



# West Nile Virus

Mosquito Control and  
Personal Protection



# Objective of the Presentation

- Description of West Nile Virus
- Transmission of West Nile Virus
- Life Cycle of Mosquitoes
- Controlling Breeding Areas
- Controlling Resting Areas
- Fight the Bite
- Recommended Insect Repellent
- Using Repellent Safely



# Description of West Nile Virus

- West Nile Virus (WNV) is a bird-borne mosquito transmitted infection that can cause mild flu-like illness or encephalitis.
- WNV has been confirmed in the United States since 1999.
- WNV symptoms include but are not limited to: fever, headache, and body aches. Occasionally skin rash and swollen lymph glands will also be present.
- More severe infections may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and death.

# Transmission of WNV

- There are 43 identified species of mosquitoes in South Dakota. Of these, only 9 species are known vectors of WNV.
- Mosquitoes become infected when they feed on infected birds. Infected mosquitoes can then transmit WNV to humans and animals while biting to take blood. The virus is transferred via injected saliva to the new host where it may multiply and cause illness.

# Transmission of WNV

- West Nile Virus is not transmitted person to person. You cannot get WNV from someone who has the disease or from a health care worker who has cared for someone who has the disease.
- There is no evidence that you can get WNV from handling dead birds or caring for animals with WNV.
- Precautions should be taken any time you handle any dead birds

# Transmission of WNV

- Precautions include barriers such as rubber gloves, plastic bags, or anything that prevents direct contact with the dead bird.
- There is no information to suggest ticks play any role in the transmission of WNV.
- Less than 1% of mosquitoes are infected with WNV.
- Less than 1% of the people who get bitten and become infected will get severely ill. The chances you will become severely ill from any one mosquito bite are extremely small.

# Transmission of WNV

- Listed below is the number of reported human cases of WNV and the number of human deaths due to WNV in South Dakota from 2003 to 2015.

Year	Reported Cases	Deaths
2003	1,039	14
2004	51	1
2005	229	2
2006	113	3
2007	208	6
2008	39	0
2009	20	0
2010	20	0
2011	2	0
2012	203	3
2013	149	3
2014	57	0
2015	40	0

# Life Cycle of Mosquitoes

- Depending upon temperature and type of mosquito, mosquitoes can develop from eggs into adults in as little as 6 days.
- Mosquitoes can also take as long as 20 days.
- Some mosquitoes winter over as eggs and others as adults.

# Life Cycle of Mosquitoes

- Mosquitoes lay their eggs in stagnant pools of water.
- The eggs hatch into larvae (wigglers). The wigglers feed until they reach the pupa or tumbler stage.
- The pupa also lives in the water, but no longer feeds.
- The mosquito emerges from the pupae case and the water as a fully developed adult.

# Controlling Breeding Areas

- Dispose of, or regularly empty, trash cans, plastic and metal containers, ceramic pots, or any other water holding containers located on your property. Do not allow water to accumulate for more than two days.
- Drill holes in the bottom of recycling containers that are left outside so the water can drain out.
- Stock ornamental pools and ponds with top feeding predacious minnows or treat with a suitable chemical agent such as BTI or IGR.

# Controlling Breeding Areas

- Remove all discarded tires on your property. Used tires have become an important source of mosquito breeding in the nation.
- Make sure roof gutters drain properly. Clean clogged gutters in the spring and fall or as needed.
- Turn over plastic wading pools and wheelbarrows when not in use. Water in wading pools should be changed at least once per week.

# Controlling Breeding Areas

- Change the water in birdbaths weekly.
- Clean and chlorinate swimming pools, outdoor saunas, and hot tubs.
- Drain water from pool covers.
- Use landscaping to eliminate standing water that collects on your property.
- Ensure window and door screens are intact and fit properly. Torn or poor fitting screens will only allow mosquitoes to enter your home or business.

# Controlling Resting Areas

- Adult mosquitoes prefer to rest on weeds and other vegetation. Cut down weeds and tall grasses.
- Mow the lawn regularly.
- Apply insecticides to the lower limbs of shade trees, shrubs, and other vegetation. (Always follow the label directions on any insecticide).

