repellents containing a higher concentration (higher percentage) of active ingredient typically provide longer-lasting protection.

## What should I consider when choosing a repellent?

There are a variety of factors that you should think about:

- The biting arthropods from which you want protection
  - Is the pest of interest listed on the label?
- The length of time you need protection
- The active ingredient

- The percent of active ingredient in the product
- The activities you will be performing
  - High amounts of physical activity? Water exposure? Air temperature?
- How attractive **YOU** are to biting arthropods – everyone is different

You can search for a repellent that is right for you at <http://epa.gov/pesticides/insect/choose.htm>

## Which repellents work best?

CDC recommends using products that have been shown to work in scientific trials and that contain active ingredients which have been registered with the US Environmental Protection Agency (EPA) for use as repellents on skin or clothing. When the EPA registers a repellent, they evaluate the product for efficacy and potential effects on human beings and the environment. EPA registration means that EPA does not expect a product, when used according to the instructions on the label, to cause unreasonable adverse effects to human health or the environment. The following are active ingredients registered with the EPA:

- DEET
- Picaridin
- IR3535
- Oil of Lemon Eucalyptus (synthetic version is PMD)

Of the active ingredients registered with the EPA, the CDC believes that DEET and Picaridin have demonstrated a higher degree of effectiveness against biting insects. Products containing these active ingredients typically provide longer-lasting protection than others.

## How can you know which active ingredient a product contains?

Check the product label if you have questions – repellents must specify their active ingredients. In some cases you will note the chemical name in addition to/instead of the “common” name:

- DEET is N, N-diethyl-m-toluamide
- Picaridin is KBR 3023, sometimes known as “Bayrepel” outside the US
- Oil of Lemon Eucalyptus contains p-Menthane 3,8-diol

- PMD is the synthetic version of p-Menthane 3,8-diol
- IR3535 is also called Merck 3535

### **Where can I find these repellents?**

Most of these repellents are sold at multiple retail, discount and drug stores. A wider selection may be available at “outdoor” stores or in hunting and camping sections.

### **What is permethrin?**

Permethrin is registered with the EPA for use as both an insecticide and a repellent. Permethrin should **NOT** be applied directly to your skin. Permethrin products are intended for use on clothing, shoes, bed nets and camping gear. Permethrin treated products kill mosquitoes, ticks and other arthropods on contact. One application of permethrin to clothing retains its effectiveness through several washings. Clothing should be retreated according to the label instructions. Some commercial products are available pretreated with permethrin.

### **What are some reactions to be aware of when using repellents?**

The use of repellent products may cause skin reactions in rare cases. Most products also note that eye irritation can occur if product gets in the eye. If you suspect a reaction to a product, discontinue use, wash the treated skin, and call a poison control center. If product gets in the eyes, flush with water and consult your health care provider or a poison control center. If you go to a doctor, take the product with you.

There is a national number to reach a Poison Control Center near you: 1-800-222-1222

### **What guidelines are available for using a repellent on children?**

Always follow the recommendations appearing on the product label when using repellent:

- When using repellent on a child, apply it to your own hands and then rub them on your child. Avoid children’s eyes and mouth and use it sparingly around their ears.
- Do not apply repellent to children’s hands. (Children may put their hands in their mouths)
- Do not allow young children to apply insect repellent themselves; have an adult do it for them.
- Keep repellents out of reach of children.
- Do not apply repellent under clothing. If repellent is applied to clothing, wash treated clothing before wearing again. (May vary by product, check label for specific instructions)

The American Academy of Pediatrics (AAP) Committee on Environmental Health recommends that repellents with DEET should not be used on infants less than 2 months old.

### **Can repellents be used by pregnant or nursing women?**

Other than the routine precautions noted earlier, the EPA does not recommend any additional precautions for the use of registered repellents on pregnant or nursing women. Consult your health care provider if you have questions.

### **How else can I protect my family from insect bites?**

Using repellents on the skin is not the only way to avoid insect bites:

- Both children and adults can wear long pants and long sleeves while outdoors
- DEET and other repellents such as permethrin can be applied to clothing, as some insects can bite through thin fabric
- Mosquito netting can be used over infant carriers
- Make your home and yard less attractive to biting arthropods
  - Use screens on windows and doors to prevent entrance of insects
  - Get rid of or empty water holding containers around your house to eliminate places where mosquitoes lay their eggs
  - Create a tick-safe zone through landscaping – [www.cdc.gov/lyme/prev/in\\_the\\_yard.html](http://www.cdc.gov/lyme/prev/in_the_yard.html)

### **Where can I find more information?**

- Maine CDC Website: [www.maine.gov/dhhs/boh/ddc/epi/vector-borne/index.shtml](http://www.maine.gov/dhhs/boh/ddc/epi/vector-borne/index.shtml)
- EPA Website: [www.epa.gov](http://www.epa.gov)
- AAP Website: [www.aap.org](http://www.aap.org)
- Maine Board of Pesticides Control: [www.maine.gov/agriculture/pesticides](http://www.maine.gov/agriculture/pesticides)

# HEALTH UPDATE: Mosquito-Borne Illnesses and Schools

**TO:** Superintendents, Heads of Private Schools, School Nurses, Principals, Athletic Directors and Coaches  
**FROM:** Maine DOE  
**RE:** Mosquito-Borne Illnesses and Schools  
**DATE:** September 2017

Maine Department of Education in collaboration with Maine Center for Disease Control and Prevention (Maine CDC) is sharing this important guidance with schools regarding mosquito-borne illnesses. Maine CDC developed the information and guidance in this letter.

