



BCIT Safety Manual
WEST NILE VIRUS
EXPOSURE CONTROL PLAN



Contents

1. Purpose	3
2. Definitions	3
2.1 West Nile Virus	3
2.2 Vector.....	3
2.3 Culex	3
2.4 DEET	3
2.5 Supervisor	3
2.6 Employee	3
2.7 Student	3
3. Applicable Legislation and Reference Materials.....	4
4. Roles & Responsibilities	4
4.1 BCIT	4
4.2 Safety, Security and Emergency Management	4
4.3 Biosafety Occupational Health and Safety Special Committee.....	4
4.4 OHS Group	4
4.5 Facilities.....	5
4.6 First Aid and Medical Services.....	5
4.7 Supervisor	5
4.8 BCIT Employees and students.....	5
5. Risk Identification, Assessment & Prevention	6
5.1 Hazard Identification	6
West Nile Virus	6
pools reported or identified in British Columbia.....	Error! Bookmark not defined.
Transmission Routes	6
Health Effects	7
People at Risk.....	7
Environments with Greater Risk	8
Seasons with Greater Risk.....	8
5.2 Risk Assessment	8
5.3 Prevention	9
Elimination of Mosquito Breeding.....	9
Surveillance & Reporting	10
Engineering Controls.....	10
Administrative Controls	11
Personal Protective Measures	12
6. Education	14



7. Health Monitoring	14
8. Documentation	15
9. Program Review	15
Appendix A 4 D's for Prevention of WNV	16

1. Purpose

This control plan has been developed to:

- Ensure a system of reporting on and alert against West Nile Virus
- Incorporate a surveillance program for West Nile virus in the Pandemic Preparedness Plan
- Outline mosquito control strategies for West Nile virus prevention
- Provide awareness and educational information on the virus and the associated symptoms/illness

This control plan includes initiative on four fronts: Surveillance, Mosquito Control, Awareness and Education. The plan is applicable to all employees, students and visitors of BCIT.

2. Definitions

2.1 *West Nile Virus*

An arbovirus (meaning it is spread by mosquitos, ticks, or other arthropods) that can cause infections in animals and humans; in some cases, the infections can lead to fatal meningitis or encephalitis, which are inflammations of the spinal cord and brain.

2.2 *Vector*

An organism that does not cause disease itself but spreads infection by conveying pathogens from one host to another. The vector for West Nile Virus is mosquitos.

2.3 *Culex*

A genus of mosquito of which several species act as vectors of important diseases, such as West Nile virus.

2.4 *DEET*

N,N-diethyl-m-toluamide, an insect repellent that can be applied to the skin or to clothing to protect against insect bites. It protects against tick bites and mosquito bites which may transmit West Nile virus.

2.5 *Supervisor*

A BCIT employee who instructs, directs, and controls employees and/or students in the performance of their duties and activities.

2.6 *Employee*

A person employed at BCIT fulltime, part time or auxiliary.

2.7 *Student*

A person enrolled in a full-time or part-time program or any courses in BCIT, including students in practicum and apprenticeships.

3. Applicable Legislation and Reference Materials

BCCDC [West Nile Virus \(WNV\)](#)

Vancouver Coastal Health [Public Health – West Nile Virus](#)

Public Health Agency of Canada [West Nile Virus](#)

WorkSafeBC [General Information about the West Nile Virus](#)

4. Roles & Responsibilities

BCIT is committed to protecting the health of employees, students, and visitors. Employees and students must be aware of the risk of West Nile Virus (WNV) and protect themselves by following this Exposure Control Plan.

4.1 BCIT

- Support the implementation of this Exposure Control Plan by ensuring:
 - 1) awareness and education on prevention of WNV is given to employees and students by their supervisors
 - 2) mosquito-controlling substances, personal protective equipment, biohazard containers, and other sanitation facilities are available
 - 3) medical services and first aid for health monitoring are provided

4.2 *Safety, Security and Emergency Management*

- Ensure compliance with this Exposure Control Plan
- Assign duties to relevant groups upon receiving reports on WNV related concerns
- Ensure due diligence, accountability and reporting

