

Newfoundland and Labrador Disease Control Manual	
Section 8	Diseases Related to Bioterrorism

Bioterrorism Agents 8.1-1
Small Pox, List A 8.2-1
Viral Hemorrhagic Fevers, List A..... 8.3-1

8.1 Bioterrorism Agents

Introduction

Bioterrorism involves the purposeful use of disease agents to cause illness in a population. Such events can be the result of domestic as well as international threats. Any number of agents can be used for bioterrorism but some have been identified as more likely including: Anthrax, Brucellosis, Plague, Tularaemia, Smallpox, Viral Hemorrhagic Fevers. This section covers disease of importance that is not identified elsewhere and pose a risk for bioterrorism. Common routes of bioterrorism include food or water poisoning or the use of aerosolized agents. The most recent example of bioterrorism in North America was the 2001 attack on various American targets using anthrax powder.

A bioterrorism event can be detected by a number of methods. First responders or MOHs may determine if an event or illness represents a credible public health risk and whether it may be suspicious.

In 2002 the Government of Newfoundland and Labrador created the Bioterrorism Response Handbook. This manual details actions needed to address real or potential bioterrorism threats.

Surveillance and prompt response to events that are suggestive of bio-terrorism will allow for implementation of measures that will prevent further illness. Case follow-up and contact tracing will also further reduce the effects of such an event on the population. A rapid response will prevent further spread of the offending agent. Some of the clues that may result in a level of suspicion include:

- unusual number of ill persons with the same disease or syndrome
- unusual number of cases of unexplained diseases or deaths
- unusual illness in a population
- unusual, genetically - engineered, or antiquated strains of an agent or antibiotic resistance strain of an organism

For more detailed information on the diseases related to federal response to bioterrorism please see the Public Health Agency of Canada website:

<http://www.phac-aspc.gc.ca/ep-mu/bioem-eng.php>

Bioterrorism Response

If an incident has been identified as highly suspicious by police and explosive chemical and radiological threats have been ruled out, the first responder along with the Medical Officer of Health (MOH) or the designate for that region shall proceed as outlined in the Newfoundland and Labrador Bioterrorism Response Handbook. Prior to sampling or collection of a suspicious package for biological analysis, chemical and radiological contamination must be ruled out. The police will be responsible for securing the area of a suspected threat with direction from the MOH depending on the agent or bacteria involved. Once any individual incident is contained the public health response follows normal policies or procedures, with updates being provided to the police.

Some of the diseases related to bioterrorism include:

- Smallpox
- Viral Hemorrhagic Fevers
 - Ebola - Marburg
 - Dengue
 - Lassa
 - Crimean Congo – Rift Valley

Many of these are diseases rarely seen in the population and will not be detailed elsewhere in this manual.

Other disease of significance to bioterrorism, but which are detailed elsewhere include:

- Anthrax
- Brucellosis
- Plague
- Tularaemia

8.2 Small Pox, List A

<http://www.phac-aspc.gc.ca/tularemia/index-eng.php>

Case Definition

Confirmed case

Laboratory confirmation of infection:

- isolation of variola virus from an appropriate clinical specimen
OR
- positive PCR for variola virus nucleic acid

* Any testing related to suspected smallpox should be done at the NML with Level 4 containment facilities.

Probable case

- Clinical illness in a person who is epidemiologically linked to a laboratory-confirmed case or to a probable case

Suspected case

- Clinical illness in a person who is not epidemiologically linked to a laboratory-confirmed case or to a probable case of smallpox
OR
- atypical lesion^{1**} known to be associated with the variola virus on a person who is epidemiologically linked to a laboratory-confirmed or probable case

Clinical Presentation

A smallpox infection starts with a sudden onset of fever (of > 38.33C), malaise, headache, backache and prostration 1-4 days before rash onset. Severe abdominal pain and delirium are sometimes present. After about three days, the fever drops and a maculopapular rash appears, involving vesicles or firm pustules in the same stage of development without other apparent cause. These lesions are deeply embedded and appear, characteristically, on the mouth and on the face, the hands, and the forearms. Scabs form after eight to fourteen day and these may become deep depigmented, pitted scars. Lesions may itch at scabbing stage. Illness lasts 14-21 days.

