DISEASES SPREAD THROUGH OTHER CONTACT

A. Introduction

Many diseases are spread through direct contact with other people, or through indirect contact with surfaces or objects in the environment. In this section you will find information on the following:

- Tetanus
- Rabies
- Viral hemorrhagic fevers
- *Clostridium difficile* (C.diff or CDI) and antibiotic resistant organisms, including vancomycin resistant enterococci (VRE), methicillin resistant *Staphylococcus aureus* (MRSA), and extended spectrum beta lactamase–producing bacteria (ESBL)

B. Tetanus

Tetanus, often referred to as "lockjaw", is a devastating disease of muscle spasm and rigid paralysis with a high mortality rate. It is caused by bacteria (*Clostridium tetani*) that produce a toxin (called tetanospasmin) in the body. The toxin attacks the nervous system and can interfere with the functioning of the autonomic systems, affecting heart rate and respiration.

Transmission

People get tetanus from the environment (e.g., soil contaminated with tetanus spores), and not from other people. The bacteria can enter the body through a puncture wound, a cut in the skin, a severe burn or an animal bite. An injury from a rusty nail is often blamed for tetanus, but it is the bacteria on the nail – not the rust – that cause the disease.

Incubation Period

Symptoms generally occur three to 21 days (but can range from one day to several months) with an average of eight days after infection.

Symptoms

The initial symptoms include headache, fever, crankiness, and spasms of the jaw muscles. This is followed by intense, painful muscle contractions in the neck, arms, legs, and stomach. Muscle spasms occur frequently and last for several minutes.

Prevention/Treatment

There are vaccines available to prevent tetanus. Infants and children receive tetanus vaccine as part of their routine immunizations, together with diphtheria polio and Hib and acellular pertussis vaccines, in a combination called DTaP vaccine. Children who are 14 to 16 years old also receive a booster dose of combined tetanus, diphtheria and acellular pertussis vaccine (Tdap or Adacel®). A booster dose of combined tetanus and diphtheria vaccine (called Td vaccine) is recommended every 10 years for adults. A single dose of Adacel® will be substituted for one of the ten-year booster doses in adults up to 54 years of age to provide coverage against pertussis (whooping cough) in addition to tetanus and diphtheria.

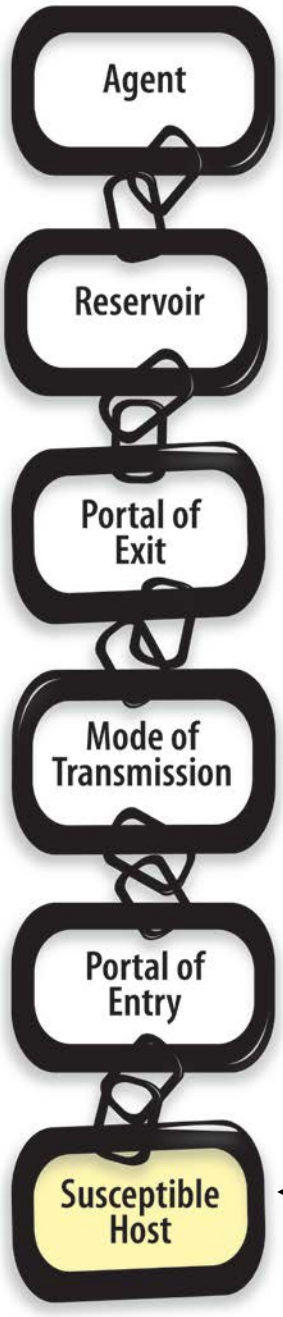
Treating tetanus involves providing human tetanus immunoglobulin (HTIG) to neutralize the tetanospasmin circulating in the body, antibiotics to kill the bacteria, and supportive care for muscle spasms, respiration, and autonomic instability.

What do you do if you think you have been exposed?

Thoroughly clean the wound or injury. Seek medical attention for diagnosis and possible treatment with antibiotics and possibly a booster shot. Contact your local public health department for follow up.

