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Infection Prevention and Control Management of Viral Hemorrhagic Fever in Acute Care

Best Practice

2nd Edition: June 2026

Public Health Ontario

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Summary of Revisions

Changes in this revision are summarized in the table below.

Date of Implementation	Description of Major Changes	Page
June 1, 2026	Added more info related to bedside specimen collection and transport.	11
June 1, 2026	Updated symptoms and added a link to PHO's VHF landing page in screening section.	11
June 1, 2026	Added notification pathway and references to Clinical Risk Assessment tool for VHF.	14
June 1, 2026	Updated table 1 to include more info on human waste safe disposal.	17
June 1, 2026	Added in table 1 PPE recommendation for staff escorting patients but not providing care.	17
June 1, 2026	Updated the algorithm for symptoms, added a link to PHO's VHF landing page and also to VHF clinical risk assessment tool.	26

Contents

Preamble

About This Document

This document has been produced by Public Health Ontario (PHO) in order to ensure that health care providers (HCP) and acute care settings are able to identify when a risk of viral hemorrhagic fever (VHF) infection may exist, initiate infection prevention and control (IPAC) measures to protect staff and patients, and manage the patient through the investigation and clinical management phases as appropriate for the acute care setting.

This document outlines guidance for IPAC management of suspect or confirmed cases of VHF with provisions to ensure that appropriate IPAC measures are put in place based on a risk assessment. The IPAC advice in this document is developed based on existing evidence for Ebola Virus Disease, however, the guiding principles and IPAC measures are applicable for other VHF agents with person-to-person transmission (e.g., Marburg, Lassa, Crimean Congo hemorrhagic fever (CCHF), Chapare, Machupo and Lujo).[1,2,3] The Ministry of Health may establish standards through policy or directives that go beyond the recommendations contained in this document. Refer to the Ministry of Health's Public Health Management of Viral Hemorrhagic Fevers – Interim Guidance and Infectious Disease Protocol Appendix 1: Case Definitions and Disease Specific Information Disease: Hemorrhagic fevers caused by: i) Ebola virus and ii) Marburg virus, iii) Lassa Fever, and (iv) Other viral causes including bunyaviruses, arenaviruses and flaviviruses for additional information.

This document supersedes and replaces the following PHO guidance documents:

- Guide to Infection Prevention and Control (IPAC) Management of Suspected or Confirmed Viral Hemorrhagic Fever (VHF) in Acute Care,[4]
- Interim IPAC Recommendations for the Care of Individuals with Suspect or Confirmed Ebola Virus Disease (EVD) in the Acute Care Setting,[5] and
- Management of Ebola virus disease (EVD) survivors in Ontario.[6]

Evidence for Recommendations

This document has been developed based on the best available evidence and is current as of June 2026.

The guidance in this document assumes that health care settings in Ontario have existing basic IPAC systems and programs in place and that an organizational risk assessment (ORA) has been conducted to determine their readiness when dealing with emerging pathogens. Additional resources, tools and links for ORA are available on the Public Services Health & Safety Association (PSHSA) site to aid in training and ensuring health care settings are prepared should a suspect or confirmed VHF case be identified in their facility.

Abbreviations

AGMP	aerosol-generating medical procedure
AIIR	airborne infection isolation room
ARO	antibiotic-resistant organism
CDC	Centers for Disease Control and Prevention
CSA	Canadian Standards Association
ES	environmental services
EVD	Ebola virus disease
HCP	health care provider
HPPA	*Health Protection and Promotion Act*
ICP	infection control professional
IPAC	infection prevention and control
MEOC	Ministry Emergency Operations Centre
MIFU	Manufacturer's Instructions for Use
OHSA	*Occupational Health and Safety Act*
PAPR	powered air purifying respirator
PCRA	point-of-care risk assessment
PHAC	Public Health Agency of Canada
PHO	Public Health Ontario
PHU	public health unit
PIDAC	Provincial Infectious Diseases Advisory Committee
PPE	personal protective equipment
VHF	viral hemorrhagic fever
WHO	World Health Organization

Glossary

Additional Precautions (AP): Precautions (i.e., Contact Precautions, Droplet Precautions and Airborne Precautions) that are necessary in addition to Routine Practices for certain pathogens or clinical presentations. These precautions are based on the method of transmission (e.g., contact, droplet, airborne).

Aerosol: Small droplet or tiny particle of moisture that may carry microorganisms. Aerosols are light enough to remain suspended in the air, allowing inhalation of the microorganism.[7]

Aerosol-Generating Medical Procedure (AGMP): A medical procedure that generates droplets/aerosols and has epidemiological data that indicates that the procedure may significantly increase the risk of infection to health care providers in the area.[8,9]

Airborne Infection Isolation Room (AIIR): A room that is designed, constructed and ventilated to limit the spread of airborne microorganisms from an infected occupant to the surrounding areas of the health care setting. This is also known as a negative pressure room. NOTE: The Canadian Standards Association uses the term Airborne Isolation Room (AIR).

Airborne Precautions: Used in addition to Routine Practices for patients/residents/clients known or suspected of having an illness transmitted by small infectious respiratory particles that remain suspended in the air and may be inhaled by others. See also Infectious respiratory particles.

Alcohol-Based Hand Rub (ABHR): A liquid, gel or foam formulation of alcohol (e.g., ethanol, isopropanol) which is used to reduce the number of microorganisms on hands in clinical situations when the hands are not visibly soiled. ABHRs contain emollients to reduce skin irritation and are less time-consuming to use than washing with soap and water.