Two mosquito-borne illnesses are considered a local risk in Maine: Eastern Equine Encephalitis (EEE) and West Nile virus (WNV). Both are potentially serious viral infections transmitted to people from the bite of an infected mosquito. The disease is especially severe in children (as well as adults over 50). There is no vaccine or effective treatment for humans. Therefore, prevention strategies are critical.

Maine saw the first human case of WNV in 2012 and the first human case of EEE in 2014. Maine did not identify any positive EEE or WNV mosquito pools, human cases, or animal cases in 2016 and to date in 2017. Massachusetts, New Hampshire, and Vermont identified mosquito pools positive for WNV in 2017 and Massachusetts identified a mosquito pool positive for EEE.

Maine also identified other mosquito-borne viruses including two cases of locally-acquired Jamestown Canyon virus and one case of travel-associated Zika virus to date in 2017. New Hampshire also identified one case of locally-acquired Jamestown Canyon virus.

The risk for contracting mosquito-borne diseases is highest from **dusk to dawn** and when temperatures are above 50 degrees (and especially above 60 degrees), since these are the conditions when mosquitoes are most actively biting.

Schools play an important role in preventing mosquito-borne illnesses. Maine CDC and its consulting experts recommend:

- **Cover up outdoors.** Children and others on outdoor field trips and participating in other outdoor activities for a significant amount of time when the temperature is above 50 degrees should be encouraged to cover up with long sleeve shirts, pants, and socks; and/or
- **Use repellent.** Use an EPA approved repellent containing DEET, picaridin, IR3535, or oil of lemon eucalyptus on exposed skin and/or clothing. The repellent/insecticide permethrin can be used on clothing and can be effective through several washes. Always follow the package directions. For details on recommended repellents see:  
<http://cfpub.epa.gov/oppref/insect/index.cfm>
  - School employees and volunteers must have authorization from parents or guardians before applying repellants to minor children (CMR 01-026, Chapter 10, Section 2.I.4.iii):  
<http://www.maine.gov/sos/cec/rules/01/026/026c010.doc>

- Schools that schedule practices or games at dusk or evening with temperatures above 50 degrees should encourage the use of repellent for all participants including coaches and observers.

**Implement Integrated Pest Management strategies.** Since we anticipate the risk from mosquito-borne illnesses to continue, schools should consult with their IPM Coordinator to review their IPM policy.

Information on Maine's School IPM Program can be found at

[http://www.maine.gov/dacf/php/integrated\\_pest\\_management/school/index.shtml](http://www.maine.gov/dacf/php/integrated_pest_management/school/index.shtml)

Please monitor Maine CDC's arboviral website for the most up to date information on positives detected in the state. **If mosquito-borne disease activity increases in your area**, the following strategies should be implemented:

1. Use EPA approved repellents. These should be available to both students and staff who are outdoors, particularly during dusk and dawn hours. If you have an outdoor event, repellent should be available to spectators as well to limit the risk of mosquito-borne diseases.
2. Consult with your school IPM coordinator and implement a plan to reduce the number of mosquitoes and mosquito breeding sites on school grounds.
3. Limit and/or reschedule evening outdoor activities. Unless the dusk temperature is forecast to be less than 50 degrees, limit or reschedule outdoor evening activities such as school athletic events so people are able to go indoors by one hour before sunset.

All these recommendations are especially true in those areas with previously-identified mosquito-borne illnesses. However, the lack of identified virus in an area of the state does not mean there is no risk.

Maine CDC has one-page **fact sheets** for EEE, WNV, and repellents which we encourage you to send home with students, share by email, and/or post on your school website(s), as you deem appropriate.

You can access the facts sheet here:

<http://www.maine.gov/dhhs/mecdc/infectious-disease/epi/vector-borne/index.shtml>.

**Resources to learn more about mosquito-borne illness and mosquito control:**

- Maine's weekly arboviral surveillance reports: <http://www.maine.gov/dhhs/mecdc/infectious-disease/epi/vector-borne/arboviral-surveillance.shtml>
- Maine CDC's Vectorborne Website: <http://www.maine.gov/dhhs/mecdc/infectious-disease/epi/vector-borne/index.shtml>
- Maine CDC Disease Reporting: 1-800-821-5821 for consultation or [disease.reporting@maine.gov](mailto:disease.reporting@maine.gov)
- Maine Board of Pesticide Control: 207-287-2731 or <http://www.maine.gov/dacf/php/pesticides/>
- Maine Department of Environmental Protection (Maine DEP): 1-800-452-1942 or <http://www.maine.gov/dep/> (info on pesticides and wetlands)
- University of Maine Cooperative Extension: 1-800-287-0274 or <https://extension.umaine.edu/>
- Federal CDC EEE Website: <http://www.cdc.gov/easternequineencephalitis/>
- Federal CDC WNV website: <https://www.cdc.gov/westnile/>

Maine Department of Education and Maine CDC continue to work very closely together and are greatly appreciative of your assistance in keeping Maine's children and school communities healthy.