4.3 *Biosafety Occupational Health and Safety Special Committee*

- Meet quarterly and distribute the most updated information on WNV when necessary
- Review this Control Plan on an annual basis and audit its effectiveness
- Ensure the implementation of preventive measures through regular audits and inspections
- Provide input regarding prevention of WNV

4.4 *OHS Group*

- Develop and maintain an effective West Nile Virus Exposure Control Plan
- When required, conduct risk assessments of mosquito activities and breeding sites with higher risk of WNV
- Plan for awareness, education and best practices on WNV prevention
- Act as an advisory resource for mosquito control
- Participate in review of this Exposure Control Plan

4.5 Facilities

- Conduct spring and summer inspections of the workplace and campus environments for potential mosquito breeding sites
- Report deficiencies involving mosquito breeding to corresponding Schools/ Departments, Supervisors, and OHS Group
- Ensure mosquito-breeding sites are eliminated or effectively controlled by elimination, engineering controls, and administrative controls
- Ensure that all dead birds or other dead animals found or reported on campuses are reported to Fraser Health for appropriate disposal and their data base.

4.6 First Aid and Medical Services

- Provide medical advice on WNV prevention
- Ensure close and ongoing monitoring for those employees/students who have developed suspicious symptoms after bitten by mosquito(s)
- File and keep relevant medical records
- Contact local health authority and advise advance medical assistance when necessary
- Notify OHS Group and the Director of Safety, Security and Emergency Management in the event of questionable symptoms

4.7 Supervisor

- Ensure risk assessments have been carried out prior to activities with the potential of mosquito bites
- Ensure the Exposure Control Plan and safe work procedures are read and understood by employees and students
- Arrange WNV awareness and education for employees and students. Ensure they are aware of
 - 1) the risk of WNV and WNV transmission routes
 - 2) the health effects of WNV and corresponding symptoms
 - 3) measures and practices for WNV prevention
 - 4) reporting of mosquito breeding, dead birds, and suspicious symptoms
 - 5) the resources to obtain further information
- Conduct inspections in summer months and maintain effective supervision over employees and students to ensure that:
 - 1) mosquito-friendly environments are identified and eliminated
 - 2) appropriate control measures are applied
 - 3) precautions are taken
 - 4) protective clothes and equipment are worn when applicable
 - 5) a person who has been bitten by mosquito and developed suspicious symptoms seeks First Aid for medical assistance immediately

4.8 BCIT Employees and students

- Attend awareness and education sessions as provided
- Read and understand the Exposure Control Plan

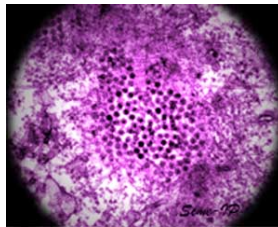
- Follow the Universal Precautions and task specific safe work procedures for handling of clinical specimens
- Understand and perform the 4 D's to defend against WNV (Appendix A)
- Report mosquito breeding sites, dead birds (or other animals), and suspicious symptoms
- Implement recommended remedial actions

5. Risk Identification, Assessment & Prevention

5.1 Hazard Identification

West Nile Virus

West Nile virus (or WNV) is a virus of the family Flaviviridae. It was first found in Uganda in 1937. Today, WNV appear in both tropical and temperate regions. The virus mainly affects corvids-birds such as crows, ravens, and jays, but is known to infect humans, horses, dogs, cats, bats, chipmunks, skunks, squirrels, and domestic rabbits. Human infection is through the bite of an infected mosquito. Below is an image of WNV under a microscope.



WNV is considered to be the most widely distributed vector-borne disease in North America, and has now been detected in B.C. From 2002 through 2008 there have been 4,511 clinical cases (i.e. showing symptoms) of WNV infection in Canada.

Transmission Routes

Human infection of WNV is through the bite of an infected mosquito, which becomes a carrier of WNV when it bites an infected bird. Not all mosquito species are WNV carriers. Only a few of the 50 species of mosquitos found in BC are likely to spread WNV.

WNV is not spread through person-to-person contact such as touching or through coughing, sneezing, saliva or mucous.

WNV can rarely be transmitted through blood transfusion or organ transplants if the donor was infected with the virus. WNV can also be transmitted from a mother to her unborn child or through breast milk however these cases are very rare.

Although the virus is not known to be transmitted to humans from animals, people should avoid handling dead birds or animals with their bare skin.