At a minimum: Minimal precautions are the most basic measures that are to be taken; this does not preclude taking higher levels of protection (for example fluid impermeable gown or powered air purifying respirator) based on an institutional and/or point of care risk assessment.

Cleaning: The physical removal of foreign material (e.g., dust, soil) and organic material (e.g., blood, secretions, excretions, microorganisms). Cleaning physically removes rather than kills microorganisms. It is accomplished with water, detergents and mechanical action (e.g., scrubbing).

Contact Precautions: Used in addition to Routine Practices to reduce the risk of transmitting infectious agents via contact with an infectious person.

Contamination: The presence of an infectious agent on hands or on a surface, such as clothing, gowns, gloves, bedding, toys, surgical instruments, care equipment, dressings or other inanimate objects.

Detergent: A synthetic cleansing agent that can emulsify oil and suspend soil. A detergent contains surfactants that do not precipitate in hard water and may also contain protease enzymes (see Enzymatic Cleaner) and whitening agents.

Disease of Public Health Significance: An infectious disease specified in Ontario Regulations 135/18: Designation of Diseases. Under the Health Protection and Promotion Act, these diseases or suspected occurrences of these diseases must be reported to the local Public Health Units by HCPs, laboratories, administrators of hospitals, schools, and institutions.

Disinfectant: A product that is used on surfaces or medical equipment/devices which results in disinfection of the surface or equipment/device. Disinfectants are applied only to inanimate objects. Some products combine a cleaner with a disinfectant. See also, Disinfection and Hospital Grade Disinfectant.

Disinfection: The inactivation of disease-producing microorganisms. Disinfection does not destroy bacterial spores. Medical equipment/devices are to be cleaned thoroughly before effective disinfection can take place. See also, Disinfectant and Hospital Grade Disinfectant.

Doffing: The action of taking off PPE.

Donning: The action of putting on PPE.

Drug Identification Number (DIN): In Canada, disinfectants are regulated as drugs under the Food and Drugs Act and Regulations. Disinfectant manufacturers are to obtain a drug identification number (DIN) from Health Canada prior to marketing, which ensures that labelling and supporting data have been provided and that it has undergone and passed a review of its formulation, labelling and instructions for use.

Environment of the Patient: The immediate space around a patient that may be touched by the patient and may also be touched by the health care provider when providing care. In a single room, the patient environment is the room. In a multi- bedroom, the patient environment is the area that may come into contact with the patient within their cubicle. In a nursery/neonatal setting, the patient environment includes the inside of the bassinette or incubator, as well as the equipment outside the bassinette or incubator used for that infant (e.g., ventilator, monitor). See also, Health Care Environment.

Enzymatic cleaner: A pre-cleaning agent that contains protease enzymes that break down proteins such as blood, body fluids, secretions and excretions from surfaces and equipment. Most enzymatic cleaners also contain a detergent. Enzymatic cleaners are used to loosen and dissolve organic substances prior to cleaning.

Exposure: An exposed person (exposure) will be defined by infection prevention and control in consultation with occupational health and safety and the public health unit.

Fit-Test: A qualitative or quantitative method to evaluate the fit of a specific make, model and size of respirator on an individual. Fit-testing is to be done periodically, at least every two years and whenever there is a change in respirator care or the user's physical condition which could affect the respirator fit.[10-12]

Hand Hygiene Moment: The point(s) in an activity at which hand hygiene is performed. There may be several hand hygiene moments in a single care sequence or activity.

Hand Hygiene: A general term referring to any action of hand cleaning. Hand hygiene relates to the removal of visible soil and removal or killing of transient microorganisms from the hands. Hand hygiene may be accomplished using soap and running water or an alcohol-based hand rub. Hand hygiene includes surgical hand antisepsis.

Health Care Environment: The people and items which make up the care environment (e.g., objects, medical equipment, staff, patients) of a hospital, clinic or ambulatory setting, outside the immediate environment of the patient. See also, Environment of the Patient.

Health Care Facility: A set of physical infrastructure elements supporting the delivery of health-related services. A health care facility does not include a patient's home or physician/dentist/other health offices where health care may be provided.

Health Care Provider (HCP): Any person delivering care to a patient. This includes, but is not limited to, the following: emergency service workers, physicians, dentists, nurses, midwives, respiratory therapists and other health professionals, personal support workers, clinical instructors, and students. See also, Staff.

Health Care Setting: Any location where health care is provided, including settings where emergency care is provided, hospitals, complex continuing care, rehabilitation hospitals, long-term care homes, mental health facilities, outpatient clinics, community health centres and clinics, physician offices, dental offices, independent health facilities, out-of-hospital premises, offices of other health professionals, public health clinics and home health care.

Hospital-Grade Disinfectant: A low-level disinfectant that has a drug identification number (DIN) from Health Canada, indicating its approval for use in Canadian hospitals. See also Disinfectant and Disinfection.

Infection Prevention and Control (IPAC): Evidence-based practices and procedures that, when applied consistently in health care settings, can prevent or reduce the risk of transmission of microorganisms to health care providers, other patients and visitors and development of health care- associated infections in patients from their own microorganisms.

Infection Prevention and Control Canada (IPAC Canada): A professional organization of persons engaged in IPAC activities in health care settings. IPAC Canada members include IPAC professionals from a number of related specialties including nurses, epidemiologists, physicians, microbiology technologists, public health and industry.