To differentiate, chickenpox or varicella from variola, the varicella rash is more superficial and more prominent on the trunk. The smallpox or variola is a centrifugal rash on face or forearm, and lesions on palms and soles (seen in >50% of cases) and the lesions are pitted and deep. The varicella lesions also appear at different stages of development where as variola does not. Variola major has a case fatality rate of 30% (can be as high as 50%). A picture of smallpox can be found at the following URL: www.who.int/emc/diseases/smallpox/slideset/index.htm

¹ Atypical presentation of smallpox include a) hemorrhagic lesions OR b) flat velvety lesions not appearing as typical vesicles or not progressing to pustules.

Epidemiology

Occurrence

Smallpox has been officially declared eradicated by the WHO in 1980. The last naturally occurring case was 1977 in a Somali boy. The only source for smallpox exists in laboratories in Russia and the United States. It is believed some of these stores may have been obtained by terrorist countries and therefore it is felt to be a present threat through bioterrorism. There has not, however, been any evidence of disease.

Reservoir

The reservoir for this virus is humans

Transmission

Smallpox can be transmitted from person to person mainly through airborne droplets released from the lungs of an infected person through cough or sneezes. Contaminated clothing or bed linen can also spread the virus.

Incubation Period

The incubation period is usually 12-14 days after exposure, could be 7-19 days.

Communicability

During the incubation period transmission does not occur. Transmission can occur during the first week of illness but the period of infectiousness extends from the development of fever until all lesions have scabbed over. That is about 21 days from the onset of illness. Prior to eradication it was expected that each case infected at least five other individuals.

Diagnosis

Case confirmation is based on findings consistent with the above listed case definition.

Control Measures

Management of Case

If a case of smallpox appeared it would be considered a global emergency. Treatment of the individual would consist of adequate hydration as well as strict isolation precautions that include airborne, contact, and standard precautions

Management of Contacts

Contacts should be vaccinated and, if develop fever, should be isolated. Vaccine, if given 2 -3 days after exposure, almost always prevents disease and given at 4-5 days almost always prevents death. The development of antibodies will occur more quickly than the disease will appear.

For those individuals who are considered to be at high risk of exposure to smallpox such as those who are immunocompromised, vaccinia immune globulin can be given with the vaccine. Vaccination and or vaccinia immune globulin would initially be performed by a team of experts from Health Canada's Center for Emergency Preparedness and Response Division.

Contraindications to use of smallpox vaccination under non-emergent circumstances would include: the presence of severe eczema, acute or chronic exfoliate skin conditions and for individuals who are immunosuppressed including household contacts.

Management of Outbreaks

Notification of one case would result in a national response. The response to an outbreak would involve deployment of an expert team from Health Canada's Center for Emergency Preparedness and Response Division. They will assist with smallpox vaccine training and other key public health measures for Canada's search and containment strategy against smallpox. Direction for quarantine and vaccination would come from this team.

Consideration of implementing a vaccination program must include an assessment of the risk and threat from smallpox. Consideration must be given to the possibility of severe adverse reactions to vaccination. There must be an assessment done at a national level to determine the supply of vaccine and vaccinia immune globulin as well as the ability of local vaccination capacity.

The primary goal is to interrupt the transmission of smallpox. This would be done by rapid isolation of cases and by identification and vaccination of contacts. Identification of infected individuals will require intensive surveillance.

Preventive Measures

The best preventive measure against smallpox is vaccination. Immunization of health care workers stopped in 1977 and the Canadian Forces stopped vaccinating in 1988; accordingly, very few of those born in Canada since 1972 would ever have had any vaccination against smallpox. Also those vaccinated prior to 1972 are not expected to have any remaining immunity.

