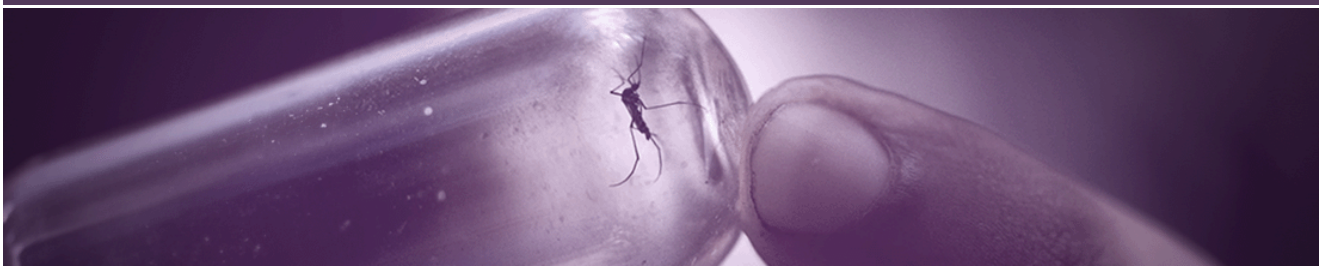
Mosquito-borne Diseases



Introduction

Some mosquitoes can spread pathogens to people through a bite. Pathogens are germs that cause disease. Anyone can get bitten by a mosquito, but outdoor workers are at greater risk. Although many mosquito-borne diseases are contracted during international travel, some, such as West Nile Virus, are also present in Canada.

Workers who have acquired a mosquito-borne disease may experience no symptoms, or a combination of symptoms including fever, headache, and vomiting. By understanding the role of mosquitoes in the transmission of pathogens and the specific risks to workplaces, the most effective workplace control measures can be implemented to protect workers' health.

This document describes how mosquitoes spread diseases, occupations at greater risk, and control measures that should be implemented to reduce exposure risk.

How Mosquitoes Spread Pathogens

Infectious diseases are caused by pathogens, such as viruses, bacteria and parasites. The "mode of transmission" refers to the different ways these pathogens spread. One such mode is through vectors like mosquitoes.

Mosquitoes are flying insects that can carry and spread pathogens to susceptible hosts. Female mosquitoes suck blood from other animals to drive their reproductive process. Only those mosquitoes that feed off an infected animal become capable of transmitting pathogens to humans. Animals that act as reservoirs for mosquito-borne pathogens include wild birds, deer, horses, sheep, and rodents. Mosquito-borne diseases do not spread between humans by coughing, sneezing, or physical touch.

Consider the following scenario that shows how a mosquito can function as a vector: a mosquito that is not carrying any pathogen inserts its pointy proboscis (mouth) into a bird to feed that has West Nile virus. The insect sucks blood and deposits saliva. The ingested blood contains the virus, which migrates through the body to finally reach the mosquito's salivary glands. It is only at this stage that the mosquito becomes a vector. The mosquito now targets a human and sucks blood and deposits saliva. This time, the virus is transferred from the mosquito to the human.

Mosquito-borne Diseases in Canada

Canada is not usually a high-risk region for most mosquito-borne diseases. Travelling to countries with outbreaks increases the risk of transmission. Refer to travel health notices for advice on international destinations and their risk levels.

Some mosquito-borne diseases of interest in Canada are West Nile virus, Jamestown Canyon virus, snowshoe hare virus, eastern equine encephalitis, and St. Louis encephalitis. There are no available human vaccines for these diseases, which makes the prevention of mosquito bites critical.