Infection Prevention and Control Professional(s) (ICPs): Trained individual(s) responsible for a health care setting's IPAC activities. In Ontario, an ICP is to receive a minimum of 80 hours of instruction in an IPAC Canada-endorsed infection control program within six months of entering the role and is to acquire and maintain Certification in Infection Control (CIC®) when eligible. The ICP is to maintain a current knowledge base of IPAC information.

Infectious Agent: A microorganism, i.e., a bacterium, fungus, parasite, virus or prion, which is capable of invading body tissues and multiplying.

Infectious respiratory particles (IRP): Pathogens carried in expired airflow from the respiratory tract of infected individuals.[13]

Long-range transmission: a mode of transmission involving respiratory particles that remain suspended in the air for longer durations and result in infection through inhalation. Transmission by this mode has traditionally been referred to as airborne transmission.[14, 15]

Manufacturer: Any person, partnership or incorporated association that manufactures and sells medical equipment/devices under its own name or under a trademark, design, trade name or other name or mark owned or controlled by it.

Mask (fluid-resistant medical mask): A device that covers the nose and mouth, is secured in the back and is used by health care providers to protect the mucous membranes of the nose and mouth.

Mode of Transmission: The method by which infectious agents spread from one person to another (e.g., contact, droplet or airborne routes).

N95 Respirator: A respirator is a personal protective device that is worn on the face and covers the nose and mouth to reduce the wearer's risk of inhaling airborne particles. The most common respirator used in health care is an N95 half-face piece filtering respirator. A National Institute for Occupational Safety and Health-certified N95 respirator has a filter efficiency of 95% or more for particles that are 0.3 microns or larger in size and provides a tight facial seal with less than 10% leak.[14]

Occupational Health and Safety (OHS): Preventive and therapeutic health services in the workplace provided by trained occupational health professionals, e.g., nurses, hygienists, physicians.

Patient: Any person receiving care within an acute care setting.

Personal Protective Equipment (PPE): Clothing or equipment worn for protection against hazards.

Point-of-Care Risk Assessment (PCRA): An evaluation of the anticipated/proposed interaction between the health care provider, the patient, and the patient environment in order to assess and analyze the potential for exposure to infectious disease in the course of the interaction.

Powered Air Purifying Respirator (PAPR): A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element. A blower carried by the user passes ambient air through an air-purifying component and then supplies purified air to the face piece. Powered types are equipped with a face piece, loose-fitting face piece, helmet, or hood.[16]

Provincial Infectious Diseases Advisory Committee (PIDAC): For the purposes of this document, PIDAC refers to Provincial Infectious Diseases Advisory Committee on Infection Prevention and Control (PIDAC-IPC). PIDAC-IPC is a scientific advisory committee that advises Public Health Ontario on the prevention and control of health care-associated infections in Ontario.

Public Health Unit (PHU): An official health agency established by a group of urban and rural municipalities to provide a more efficient community health program, carried out by full-time, specially qualified staff. Public health units administer health promotion and disease prevention programs.

Respiratory Etiquette: Personal practices that help prevent the spread of bacteria and viruses that cause acute respiratory infections (e.g., covering the mouth when coughing, prompt and careful disposal of tissues).

Routine Practices (RP): The system of IPAC practices to be used with all patients during all care to prevent and control transmission of microorganisms in all health care settings. For a full description of Routine Practices, refer to PIDAC's Routine Practices and Additional Precautions in all Health Care Settings.

Safety-Engineered Medical Device: A non-needle sharp such as a scalpel, or a needle device used for withdrawing body fluids, accessing a vein or artery, or administering medications or other fluids, with a built-in safety feature or mechanism that effectively reduces exposure incident risk. Safety-engineered devices are licensed by Health Canada.

Seal-Check: A procedure that the health care provider is to perform each time an N95 respirator is worn to ensure it fits the wearer's face correctly to provide adequate respiratory protection. The health care provider is to receive training on how to perform a seal-check correctly.

Sharps: Objects capable of causing punctures or cuts (e.g., needles, lancets, sutures, blades, clinical glass).

Staff: Anyone conducting activities in settings where health care is provided, including but not limited to, health care providers, housekeeping and environmental services workers. See also, Health Care Provider.

Terminal Cleaning: The thorough cleaning of a patient room or bed space following discharge, death or transfer of the patient, in order to remove contaminating microorganisms that might be acquired by subsequent occupants and/or staff. In some instances, terminal cleaning might be used once some types of Additional Precautions have been discontinued. Refer to PIDAC's Best Practices for Environmental Cleaning in All Health Care Settings for more information about terminal cleaning.

Viral hemorrhagic fevers (VHF) non-transmissible person-to-person: Some viruses that cause VHF may be transmitted to people by arthropod or animal vectors and are not known to be transmitted from person to person (e.g., dengue, yellow fever, and Rift Valley Fever). Patients affected by these VHFs can be cared for using Routine Practices. Additional Precautions may still be necessary should there be another reason for their application in care of the patient.

Viral hemorrhagic fevers (VHF) transmissible person-to-person: Some viruses that cause VHF may be transmitted from one person to another through close physical contact with infected people and their body fluids (i.e., Ebola, Marburg, Lassa, Crimean-Congo hemorrhagic fever, Chapare, Machupo, and Lujo). Additional precautions are required to protect health care providers.