If there was a reintroduction of smallpox at this time there is a very susceptible population. Prior to vaccinating individuals, a screening process must take place in order to rule out those who are at risk of complication from vaccination. The vaccination process currently would only take place under the direction of Health Canada as training of staff would be required.

Cases would need to be isolated to prevent further spread. This can be done at home to prevent further transmission. If the individual requires hospitalization, a room with negative air pressure should be used. Also contacts should be screened then placed under observation.

Reporting Requirements and Procedures

The PH Lab will provide immediate report of any identified cases

Regional MOH will notify

- Local physicians, nurse practitioners, communicable disease control nurses (CDCNs) and infection control nurses (ICN) in the particular region.
- Provincial office of the CMOH as per list A

Provincial Public Health is responsible for

- Reporting the data related to the disease to PHAC and other regions.
- Analysis of cases and reporting in the Communicable Disease Report (CDR)

8.3 Viral Hemorrhagic Fevers, List A

Case Definition

Confirmed case

Laboratory confirmation of infection:

- isolation of virus from an appropriate clinical specimen (tier 3 laboratory only)
OR
 - Identification of virus antigen by enzyme immunoassay
- AND
- Molecular detection of virus by reverse-transcriptase PCR testing from appropriate clinical specimen

Clinical Presentation

Viral Hemorrhagic Fevers (VHF) includes many viruses in the family *Filoviridae*. Different forms may have different presentations. Ebola-Marburg is the most significant because of its severity and communicability. This group of diseases provides especially high risk because there are virtually no effective treatments.

Ebola-Marburg Viral Diseases

This VHF is characterized by abrupt onset of fever, myalgia, and headache. It is followed by malaise, vomiting, abdominal pain, and pharyngitis. A maculopapular rash appears which is most prominent on the trunk. Severe dehydration and significant wasting can occur. Severe fatal cases also consist of hepatic damage, renal failure, CNS involvement, and terminal shock with organ failure. Serological analysis may also find lymphopenia, severe thrombocytopenia, and elevated transaminase. Creatinine, and urea nitrogen levels increase in the final stages accompanying renal failure. The case-fatality rate of Ebola-Marburg can be 25-90%.

Dengue Fever

Dengue fever is often a biphasic febrile virus. It is characterized by sudden onset of headache, myalgia, arthralgia, retro-orbital pain, anorexia, nausea, and vomiting. A maculopapular rash may appear close to the end of fever. Minor bleeding may occur during the febrile phase, though major hemorrhage may happen in some adults. Lymphadenopathy, leukopenia, and mild thrombocytopenia are found as well. Case-fatality is 1-10% and lasts 2-7 days.

Lassa Fever

Lassa fever begins with a gradual onset of malaise, fever (which may spike), headache, sore-throat, cough, nausea, vomiting, diarrhea, myalgia, and abdominal pain. Inflammation and exudation of pharynx and conjunctivae also occurs; symptoms last 1-4 weeks. Severe cases may experience hypotension, shock, hemorrhaging, encephalopathy, edema, and effusion. Platelet function is abnormal. Infections are mild or asymptomatic in 80% of patients. Lassa fever has a case-fatality of 1%.

Rift Valley

The principal difference between this VHF and the others is the presence of ocular disease, consisting of photophobia and retro-orbital pain. Extreme weight loss may occur and recovery occurring within 2-7 days of illness onset. Case-fatality of 1-10% is observed.

Crimean-Congo Fever

Crimean-Congo fever is characterised by sudden onset of general symptoms including: weakness, fever, headache, malaise, diarrhea, and myalgia. Symptoms are similar to other VHF but may also include photosensitivity. The patient may develop mood swings and aggressive behaviours. In 2-4 days this may be replaced by exhaustion, depression, and lassitude. Abdominal pain may be localised to the upper right quadrant and hepatomegaly may occur. Petechiae may occur on skin and internal mucosal surfaces, chest, and abdomen. Crimean-congo fever has a case-fatality of 30% and average recovering occurs at 10 days.