# Fight the Bite

- Use mosquito repellants when you are outdoors.
- Minimize the amount of time spent outdoors between dusk and dawn.
- Wear shoes, socks, long pants, and a long sleeve shirt when outdoors between dusk and dawn or for long periods of time.
- Turn off any lights that can attract mosquitoes. Use yellow “bug lights” as outdoor lighting.

# Fight the Bite

- Avoid areas with dense populations of mosquitoes.
- If you must venture into areas with high mosquito populations, use head nets, long sleeves, long pants, gloves, and spray your clothing and exposed skin with insect repellent.

# Recommended Insect Repellent

- A wide variety of insect repellent products are available.
- The Center for Disease Control (CDC) recommends the use of products containing active ingredients which have been registered with the EPA.
- Use an EPA-registered insect repellent such as those containing DEET, picaridin, IR3535, and oil of lemon eucalyptus and para-methane-diol products.

# Using Repellent Safely

- Apply repellents to exposed skin and clothing (as directed on the product label). Do not use under clothing.
- Use just enough repellent to cover exposed skin and/or clothing. Heavy application and saturation is generally unnecessary for effectiveness. If biting insects do not respond to a thin film of repellent, apply a bit more.

# Using Repellent Safely

- Very few confirmed incidents of toxic reactions to DEET have occurred when the product is used properly (< 50 since 1960).
- The rare adverse reactions to DEET generally occur when the product is improperly used.

# Using Repellent Safely

- Use both sunscreen and insect repellent when outdoors to protect your health.
- Apply sunscreen first; then apply insect repellent.
- Do not use combinations of sunscreen and DEET. DEET does not need to be reapplied as frequently as sunscreen.

# Using Repellent Safely

- Any given repellent will not protect all users equally.
- Multiple factors determine how long a repellent will protect the user. The amount of active ingredient, level of activity, ambient temperature, water exposure, amount of perspiration, abrasive removal, and other factors will affect the time of protection.

# Using Repellent Safely

- Do not allow children to handle the repellants. Apply them to your hands and then to the child. Do not apply to the child's hands (children may tend to put their hands in their mouth).
- Avoid the eyes and mouth. Use sparingly around the ears for both adults and children.

# Using Repellent Safely

- If you have an adverse reaction to any type of repellent, seek medical attention.
- DEET is a plasticizer and is capable of dissolving watch crystals, the frames of glasses, and certain synthetic fabrics. Read the label and MSDS for these precautions.
- After the exposure, or when you return indoors, thoroughly wash all treated areas of your body.
- Wash treated clothing before wearing.

# Using Repellent Safely

- Permethrin containing repellents (Permanone) are recommended for use on clothing, shoes, bed-nets, and camping gear.
- Permethrin treated clothing repels and kills ticks, mosquitoes, and other arthropods. It retains this effect even after repeated laundering.
- Permethrin treated clothing should be safe when label instructions are followed.

# Using Repellent Safely

- Under no circumstances should bare skin or clothing on the body be treated with permethrin.
- Do not allow contact with surfaces treated with permethrin until the spray has dried.

# Summary

- Remove breeding areas for mosquitoes.
- Avoid working in areas where mosquito infestations are heavy.
- If you must work in those areas, wear long sleeves, long pants, gloves, shoes and socks. If available, a mosquito net covering your head would be appropriate.
- Use insect repellent while you will be working in the area.

# Summary

- Avoid being outside from dusk to dawn when mosquitoes are most active.
- Remove or treat resting places.
- Use insect repellents and pesticides as directed on the label.
- Wash treated skin when you return indoors.
- Wash treated clothing before wearing.
- No pesticide is 100% safe. Follow the directions for use found on the label.

# Information Sources

- American Mosquito Control Association
- New England Journal of Medicine
- South Dakota Department of Health
- Center for Disease Control
- US Environmental Protection Agency
- Harvard University
- Fairfield MSDS sheet #6840-00F0290029