Viral hemorrhagic fevers (VHF): Viral hemorrhagic fevers (VHFs) refer to a group of illnesses that are caused by several distinct families of viruses. In general, the term "viral hemorrhagic fever" is used to describe a severe multisystem syndrome. Symptoms are often accompanied by hemorrhage, which can be life-threatening. While some types of hemorrhagic fever viruses can cause relatively mild illness, many of these viruses cause severe, life-threatening disease.

Background

Viral hemorrhagic fevers (VHFs) are caused by a diverse group of RNA viruses (e.g. arenaviruses, filoviruses, flaviviruses, hantaviruses, nairoviruses, phenuiviruses, and rhabdoviruses). Many VHF viruses are characterized by a low infectious dose, meaning that infection may occur following exposure to small amounts of virus. Among VHF viruses, those known to be transmissible from person-to-person include Ebola viruses, Marburg virus, Lassa virus, Crimean-Congo hemorrhagic fever virus, Chapare virus, Machupo virus, and Lujo virus. Ebola virus disease in humans can be caused by four Ebola viruses:[17]

- Ebola virus (*Orthoebolavirus zairense*)
- Sudan ebolavirus (*Orthoebolavirus sudanense*)
- Bundibugyo ebolavirus (*Orthoebolavirus bundibugyoense*)
- Taï Forest ebolavirus (*Orthoebolavirus taiense*)

VHF viruses are endemic to specific geographies in Africa, the Middle East and Asia. For more information on geographical locations where VHF viruses are endemic and associated with animal or human disease, please refer to the CDC webpage on VHFs.[1] Outbreaks of VHF have been reported periodically in several countries across Central, West, and East Africa. Public Health Ontario (PHO) monitors VHF activity globally and provides information on unexpected activity in VHF-endemic areas and on VHF outbreaks declared by the World Health Organization on its VHF Landing Page. The risk of importation of a VHF-infected individual into Ontario is low. However, clear guidance on appropriate infection prevention and control measures in acute care settings is essential.

Ebola Zaire vaccine (EZV), is effective against Ebola virus (*Orthoebolavirus zairense*), is authorized in Canada for use in adults 18 years of age or older. EZV should be offered as post-exposure prophylaxis to persons who have been exposed to Ebola virus in Canada.[17] EZV is not recommended for Canadians as part of routine immunization or for vaccination prior to travel. EZV is not indicated against the other types of orthoebolaviruses or related filoviruses.

VHFs are designated as diseases of public health significance under *Ontario Regulation 135/18: Designation of Diseases*[18] under the *Health Protection and Promotion Act, R.S.O. 1990, c. H.7*. If a clinician has suspicion for VHFthey must immediately notify by telephone the Ministry of Health (see the Notification Pathway for Special Pathogens) and their local Medical Officer of Health (see the Public Health Unit locator website).

> In the event of importation, threat of importation, or transmission of a VHF agent in Ontario, the Ministry of Health may establish additional standards through policy or directives that supersede or exceed the recommendations contained in this document.

Transmission

Person-to-Person Transmission

VHFs capable of person-to-person transmission may initiate human transmission chains that can result in outbreaks within geographic areas including health-care and other institutional settings, in the absence of appropriate IPAC measures.[19-20]

Direct Transmission: Occurs through contact with the body fluids of the infected person with exposure of mucous membranes or non-intact skin such as when:

- Providing care for the person at home or in a health care setting without the use of appropriate PPE.
- Preparing a body for burial or participating in burial rituals without the use of appropriate PPE.
- Inoculation through a needle-stick injury.
- A sexual partner has unprotected sexual contact with a survivor of VHF (e.g., Ebola, Lassa and Marburg) who has persistent infectious virus in their semen following infection.

Indirect Transmission: Has been a factor in propagating outbreaks in health care settings when contact with objects contaminated with infectious body fluids has occurred. Examples include:

- Re-use of single-use medical equipment such as syringes and needles.
- Multi-use patient care equipment used without cleaning and disinfecting in between patients.

Long-Range Transmission (traditionally referred to as Airborne Transmission): The possibility of long-range transmission has been considered for filoviruses (Ebola, Marburg) given the identification of cases without a known exposure to an infected person or carcass during outbreaks. Although this has only been supported by limited epidemiological evidence and some experimental studies.[21]

While the possibility of long-range transmission cannot be excluded, epidemiological data supports direct contact with infectious patients or surfaces as the most important risk factor.

Factors That Impact VHF Transmission

- Individuals infected with a VHF virus are not communicable prior to the onset of symptoms.[22,24]
- Virus levels in a patient's blood at the time of symptom onset are low and may be undetectable by reverse transcription - polymerase chain reaction (RT-PCR) assays during the first three days of illness in some cases. Some patients may not have a positive RT-PCR blood test result during the first three days of illness.[22,23]
- Viral RNA levels increase throughout the course of infection and are highest late in the course of the disease when copious fluid loss is experienced due to diarrhea, vomiting or hemorrhage.[23,25]
- Direct contact with blood or other body fluids of infected persons without use of PPE increases the risk for transmission in households and health care settings.[24,26]
- The bodies of deceased persons infected with VHF are highly infectious; family members who touched a deceased person infected with VHF without use of PPE and who were exposed during the late phase of illness were at additional risk for infection.[26]
- Confirmed VHF cases remain communicable as long as blood or other body fluids (e.g., semen) contain infectious virus.[27]