Below is an image of the mosquito (Culex) that has been found to be the major vector for WNV.



Health Effects

Epidemiological studies suggest that about 1 out of 5 people bitten by a mosquito carrying WNV will develop symptoms. Most people who are infected have either no symptoms or mild illness such as West Nile fever.

About 1 in 5 people infected experience only flu-like symptoms. In about 1% of infected individuals, WNV can cause more severe illness resulting in hospitalization. Severe symptoms include high fever, swelling of the brain (encephalitis), inflammation of the lining of the brain (meningitis) or polio-like paralysis and possibly death. However, even milder illness may cause lasting health effects, including muscle weakness, memory problems and fatigue that may continue for months.

The following symptoms may be the early signs of WNV illness. A person with these symptoms after bitten by a mosquito must seek medical attention to determine the cause:

- fever
- muscle weakness
- stiff neck
- confusion
- severe headache
- sudden sensitivity to light

Extreme swelling or infection at the site of a mosquito bite is possible. This may or may not indicate West Nile infection. A sufferer should consult his/her physician or contact BC Nurse Line at 604-215-4700 (toll free: 1-866-215-4700).

Currently, there is neither vaccination for prevention nor specific medication that can cure illness from WNV. Rest, fluids and sometimes hospital care is the only treatment.

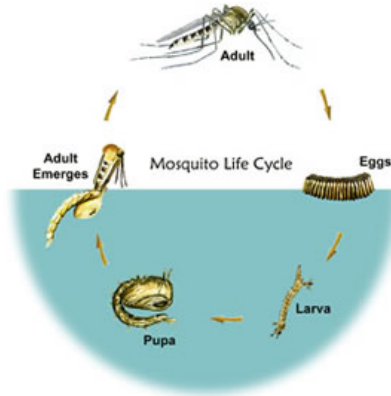
People at Risk

Everyone who is outside during the summer months may be at risk although the chance of being infected is very low.

While anyone can be infected with WNV, the chances of having a severe illness are greater for older people even if they are healthy. People who have chronic illness or weakened immune system may also be at greater risk.

Environments with Greater Risk

Mosquitoes have a four-stage life cycle: egg, larva, pupa and adult as shown in the following picture:



Female mosquitoes find stagnant water with high nutrient levels, which is the most attractive environment for laying eggs. These types of breeding grounds can be common on campuses. There are many species of mosquitoes and each has its preference for breeding habitats, ranging from clear to grossly polluted water. The main requirement for massive breeding of mosquitos is that the water source must be nearly undisturbed. In general, areas around any water that remains relatively undisturbed for more than 7 days are the places where people have a greater risk of being bitten by mosquitoes. Some examples of mosquito breeding sites include, but are not limited to:

- tire ruts in laneways
- discarded tires
- containers or drums
- pools
- water in catch basins or drains
- water in ditches
- ponds, especially at the edges
- puddles formed by leaking pipes
- flat roofs
- water in eaves troughs or rain barrels
- puddles or ponds of wash water or processing water

Seasons with Greater Risk

Summer is the high season for mosquito activity and human exposure. The most likely time for people to contact is between August and September.

Mosquitoes are more active in the late afternoons and evenings, throughout the night and in the early morning hours when humidity is high, or during the day when conditions are cloudy or overcast with high humidity.

5.2 Risk Assessment

During spring and summer months, BCIT employees and students should do a risk assessment of mosquito biting prior to assigned outdoor activities that may require long stay in/near areas of high mosquito populations/or potential breeding spaces such as lawns, thick grass and ponds.

In general, the magnitude of a risk of being bitten by mosquitos depends on:

- season
- time of day
- weather/climate
- mosquito populations
- the environment/surroundings in which work is being performed
- length of time and frequency for outdoor activities
- clothing and areas of exposed skin
- preventative measures (such as protective clothing, mosquito repellent)

A risk assessment should be performed in accordance with the Risk Assessment Procedures prescribed in Part 2 - Section 23, of BCIT Safety Manual (to be available) to determine the risks of WNV infection. Consultation with physicians, OHS Group or the Biosafety OHS Special Committee is encouraged whenever necessary.

5.3 Prevention

BCIT employees and students should take the following measures to prevent WNV infection.