Epidemiology**Occurrence**

VHFs are found mainly in tropical regions especially central and West Africa. Rift Valley fever is seen mainly in sub-saharan Africa but outbreaks have occurred in Somalia, Kenya, Egypt, and Saudi Arabia.

Reservoir

Crimean-Congo fever is carried by ticks and it, along with Rift Valley fever can be found in local mammals. Lassa fever is found mainly in rodents. The reservoir for Ebola-Marburg is largely unknown. It may be primates and large rodents. Rift-valley fever is found in mosquitoes.

Transmission

Rift Valley and Crimean-Congo can be transmitted by bites from insect vectors or being exposed to infected animal blood, tissues, or fluids. Lassa fever is contracted by contact with aerosol of physical excreta from infected rodents. Individuals may become infected with Rift Valley and Crimean Congo if they come in direct personal contact with blood or excreta from infected patients. It is believed that Ebola Marburg is first contracted by handling carcasses of dead infected animals. Ebola-Marburg, however, has a high communicability through infected blood, secretions, organs, or semen. Risk is highest during vomiting, hemorrhaging, and diarrhea phases as well as during burial of dead because of a lack of precautions. Ebola-Marburg is more highly communicable than the others potentially because of the severity of the illness and the amount of vomit, excreta, and blood produced.

Incubation Period

VHFs have variable incubation periods: Ebola-Marburg disease - 2-21 days; Lassa fever - 6-21 days; Crimean-Congo fever - 5-13 days; and Rift Valley - 2-6 days. In most cases, onset occurs sooner rather than later.

Communicability

Technically the virus is communicable for as long as it can be found in the blood. Communicability increases with the amount of blood, excreta, and vomit produced. Ebola virus has been found in semen 61 days after onset of the illness.

Diagnosis

Case confirmation is based on findings consistent with the above listed case definition.

Control Measures

Management of Case

Generally medical care is supportive. Few treatments have been found to have any effect. Lassa fever can be treated with ribavirin within the first 6 days of illness. Oral rehydration is important. For Lassa and especially Ebola-Marburg, strict isolation should be imposed. Extreme precautions should be taken with blood, septum, and excreta of infected individuals.

Management of Contacts

Contacts require identification and surveillance. Isolation is not required. Body temperature should be monitored. If it goes above 38.8 degrees Celsius, an individual should be hospitalized immediately.

Management of Outbreaks

Because VHF's are not endemic in Canada and can be potentially serious, isolation should prevent further spread because infected humans would be the only hosts. In the case of suspected bioterrorism please consult the Newfoundland and Labrador Bioterrorism Response Handbook.

A single case of inhalation VHF should result in investigation. Notification of one case would result in a national response. The response to an outbreak would involve deployment of an expert team from Health Canada's Center for Emergency Preparedness and Response Division. Further health direction would come from this team. When deliberate use is suspected than specific measures should be taken and criminal investigation authorities should also be notified and included in planning.

Preventive Measures

Prevention involves careful monitoring of international travel. Educating travelers of potential illness could speed diagnosis time

Reporting Requirements and Procedures

- Physicians and laboratories report notifiable diseases immediately for list A and within 4 days for list B, aggregate weekly for list C to the Regional Medical Officer of Health (RMOH)
- The RMOH office initiates coordinated response including contact tracing as indicated for a specific disease
- The RMOH office reports to the Provincial Public Health through electronic reporting system

- If an outbreak has been identified an outbreak report is completed and sent to the Provincial Public Health.
- The RMOH office will notify local health professionals and others deemed as necessary
- Provincial Public Health
 - Reports cases to Public Health Agency of Canada
 - Provides analysis and reports to RHA's in the Communicable Disease Report (CDR)