Post Recovery Infectivity

VHF is not transmitted through casual contact with a VHF survivor. After recovery from VHF, when the virus has cleared from elsewhere in the body, the virus can remain in "immunologically privileged sites" (e.g., testes, interior of the eyes, cerebrospinal fluid, mammary glands) shielded from the survivor's immune system for several months after recovery.[28-9] The location and length of time the VHF virus remains in these sites varies by the survivor. The Centers for Disease Control and Prevention (CDC) in the United States have summarized the longest time periods from illness onset that EVD RNA or antigen have been detected in various body fluids, as well the longest time period that infectious Ebola virus has been detected in these body fluids.[28]

Limited evidence is available on the persistence of infectious virus following recovery of other VHFs. For example, Marburg virus has been identified in infected semen up to seven weeks after recovery. Lassa fever virus has also been detected up to 64 days post recovery in semen. Knowledge regarding the length of viral persistence continues to evolve as survivor studies continue. However, persistent virus in survivors is possible and suspected to be the source of some subsequent outbreaks.[28, 30]

Screening and Testing for VHF

Screening of Patients Presenting for Care

Screening patients for a history of travel and relevant exposures is part of routine patient evaluation of persons presenting with signs or symptoms that could be due to an infectious cause (e.g., fevers, respiratory symptoms, rashes, vomiting and diarrhea).

Signs and symptoms of VHF include a documented fever (≥ 38.0°C / ≥ 100.4 °F), any hemorrhagic manifestation (e.g., petechial or purpuric rash, ecchymoses, conjunctival injection or hemorrhage, epistaxis, gingival bleeding, hemoptysis, hematemesis, melena, and hematochezia), subjective fever/chills (patient-reported), chest pain, cough, sore throat, headache, fatigue, myalgia (body aches), conjunctivitis, abdominal pain, weakness, nausea, vomiting, or diarrhea.

Suspicion of viral hemorrhagic fever (VHF) should be considered in any patient presenting with compatible signs and symptoms and a history of relevant exposure **within 21 days before the onset of symptoms:**[30]

- Have travelled in the specific local area of a country where VHF is endemic or there is an active VHF outbreak. Refer to PHOs VHF landing page, which provides information on unexpected activity in VHF-endemic areas and on VHF outbreaks.
- Had direct contact with blood, other body fluids, secretions, or excretions of an animal or person (alive or deceased) with suspected or confirmed VHF.
- Is a laboratory worker that has handled a virus known to cause VHF (i.e., interacted with a specimen that contained VHF virus).
- Is an animal worker that has handled a symptomatic animal/animal suspected of having a VHF and that animal has recently been imported from a country/region where active transmission of a virus known to cause VHF is occurring (i.e., virus is endemic or there is an active VHF outbreak).

If a patient is suspected of having a VHF immediately initiate IPAC measures for patients with a suspect or confirmed VHF (see table 1) and notify your IPAC team. Consider consulting an Infectious Disease physician if available. If suspicion for VHF remains after a physician completes PHO's VHF Clinical Risk Assessment Tool and following consultation with an Infectious Diseases physician (if available), refer to the Ministry of Health's Notification Pathway for Special Pathogens and **immediately** notify, **by telephone, both:**

- The Ministry of Health - Health System Emergency Management Branch (HSEMB) by telephone via the 24/7 Health Care Provider Hotline (1-866-212-2272 ext. 1).
- Your local public health unit.

Laboratory Investigation and Specimen Handling

Viruses causing VHF that are transmissible person-to-person are classified as risk group 4 pathogens, meaning that these viruses pose a high risk to the health of individuals and public health. As a result, specimens for human diagnostic testing have specific biosafety, shipping and transportation requirements. [31] Molecular testing (i.e., RT-PCR) for viruses causing VHF is performed by PHO's laboratory and the National Microbiology Laboratory (NML). Testing for a VHF requires coordination between local, provincial and federal partners due to the nature of these pathogens and their associated safety risks. Refer to the Ministry of Health's **Notification Pathway for Special Pathogens** which outlines the provincial algorithm for managing special pathogens, including VHFs. Specimens for VHF testing should be collected only after consultation with the Ministry of Health - HSEMB.

For current testing, specimen handling and other laboratory guidance on VHF, refer to:

- PHO: Viral Hemorrhagic Fever including Ebola Virus Disease Test Information
- PHO: Diagnostic Testing for Viruses That Cause Hemorrhagic Fevers

Specimens are to be collected and transported by staff experienced in the required techniques and trained in the safety procedures. As per the IPAC section below, the same protective equipment as described for other hospital staff providing direct care is to be worn by those obtaining specimens at the bedside, with the addition of double gloves to facilitate the cleaning of the exterior of the specimen container. Once the specimen is collected, the entire outside of each specimen container is to be wiped with an approved hospital-grade disinfectant. The specimen container should be placed in a leakproof rigid securable secondary container for safe transport within the facility. Specimens are not be transported in a pneumatic tube system to prevent breakage or leakage. A route should be planned in advance from the patient care area to the packaging location, avoiding high-traffic areas.[32] Perform site-specific risk assessment to determine PPE and personnel for transport; at a minimum disposable gloves are to be worn.[32]

Federal shipping and transportation regulations, including the requirement to activate an Emergency Response Assistance Plan (ERAP), must be followed when handling or transporting specimens for VHF testing. All specimens must be shipped in compliance with the Transportation of Dangerous Goods Act.