Elimination of Mosquito Breeding

Elimination of mosquito breeding is usually achieved by getting rid of mosquito-friendly environments and through the application of insecticides.

1) Removal of mosquito-friendly environments

Many mosquitoes need standing water to lay their eggs. Therefore, the best way to keep mosquitoes away is to eliminate areas where they like to breed.

Whenever possible, BCIT employees and students must take the following measures to eliminate mosquito breeding sites on campuses:

- turn containers or drums on their sides to avoid collecting water
- remove unnecessary equipment that can accumulate water
- properly recycle old tires
- discard unused containers and drums
- clean catch basins and lawn drains at least once a year, preferably in spring
- ensure ditches and culverts are not blocked and allow continuous flow
- clean out eaves troughs and flat-roof drains so water can flow freely
- clear out dense shrubbery where mosquitoes like to breed and rest
- prevent organic matter (such as leaves or grass) from entering and accumulating in ponds/ditches (the debris provides nutrients for larvae survival)
- keep grass mowed and manage tall weeds to eliminate mosquito resting areas
- immediately throw away lawn cuttings, raked leaves or other decaying debris
- repair any leaking pipes

2) Insecticide Application

Use of federally registered insecticides can also eliminate mosquito breeding; however, adult

mosquito control insecticides have low to high acute toxicity to humans, depending on the active ingredients and formulation. Users must consult OHS Group when they decide to apply insecticides and must refer to a product's Material Safety Data Sheet (MSDS) to determine the relative toxicity of specific formulations for each insecticide and take relevant protection measures.

All products designed to manage, destroy, attract or repel pests that are used, sold or imported into Canada are regulated by Health Canada's Pest Management Regulatory Agency (PMRA). The federal legislative authority for the regulation of pesticides in Canada is the Pest Control Products Act (PCPA). The use of pesticides is also subject to regulation under provincial/territorial legislation. Please refer to the reference materials (Section 3) of this Exposure Control plan for further information.

Two types of mosquito control products are commonly used to eliminate and control mosquito breeding:

- larvicides are used to control mosquito larva, an immature stage of the insect. Larviciding involves placing pellets or granules containing anti-larvae pest control products in mosquito breeding sites.
- adulticides can control mosquitoes at their adult stage. They are applied as fog or a spray in areas where adult mosquitoes are present.

Both types of control options must be used in conjunction with repellents and other control practices.

Surveillance & Reporting

In educational settings, surveillance for West Nile Virus mainly involves:

- monitoring of dead birds
- identification of mosquito breeding sites
- monitoring of mosquito populations, in particular populations

1) Dead Corvid Reporting

BCIT employees and students should report any "freshly" dead (not decayed) crows, ravens, magpies or jays that they find to the Safety, Security and Emergency Management or OHS Group so that the dead birds can be reported to Fraser Health for appropriate disposal and their data base.

2) Breeding Site Reporting

BCIT employees and students should report any major mosquito breeding sites that they find to the Facilities or OHS Group so that the sites can be eliminated or treated as soon as possible.

3) Large Populations of Mosquito Reporting

BCIT employees and students should report massive mosquito populations to the Facilities or OHS Group and offer assistance in identifying the breeding sources.

Engineering Controls

Engineering controls involve installation of mosquito netting window screens and use of mosquito traps.

1) *Mosquito Netting Mesh Screens*

Most windows in BCIT buildings are closed because of heating, ventilating, and air-conditioning. This prevents mosquitoes from flying in from outdoors. If a window needs to be open in the evening, night or early morning and there are high populations of mosquitos then a mosquito netting mesh screen should be installed. Occupants should regularly check window screens for holes and make sure they fit snugly into the window frame.

During the summer, all windows without mosquito netting mesh screen must be closed between the hours of dusk and dawn.

2) *Other Strategies for Repelling/Elimination of Mosquitos*

Mosquito traps, ultrasonic repellents, bug zappers, mosquito magnets, citronella candles and citrosa plants can also help disperse or eliminate mosquitoes. Some of these gadgets work silently, without odor and can be used in pool areas and lawns where there is no accessibility to electricity. However, these devices may not be able to reduce mosquito numbers enough to fully remove the risk of mosquito bites or the risk of becoming infected with West Nile virus. They may serve as a supplementary approach for mosquito control.