Humans are "dead-end" or incidental hosts for mosquito-borne diseases that are endemic (regularly found) in Canada. This means that the level of the virus in the human bloodstream is too low to pass on the virus to biting mosquitoes. By contrast, reservoir hosts have levels of the virus in their bloodstream that allow the virus to be passed on to biting mosquitoes. Known reservoir hosts that allow these animals to house these pathogens in Canada include:

- West Nile virus: wild birds
- Jamestown Canyon virus: deer
- Snowshoe hare virus: squirrels, chipmunks, hares, rabbits, rodents
- Eastern equine encephalitis: wild birds
- St. Louis encephalitis: wild birds, domestic fowl, bats

Symptoms of Mosquito-borne Diseases

Mosquito-borne Diseases

Many mosquito-borne diseases have similar symptoms, and often people with an infection show no signs of illness and do not feel sick. The most commons symptoms are:

- Fever
- Fatigue
- Headache
- Nausea
- Vomiting
- Rash

In more serious cases, people may develop inflammation of the brain, spinal cord, or the membranes that protect the brain and spinal cord (conditions called encephalitis, myelitis, and meningitis).

The onset of illness usually ranges from a few days up to 2 weeks (incubation period) after being bitten by an infected mosquito.

Sources of Exposure and Assessing Risk

Certain activities put workers at higher risk of being exposed to mosquitoes including working:

- Near stagnant (standing) water
- In vegetated (e.g., grass, weeds), wooded, or shaded areas
- Outdoors between May and September, especially at dusk or dawn
- With or near animals known to carry a mosquito-borne disease (e.g., wild birds, rodents)

Changes in weather and climate due to climate change may impact mosquito habitats. Warm, wet conditions can mean bigger mosquito populations and a greater risk of exposure leading to mosquito-borne diseases.

Anyone working outdoors can be exposed to mosquitoes. Some occupations at higher risk include:

- Agriculture or farm worker
- Construction worker
- Forestry worker
- Hydro worker
- Landscaper
- Laboratory worker
- Logger
- Military personnel
- Telecommunications line worker
- Outdoor guide
- Veterinarian
- Wildlife conservation or rehabilitation worker

Each workplace is unique, and the employer is required to take every reasonable precaution for the protection of workers. When workers are at higher risk of exposure to mosquitoes, the employer must conduct a risk assessment and implement appropriate control measures. A risk checklist can help identify risks and suggested control measures.

Workplace Control Measures

After identifying the risks to workers, employers must implement the most appropriate control measures with consideration given to the hierarchy of controls. A layered approach where multiple control measures are applied at the same time is recommended since a single control measure alone is not likely to be very effective.

Workplace control measures that can be implemented to reduce the risk of exposure to mosquitoes include:

- Remove sources of stagnant water regularly (e.g., buckets, cans, barrels, tires, parking lot puddles, etc.)
- Avoid work or implement more controls at times when mosquitoes are more active (between May and September, usually between dusk and dawn)
- Stay indoors and in cool environments, if possible
- Use insect repellent containing DEET or Icaridin (always follow label directions)
- Use mosquito screens to prevent mosquitoes from entering indoor spaces
- Use mosquito nets when spending time in unscreened outdoor structures, if possible
- Wear loose-fitting long pants and long-sleeved shirts
- Wear permethrin-treated clothing (always follow label directions)

Emergency Preparedness and Response Plan

The emergency preparedness and response plan should be tailored to the mosquito-borne disease that workers can reasonably become sick with. For example, there should be a West Nile virus-focused plan in place if work is conducted in an area known to have mosquitoes and animals that carry West Nile virus

Reporting and Support

Individuals exposed to mosquitoes while working may become ill, experience lost work time, or require medical attention. Any worker experiencing illness, even mild symptoms, after an occupational exposure to mosquitoes should contact their employer and a health care professional. Notification to the government department responsible for health and safety and worker's compensation board may also be required. Workers who become sick should be encouraged to take time away from work (a sick leave policy can support this).

Becoming ill with a mosquito-borne disease can impact a worker's health, including physical and mental health symptoms of increased stress, anxiety, and depression. Mental health resources and support should be provided to all workers, including access to an employee assistance program, if available.

Refer to the following mental health information sources:

- Mental health support: Get help – Public Health Agency of Canada
- Mental health and wellness – Public Health Agency of Canada
- Mental health – Canadian Centre for Occupational Health and Safety