IPAC Measures for Suspect or Confirmed VHF Cases

Each organization will need to incorporate protocols, policies and procedures specific to its organizational risk assessment and designated role, if indicated, in assessing, testing, and treating patients who may have a suspect or confirmed VHF. This would include comprehensive policies, procedures, and training for the sequence of putting on (donning) and removing (doffing) PPE that has been made available for staff providing care to a patient with a suspect or confirmed VHF infection.

The clinical presentation of the patient with suspected or confirmed VHF will evolve over time and risk of exposure to the infectious agent will also change depending on the patient's clinical status and the nature of the care or procedure being provided. The presence of large amounts of fluid loss in a clinically unstable patient puts the HCP at a higher risk for body fluid exposure or the environment at higher risk for contamination.[24]

Table 1 summarizes key aspects of the elements of Additional Precautions that can be applied based on clinical status and risk of exposure categorized as stable suspect case, unstable suspect case or confirmed case of VHF. Decision making will also need to consider the anticipated care procedures.

Stable Suspect Case (e.g., stable vital signs, contained fluids):

- patient is in early stage of illness (e.g., fever with fatigue and myalgia)
- patient is in convalescent stage of illness with diarrhea and vomiting resolved
- patient's body fluids are contained (e.g., formed stool, no vomiting, no bleeding)
- patient is continent of stool and urine
- patient is capable of self-care and hygiene

Unstable Suspect Case (e.g., abnormal vital signs, uncontained fluids):

- other clinical findings suggesting that the patient is likely to contaminate their environment with blood and bodily fluids (e.g., non-compliance, delirium, etc.)
- patient's body fluids are uncontained (e.g., vomiting, diarrhea, or bleeding)
- patient is incontinent of stool or urine
- patient is unable to perform self-care and hygiene
- patient requires invasive procedure or AGMP (e.g., intubation, suctioning, active resuscitation)
- patient has signs and symptoms of shock

All confirmed cases of VHF should be managed as unstable, given the potential for deterioration, including high-volume fluid loss or the need for AGMPs. Once a confirmed case is convalescing and the acute, high-volume fluid loss phase has resolved, you may consider de-escalation of recommendations, to those of a stable patient.

Table 1: IPAC Recommendations for Patients with a Suspect or Confirmed VHF Based on Clinical Status[22, 31, 32]

Component	Stable Suspect Cases of VHF	Additional Considerations for Unstable Suspect or Confirmed Cases of VHF	Comments
Additional Precautions	• At a minimum Droplet and Contact Precautions in addition to Routine Practices. • Dedicate patient care equipment to the room. • Use disposable equipment where possible.	• None	• If dedicated or disposable multi-use equipment is not available, then ensure the shareable equipment is cleaned and disinfected as per Manufacturer's instructions for use (MIFU). • Airborne Precautions may also be needed if the patient is exhibiting signs of VHF pneumonia, has a differential diagnosis of an infection that requires Airborne Precautions (e.g., tuberculosis, varicella, or measles) or performance of AGMPs are anticipated/possible.
Personal protective equipment (all staff)	• Well-fitting fluid-resistant medical mask.** • Disposable full-face shield. • Disposable fluid-resistant.** cuffed sleeve gown that covers to mid-calf. • Gloves with extended cuffs to pull over gown cuffs.	• A fit-tested, seal-checked N95 respirator*** • Disposable full-face shield. • Fluid resistant/impermeable hair/head/neck covering. • Impermeable**** long-sleeved, cuffed gown that covers to mid-calf and fluid resistant/impermeable shoe cover with/plus gaiters that come up to the knee. **OR** Impermeable coverall and fluid resistant/impermeable shoe covers/integrated sock. Apron can be worn if coverall has zipper on the front. • **Double gloves** should be considered, depending on activity (e.g., phlebotomy), to allow for changing of glove if required between activities while in the patient room. In this case the outer pair of gloves should have extended cuffs. Ensure cuffs of the inner gloves are tucked under the sleeves of gown or coverall.	• When removing the outer pair of gloves, use ABHR to sanitize the inner gloves prior to putting on a new pair of outer gloves.[34] • Fit-tested and seal-checked N95 respirator required for all AGMPs.***** • Staff escorting the patient who are not anticipating contact should wear at a minimum PPE consistent with Droplet and Contact Precautions (i.e., well fitting medical mask, eye protection, gown and gloves).

Component	Stable Suspect Cases of VHF	Additional Considerations for Unstable Suspect or Confirmed Cases of VHF	Comments
Patient Placement	• Single room with a dedicated washroom. • Door to always remain closed. • Location allows for separate spaces that are clearly delineated "clean" (outside patient room) and "contaminated" areas. • Storage for clean PPE in clean area. • Alcohol-based hand rub (ABHR) and waste containers available at point of care and "contaminated" or doffing area.	• None	• Consider Airborne Infection Isolation Room (AIIR) to accommodate potential clinical changes (e.g., need for AGMP).***** • If a dedicated washroom is unavailable, a dedicated commode with appropriate disposable absorbent pads or disposable bedpans may be used as an alternative.
Staffing	• Only essential/dedicated staff members who have been trained and have demonstrated competency in putting on and taking off recommended PPE are to be assigned to provide care for the patient. • Assess the need for secondary personnel to monitor donning and removal of PPE.	• Institute an observer to coach and observe putting on, taking off and disposal of PPE.	• If unfamiliar PPE is being worn, refresher training is to be provided prior to use (just-in-time training may be needed). • Maintain a log of all people entering the room. • Observers can be used to ensure that HCPs follow the appropriate procedure for donning and doffing PPE. This can be supported through the use of a visual aid and checklist that is read aloud to the HCP while they don and doff PPE.[26] • There is some evidence that having an additional HCP assist with donning and doffing can further reduce the risk of contamination.[27]