Administrative Controls

Administrative controls include taking measures to get rid of mosquito-friendly environments, as well as taking precautionary measures.

1) *Precautions for the Handling of Clinical Specimens*

In case there is a WNV outbreak in BC, potentially infected human and animal clinical specimens (e.g. blood, serum, tissues) should be handled in a Containment Level 2 facility using Containment Level 3 operational practices as outline below:

- blood collection should be carried out with universal precautions (refer to BCIT Exposure Control Plan for Bloodborne Pathogens)
- certified biosafety cabinets must be used for laboratory manipulations of suspect clinical specimens
- centrifugation of clinical specimens (e.g. for serum separation) should be carried out using sealed centrifuge cups or rotors that are loaded and unloaded in a biosafety cabinet
- aliquots used for serology should be heat inactivated at 56° C for 30 minutes
- PCR testing may be performed in a Containment Level 2 facility using Containment Level 3 operational practices

2) *Precautions for the Handling of Dead Animal*

Handling of dead animal should be restricted at BCIT. If there is such a need, employees and students must abide by the following precautions:

- where practical, animal carcasses should be manipulated in a certified biosafety cabinet
- larger carcasses should be manipulated using the personal protective equipment as per

the following Section of this Control Plan)

3) *Precautions for the Field Collection of Dead Birds & Other Animals*

BCIT students and untrained employees are not allowed to collect any dead birds and other animals on campuses. Rather, they should report to the Safety, Security and Emergency Management or OHS Group. Any qualified persons who involve in collecting dead birds and other animals must follow the recommendations of the *Occupational Health Advisory West Nile Virus, Revised May 29, 2003* by Public Health Agency of Canada:

- precautions for mosquito avoidance (i.e. wearing appropriate personal protective equipment as per the following Section of this Control Plan) and the use of repellents (i.e. 20-30% DEET) should be implemented
- bare-handed contact must be avoided when handling dead animals and birds and precautions must be taken to avoid direct contact with excretions
- biohazard labelled double plastic bags turned inside out should be used while handling dead birds and animals
- hands must be washed with soap and appropriate antiseptic agents after handling dead birds
- whenever possible, collection should be performed outside the periods of time (e.g. dusk, night and dawn) when mosquitoes are likely to be encountered

4) *Precautions for Other Outdoor Activities on Campuses*

On BCIT campuses, employees and students have a variety of chances for outdoor activities. These activities can render higher risk of being bitten by mosquitos during mosquito seasons. People involved in outdoor activities should take the following measures to protect themselves from WNV:

- avoid arranging such activities in the hours between evening and dawn during the summer months
- scouting for mosquito populations and breeding sites prior to staying long periods on grassy fields or beside ponds and control mosquitos by appropriate means
- take the protective measures prescribed in Section “Personal Protective Measures” of this Control Plan

Personal Protective Measures

Use of personal protective measures is an effective approach to prevent against mosquito bites. Personal protective measures include insect repellents and protective wear.

1) *Mosquito Repellents*

Applying federally registered insect repellents, such as those that contain DEET (N,N-dethyl-m-toluamide), on exposed skin is an effective way to protect from mosquito bites.

DEET is approved for use in Canada. Insect repellents containing DEET are not the same as insecticides which kill the insects. There are some other effective insect repellents registered in Canada that contain active ingredients other than DEET. These include soybean oil and p-menthane-3,8-diol (PMD, also known as lemon-eucalyptus oil).

Citronella oil has been used as a mosquito repellent for years in Canada. It is not as effective as DEET or PMD and there have been some concerns about its safety when used on the skin recently.

Many perfumes attract insects, including mosquitoes. Diet additives such as vitamin B12 and garlic have no influence on reducing the number of mosquito bites.