More information about Tetanus

TETANUS CHAIN OF TRANSMISSION



Bacteria called *Clostridium tetani*, which produce a toxin called tetanospasmin

- Intestines of horses and other animals, including humans in which the organism is a harmless normal inhabitant
- Soil or objects contaminated with animal and human feces

Animal or human feces

Spores are usually introduced into the body though a puncture wound contaminated with soil, street dust or animal or human feces. Tetanus does not transmit from person to person.

Lacerations, burns, dirty wounds, and trivial or unnoticed wounds, injected contaminated drugs or surgical procedures that are performed under unhygienic conditions

Unvaccinated population of all ages

Break the chain of transmission here by getting vaccinated against tetanus every 10 years

****Remember: Break the Chain, Stop Infection!**

C. Rabies

Rabies is a preventable viral disease most often transmitted through the bite of a rabid animal. If left untreated, the virus infects the central nervous system, and ultimately leads to death. The principle hosts for the rabies virus are mammals, most notably dogs, cats, raccoons, skunks, foxes, bats, and coyotes. Wild animals account for most reported cases of rabies. However, the possibility for exposure exists from frequent contact between wild and domestic animals, which requires constant vigilance and the continued use of anti-rabies treatments.

Transmission

The rabies virus lives in the saliva and nerve tissues of infected animals, and is transmitted to humans through bites and scratches, allowing the virus to enter the bloodstream and nerve pathways. The virus from an infected animal can also enter the human body through an open cut, sore or wound or through mucous membranes (e.g. mouth, nasal cavity, or eyes).

Individuals may not always be aware of exposure to an infected animal. Anyone who has found bats in a room where he or she has been sleeping or who is unable to communicate if he or she has been bitten should discuss with their designated officer and also seek the advice of a physician.

Symptoms

The initial symptoms of rabies in humans include numbness around the site of the bite, headache, fever and general malaise. Later symptoms may include muscle spasms and hydrophobia (fear of water). Once symptoms appear, death is imminent.

Incubation Period

Symptoms can appear in as little as two weeks, or up to one year following exposure.

Prevention/Treatment

You can prevent rabies by avoiding contact with stray dogs, unfamiliar domestic animals, wild animals and as a pet owner keep your animal's rabies vaccination up to date. Also, prevent bats from entering your home by checking for possible entry sites and sealing any spaces under eaves, electrical conduits and holes around the chimney and windows.

All animal bites and scratches are investigated by York Region Community and Health Services. Bites and scratches from a dog or cat or other mammal must be reported to the local public health unit. A Public Health Inspector will obtain information on the incident and in the case of dogs and cats quarantine the animal for a ten-day period.

If the animal cannot be quarantined, or it exhibits signs and symptoms of rabies within the quarantine period, then your physician may administer a series of vaccinations. Post-exposure prophylaxis (PEP) is recommended for individuals exposed to a rabid animal and should be given as soon as possible after exposure. PEP consists of a regimen of one dose of Human Rabies Immune Globulin (HRIG) and five doses of rabies vaccine over a 28-day period. HRIG and the first dose of the vaccine are administered as soon as possible after exposure, and the remainder of the vaccine doses are given on days 3, 7, 14, and 28 after the first dose.

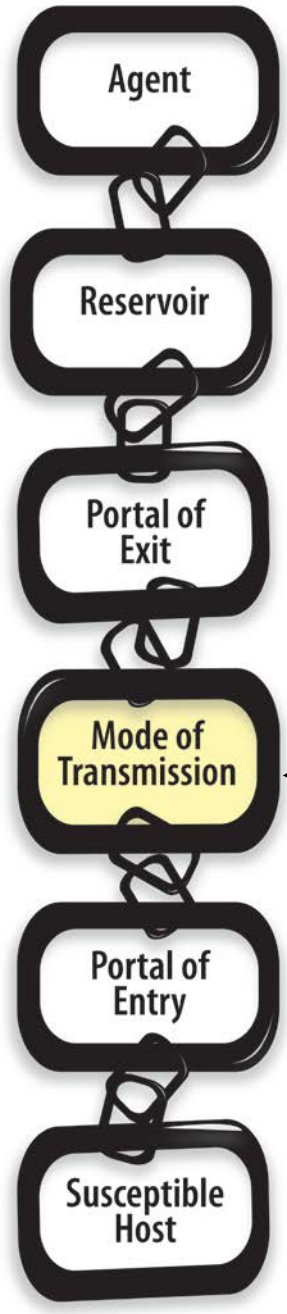
What do you do if you think you have been exposed?