Component	Stable Suspect Cases of VHF	Additional Considerations for Unstable Suspect or Confirmed Cases of VHF	Comments
Environmental Cleaning	• Environmental services cleaning equipment is to be disposable or remain in the room for duration of patient admission. • Frequency of routine and/or high touch surface cleaning is to be based on the level of contamination with blood and/or body fluids—but, at a minimum, cleaning is to be done daily and when visibly soiled. • Use approved hospital-grade disinfectant with a Drug Identification Number (DIN) and claim sufficient to inactivate enveloped viruses.	• Consider additional cleaning (e.g., twice daily or more frequent) based on level of environmental contamination.	• Cleaning of the patient room and PPE doffing area is important in reducing the environmental contamination which in turn decreases the risk of transmission to HCPs. • VHF viruses have a lipid envelope which make them relatively easy to inactivate with most approved hospital-grade disinfectants.
Linen and Waste Management	• General patient care waste (e.g., dressings, diapers) from patients undergoing investigation for possible VHF is to be stored in a labelled leak-proof container if possible until such time as a VHF diagnosis is confirmed or eliminated. • Urine/feces/emesis and dialysis effluent may be disposed of through the normal sanitary sewer system, or in accordance with municipal/regional regulations When pouring waste in to the toilet, do it slowly from a low height to avoid splashing, close the lid before flushing, then disinfect all toilet surfaces and discard cleaning materials as biohazard waste.	• None	• All VHF associated waste is considered biohazardous (or infectious) waste and includes items (including linen and sharps) contaminated with human blood and body fluids that warrants special handling and disposal. Where municipal regulatory restrictions exist on disposal through the normal sanitary sewer system refer to Health Canada recommendations on VHF waste management for alternate strategies.[25] • VHF is classified under Transport Canada regulations as Class A agents and require special handling and packaging.[28] • Do not use hand hygiene sinks or patient sinks for disposal of body fluids/liquids, instead dispose them through the dedicated toilet.

Component	Stable Suspect Cases of VHF	Additional Considerations for Unstable Suspect or Confirmed Cases of VHF	Comments
Duration of Precautions	• Duration of precautions is to be determined on case-by-case basis based on laboratory findings and patient symptoms. • Decisions to revise or discontinue Additional Precautions for confirmed cases are to be made in conjunction with the IPAC department and local Medical Officer of Health.	• None	• Other co-conditions may require specific Additional Precautions be continued for the patient (tuberculosis, ARO colonization, etc.). • De-escalation of PPE to that of a stable case of VHF for confirmed cases can be considered when they are later in the course of illness (once viral load dropping and symptoms of vomiting, diarrhea and bleeding has stopped).

*Medical Masks of ASTM level 2 and level 3 (refer to COVID-19 medical masks and respirators: For health professionals - Canada.ca)
**Fluid resistant gowns meet CSA or AAMI level 2 or 3 standards (refer to Personal Protective Equipment against COVID-19: Medical gowns - Canada.ca)
***A PAPR is an alternative and may be used based on considerations such as length of time in patient room, availability of equipment, user training, and PPE assistance/observers.
**** Impermeable gowns meet CSA or AAMI level 4 standard (refer to Personal Protective Equipment against COVID-19: Medical gowns - Canada.ca)
***** Performance of AGMPs can increase the creation and mobilization of in particular very small, respiratory particles which may result in a risk of transmission to health care staff.

Additional IPAC Considerations

Transportation of Patients

Transportation should be avoided in general, only transport for essential procedures or diagnostic testing. Transport staff should use PPE as in Table 1 and change into new PPE when exiting the room.[33] The patient should wash their hands and wear a medical mask if tolerated upon exiting the room.[34] Ensure the receiving room/facility are ready to receive the patient. Emergency medical services/transportation company should be notified in advance if transporting outside of the facility.

Visitor Restriction

Visitors should be limited and in discussion with local public health and hospital IPAC. Visitors are to be screened prior to each visit and their entry and exit times logged. Visitors should be instructed and trained in use of PPE following the facility's policies, performing hand hygiene, and have minimal contact with surfaces.

Communications

IPAC should be notified immediately of a patient under investigation for VHF.

VHF is a disease of public health significance as per *Ontario Regulation 135/18*: *Designation of Diseases*[18] under the *Health Protection and Promotion Act, R.S.O. 1990, c. H.7* that requires **immediate** reporting to the local health unit.

Note that the Ministry of Health may activate the Ministry Emergency Operations Centre (MEOC) to coordinate and direct the health system's response in the event of a suspected or confirmed case of VHF in Ontario. As part of this coordination, the MEOC will support health system partners to implement a coordinated communications strategy.