The following is a guideline for using insect repellants:

- apply repellent sparingly on exposed skin or on the top of clothing (not under them)
- the repellent does not have to be applied heavily to work. A light coating will do
- use hands to rub the repellent over the skin after spraying it on
- do NOT use repellent on open wounds, irritated or sunburned skin, or in the eyes
- avoid breathing mist from spray-type repellent. Never apply spray repellent inside a small and non-ventilated space
- do NOT use the repellent near food and drinks
- carefully read the manufacturer's instruction before use
- never use a product labelled as an 'insecticide' on your body
- check for sensitivity – apply repellent to a small area of skin and wait for 24 hours before use
- Thoroughly wash repellent sprayed hands before eating, drinking and smoking
- choose a product that meets your specific needs according to the following table

Concentration in Different Products	Length of Time Protection Provided (Hours)
DEET 30%	6
DEET 15%	5
DEET 10%	3
DEET 5%	2
p-menthane-3,8-diol 10%	3

- refer to the [Safety Tips on Using Personal Insect Repellents](#) from Health Canada for further information

Note: DEET may destroy some synthetic materials or reduce effectiveness of flameproof clothing

2) **Protective Wear**

Protective wear mainly refers to wearing clothing over repellants, but use of hats, boots, socks/stockings, pants, gloves and other barriers can also help minimize skin exposure.

- Clothes

During dawn and dusk, people spending time outdoors should wear long sleeved, loose fitting, light colored clothes with a tight weave. This will help to reduce mosquito bites and is especially necessary between the hours of dusk and dawn for outdoor activities. Long sleeved clothes, long legged pants,

and stockings/socks reduce the amount of exposed skin. Light colors and white are not as attractive to mosquitoes as are dark colors. For extra protection, people may consider tucking pant legs into stockings/socks, spraying clothing with 30% DEET and removing mosquito-attracting floral fragrances such as perfumes, soaps, hair care products, and lotions.

- Gloves

People involved in handling of clinical specimens and dead birds/other animals on campuses must wear rubber/latex/vinyl/PVC gloves, in addition to other PPE required.

- Footwear

People staying outside for a long period of time during mosquito active periods should wear non-skin-exposed footwear such as high boots. If slippers or sandals are worn, stockings/socks should be worn as well.

- Hats

People with thin hair should consider wearing hats if staying outside between the hours of dusk and dawn in the summer.

- Other Barriers for Skin Exposure

In the places where massive mosquito groups are observed the use of mosquito nets, veils, or scarves may be required.

6. Education

Supervisors should ensure that those employees and students who are concerned for higher risk of WNV because of their tasks/activities have read and understood this control plan. After education, employees and students should have sufficient awareness and be able to answer seven key questions:

- 1) what is WNV?
- 2) how is WNV transmitted?
- 3) what are the typical symptoms of WNV infection?
- 4) what precautions and control/protective measures are required to prevent WNV?
- 5) what should you do when you spot a dead bird or a major mosquito breeding site?
- 6) what should you do if you have suspectable symptoms after being bitten by mosquito(s)?
- 7) where can you obtain further information and help?

Records of education such as signed training forms will be kept by in Dean/Directors Office for at least 3 years.

BCIT Employees and students are also encouraged to use the Toll Free Number, operated by the Fraser Health Authority, 1-888-WNV-LINE (1-888-968-5463) to acquire general information on West Nile Virus.

7. Health Monitoring

Any employee or student who has been bitten by mosquito(s) and developed symptoms described in Section 5.1 of this control plan should report to his/her Supervisor and seek medical attention (through First Aid if it occurs at work) as soon as possible.



BCIT Medical Services will monitor those patients who have mosquito-bitten history and flu-like symptoms. Consultation with BC Nurse Line, contact with local Health Authorities, and patient transfer for hospitalization must be performed whenever necessary.

8. Documentation

Records of education on WNV and prevention will be kept as outlined in Section 6 of this document.

Copies of records will be forwarded to Biological Safety Committee and Director of Safety, Security and Emergency Management when necessary.

9. Program Review

This Control Plan will be reviewed annually for the following:

- the most updated information on WNV in BC
- the effectiveness of mosquito control measures
- documentation for awareness and education

The annual review will be done in consultation with BCIT Joint Occupational Health and Safety Committee and BCIT Biological Safety Occupational Health and Safety Special Committee.

Appendix A

4 D's for Prevention of WNV

D-Fend Against West Nile Virus



Practice the 4 D's to Reduce the Risk

DRAIN your property of standing water

DUSK/DAWN are times to avoid being outside or to take extra precautions

DRESS appropriately & protectively

DETER mosquitoes from biting by using mosquito repellents wisely