If an exposure has occurred, rabies can be prevented by implementing post-exposure prophylaxis (PEP) promptly and appropriately. Thoroughly wash the bite or scratch with soap and warm water and then seek immediate medical attention from your family physician or nearest hospital. Report the incident to York Region Community and Health Services by contacting our Health Connection line at 1-800-361-5653.

There is no treatment for rabies after symptoms appear.

More information about rabies

RABIES CHAIN OF TRANSMISSION



The rabies virus

Saliva and nerve tissue (brain)

Usually from mouth of infected animal that is hypersalivating as part of the disease process

- Usually a bite from an infected animal
- Non bite – saliva or brain tissue exposure to mucous membrane

Break the chain of transmission here by using Personal Protective Equipment

Bite wound breaks skin; virus enters muscles and nerve pathways or unprotected mucous membranes

Everybody

Remember: Break the Chain, Stop Infection!

E. Viral Hemorrhagic Fevers

Viral hemorrhagic fevers (VHFs) are diseases characterized by fever and, in most cases, shock and hemorrhage (bleeding). They are caused by a number of geographically restricted viruses which are not indigenous to Canada. Examples of these diseases include Lassa fever, Marburg virus hemorrhagic fever, Ebola virus hemorrhagic fever, Crimean-Congo hemorrhagic fever, Bolivian (Machupo) and Venezuelan hemorrhagic fever (Guanarito). In the remainder of this section, VHF will refer to any of these six diseases.

Transmission

These viruses are spread though close, personal contact with a person who is actually ill with the disease. The incubation period varies depending on the virus that caused the hemorrhagic fever, but is usually three to 21 days.

Transmission depends on the stages of illness and symptoms which may include vomiting, diarrhea, or hemorrhage. The management of a patient with VHF requires considerable care to prevent the possibility of further transmission.

Symptoms

Specific signs and symptoms vary by the type of VHF, but they initially include fever, fatigue, dizziness, muscle aches, loss of strength and exhaustion.

Individuals with severe cases of VHF often show signs of bleeding under the skin, in internal organs, or from body openings such as the mouth, eyes or ears. Individuals rarely die due to blood loss despite bleeding from many sites around the body.

Severely ill patients may also experience shock, nervous system malfunction, coma, delirium and seizures. Some types of VHF are associated with kidney failure.

Incubation Period

Symptoms may present anywhere from three to 16 days after exposure depending on the virus. The hemorrhagic symptoms begin three to five days after the fever develops.

Prevention/Treatment

Because most persons requiring pre-hospital evaluation and transport are in the early stages of disease, they likely would not have the symptoms (e.g., vomiting, diarrhea, or hemorrhage) that would increase the risk of contact with infectious body fluids. In such cases, routine practices are generally sufficient to prevent transmission. If a patient has respiratory symptoms (e.g.,

cough or runny nose and sneezing), face shields or surgical masks and eye protection (e.g., goggles or eyeglasses with side shields) should be worn by caregivers to prevent droplet contact.

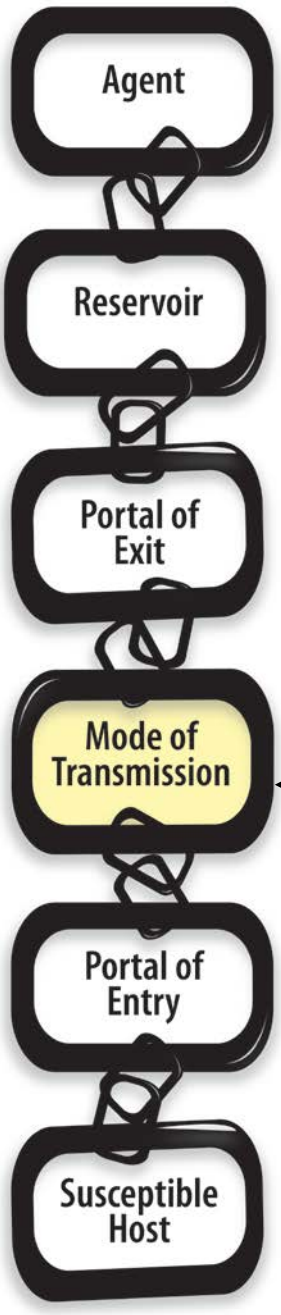
The transport vehicle should be promptly decontaminated (see **Cleaning, Sterilizing and Disinfecting**). The vehicle should not be used for other patients or individuals until decontamination has been done.

Once the diagnosis is confirmed, people who have been in contact with a case (those identified by local or provincial health authorities) should be monitored closely for symptoms for three weeks after their last contact with a VHF case. Contacts should record their temperature twice daily and report any temperature 38.3 degrees Celsius (101 degrees Fahrenheit) or higher and/or any symptoms of illness to the Medical Officer of Health/Designate.

What do you do if you think you have been exposed?

Although these diseases are very rare, they are serious and require the involvement of local, provincial, and federal health authorities. When a case of viral haemorrhagic fever is identified, everyone who may have been exposed to the case will be contacted by provincial or local health authorities. The local Medical Officer of Health will initiate actions as outlined in the *Viral Haemorrhagic Fevers Contingency Plan, Ontario 2002*

VIRAL HEMORRHAGIC FEVER (VHF) CHAIN OF TRANSMISSION



A virus. The five of greatest concern are: Lassa fever, Ebola, Marburg, Venezuela and Crimean-Congo

- Blood
- All bodily fluids including: blood, semen, vaginal fluids, pleural, amniotic, pericardial, peritoneal, synovial, cerebrospinal, saliva, urine, vomitus, feces, plus any other secretions and excretions

Any body opening or wound that is draining fluids or causing droplet release (e.g., coughing, sneezing, etc.)

- Usually direct contact with blood or bodily fluids
- In addition, respiratory contact with droplets expelled by patient during treatment (e.g., suctioning, IVs, etc.)

Break the chain of transmission here by using Personal Protective Equipment

The virus can be absorbed through mucous membranes (nose, eyes, mouth) or through unprotected compromised skin, broken skin

Everyone

Remember: Break the Chain, Stop Infection!

F. *Clostridium Difficile* and Antibiotic Resistant Organisms

Antibiotic resistant organisms (AROs) are bacteria that have become resistant to the antibiotics normally used to treat the infections they cause. Common types of antibiotic resistant organisms are: methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococcus (VRE), and extended spectrum beta-lactamase (ESBL)-producing bacteria.

Clostridium difficile (C. difficile) is the leading cause of health-care associated diarrhea. It is not an antibiotic resistant organism but it is mentioned here because it is similar to AROs in terms of transmission and control. It most often causes symptoms in individuals who are vulnerable due to certain risk factors[1], such as:

- antibiotic use
- gastrointestinal surgery or manipulation
- long length of stay in a health-care setting
- a serious underlying illness
- immunocompromising conditions
- advanced age

People can either be colonized or infected with an ARO or *C. difficile*.

- Colonization means the bacteria are present on or in someone's body but are **not** causing that person to be ill.
- Infection with an ARO or *Clostridium difficile* associated diarrhea (CDI) happens when the bacteria reach sufficient numbers in a susceptible host, causing the person to become ill. AROs can invade body tissues and organs and cause infections of the urinary tract, skin and lungs (pneumonia).

Transmission

AROs live in and on the bodies of people who are colonized or infected. AROs and *C. difficile* can be transmitted from one person to another through direct and indirect contact.

When colonized or infected people touch their face or go to the bathroom, their hands may become contaminated with the ARO or *C. difficile*. If they do not wash their hands thoroughly before touching their environment or another person, they could potentially transfer these microbes. AROs and *C. difficile* can survive on surfaces (e.g., counters, door knobs) and be picked up by other people when they touch the contaminated surface and then touch their skin

[1] Ontario Ministry of Health and Long-Term Care. *Clostridium difficile* in Health Care Settings. Information for Professionals. November 2006.

(in the case of MRSA) or touch their mouth and swallow the bacteria (VRE, ESBL and *C. difficile*).

Prevention/Treatment

Practicing good hand hygiene after an exposure to an ARO or *C. difficile* is sufficient for reducing the risk of transmission to the emergency service worker. In circumstances where contact with a person with an ARO or *C. difficile* is anticipated, contact precautions equipment (i.e., gloves and gown) should be worn to reduce the risk of transmitting the bacteria to other susceptible individuals.

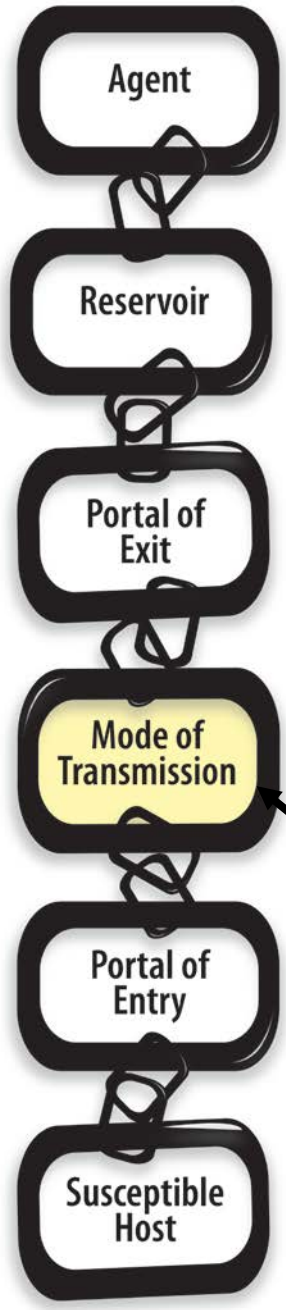
Treatment options for those infected with an ARO are lengthy and complicated and may not always be effective. Treatment options for those with *C. difficile* will depend on the severity of symptoms. In mild cases where an antibiotic is being taken, symptoms may resolve on their own once the antibiotic is completed; in more severe cases, medication and surgery may be necessary.

What do you do if you think you have been exposed?

Exposure to an ARO or *C. difficile* does **not** constitute an emergency response. Healthy people are usually **not** at risk of becoming infected with an ARO.

More information on antibiotic resistant organisms, extended spectrum beta-lactamase (ESBL), and methicillin-resistant staphlococcus aureus

ANTIBIOTIC RESISTANT ORGANISMS (AROs) AND *CLOSTRIDIUM DIFFICILE (C. DIFFICILE)* CHAIN OF TRANSMISSION



- AROs are bacteria that are resistant to the antibiotics normally used to treat the infections they cause e.g., Methicillin-resistant *Staphylococcus aureus* (MRSA), Vancomycin-resistant enterococcus (VRE), extended spectrum beta-lactamase (ESBL)

- *Clostridium difficile* (*C. difficile*) are bacteria that are transmitted in the same way as AROs
- AROs live in the gut and on the skin of people who are colonized or infected
- MRSA can also live in the front part of the nose
- *C. difficile* are found in the bowel of infected persons
- AROs – face, hands, skin, underarms, boils, wounds, lesions, feces
- *C. difficile* – feces

DIRECT OR INDIRECT CONTACT

AROs – when colonized or infected people pick their noses or go to the bathroom and don't wash their hands they could transfer these microbes to their environment or another person

C. difficile – contact with feces and improper washing of the hands after toileting or assisting a person with their personal care

Break the chain of transmission here by thorough handwashing and using Personal Protective Equipment

Skin (MRSA) or swallowing the bacteria (VRE, ESBL and *C. difficile*)

Anyone can become colonized, but infections with AROs or *C. difficile* generally occur in those with a weakened immune system or those receiving multiple antibiotic therapies.

Remember: Break the Chain, Stop Infection