In addition, health care facilities that care for patients with suspected or confirmed VHF should have a communications plan in place to manage media interest while ensuring patient confidentiality. It is advisable to notify administrative leadership and public relations, as a VHF case may attract significant media attention. A strategy for internal communications within the organization to reach all staff is important. Easy access to updated policies, procedures, fact sheets and Q and A's geared to various educational and language levels are examples. Maintaining patient confidentiality in the face of media interest is a challenge. HCPs are to be reminded of their legal responsibilities under the *Personal Health Information Protection Act, 2004, S.O. 2004, c. 3, Sched. A*.[35]

Education of Staff and Visitors

Staff

Basic IPAC education is essential and is to be provided to all staff, especially those providing direct patient care. In addition to scheduled ongoing continuing education related to potentially serious imported diseases such as VHF, all HCPs are to refresh their knowledge and skills in IPAC. Resources on IPAC education are available from PHO: IPAC For Health Care Workers, Point-of-care risk assessment, PIDAC's Best Practices for Hand Hygiene in All Health Care Settings, PIDAC's Routine Practices and Additional Precautions in All Health Care Settings.

Training for VHF (and other emerging infectious diseases) **preparedness**: Staff members require training on the protocols, policies and procedures that are developed by the organization for the testing and/or treatment of patients with suspect or confirmed infections due to a VHF:

- Each organization is to have specific guidance and training on the donning and doffing of PPE that has been selected by the organization. Ongoing training/refreshers are to be scheduled to ensure retention of practice.
- Guidance and training are to also address the measures to take should the PPE be breached. This includes careful removal of the damaged PPE and removal of any leaked blood and body fluids on intact skin with soap and water.
- Clear protocols and response roles are to be in place for any blood or body fluid exposure including puncture, splash, or spray to mucous membranes.

Visitors

For patients with suspected or confirmed VHF, visitors are to be restricted to those considered essential. For visitors deemed essential, public health should be engaged and teaching is to include[33]:

- hand hygiene
- hygiene practices that prevent the spread of microorganisms
- selection and use of PPE
- self-screening for fever or symptoms of VHF

ICPs may assist staff in education of visitors through developing and/or reviewing informational materials pertaining to Routine Practices and Additional Precautions. Health care facilities may use PHO training resources, Infection Prevention and Control Tips for Visiting All Health Care Settings.

Handling of Deceased VHF Patients

Due to the presence of high viral loads throughout the body at the time of death, only persons who have been trained in the proper use of PPE (as recommended for unstable patients in Table 1) and the process for handling the body of a VHF patient are to handle, prepare and move the body within the patient room. Handling of the body is to be kept to a minimum. Autopsies are not recommended, and embalming is not to be done.[22] Notification of all other areas where the body may be stored or transported is required prior to arrival of the body.

The preparation of the body is to be done within the patient room as follows:

- Clamp and leave all intravenous lines, endotracheal tubes or other invasive devices in place to avoid additional splashes or leakage, cover any leaking tubes with absorbent material.
- Do not wash, spray or clean the body.
- Use the bed linens to wrap the body.
- Immediately place the wrapped body into a leak-proof plastic body bag (150 µm thick) and close the zipper.
- Clean the outside of the bag to remove any visible soil or leakage with an approved hospital- grade disinfectant and discard the wipes or cloths and gloves.
- Clean hands, apply new gloves and use a fresh wipe or cloth and reapply the disinfectant to the entire bag surface.
- Allow appropriate contact time and drying according to the manufacturer's recommendations.
- Place the bagged body into a second leak-proof body bag and close the zipper.
- Disinfect the outside of the second bag along with the stretcher surfaces, again allowing for appropriate contact and drying time according to the manufacturer's recommendations prior to removing the body from the room.
- As the body exits the room, have other staff outside the room assist in moving the stretcher through the anteroom or the doorway of the isolation room to allow space for the staff who have prepared the body to safely remove and discard their PPE within the allocated doffing space.

Once the body has been double bagged and the outer surfaces have been disinfected with an approved hospital-grade disinfectant, the personnel providing the transportation of the body to the morgue do not need to wear PPE. Affix identification of the body and confirmation of surface disinfection to the bag and ensure that the body is kept in a secured area that cannot be accidently accessed if there will be any delay in retrieval of the body by the designated funeral home staff.

Cremation is the preferred option. A hermetically sealed casket may be used as an alternative to cremation if burial is preferred or required by the family.

Please refer to R.R.O. 1990, Reg. 557: COMMUNICABLE DISEASES – GENERAL for more information.[36]

Recommendations for Recovering Patients Presenting for Care or Readmission

Not Previously Tested for Cure

Patients with a reported previous history of VHF within the last 12 months and no documented negative tests post recovery should be cared for using VHF-specific precautions until two consecutive blood or serum specimens are negative by RT-PCR.

Not Related to a VHF Relapse

Body fluids that are NOT from immunologically privileged sites: As usual, Routine Practices and Additional Precautions (and not VHF-specific precautions) are used for potential exposure to blood, and body fluids.

Body fluids from immunologically privileged sites: VHF-specific precautions (refer to Table 1) are used if contact is expected with fluids from immunologically privileged sites (e.g., intraocular fluid, cerebral spinal fluid (CSF), semen, breast milk or synovial fluid). Please refer to post recovery infectivity section above for more information. VHF-specific precautions would no longer be required for fluids that have been tested by RT-PCR and have been found to be negative on two consecutive tests.

Delivery and handling of newborns: VHF-specific precautions are used for the delivery and handling of the newborn baby from a woman who acquired VHF at anytime during pregnancy. Routine Practices and Additional Precautions are used for the delivery and handling of the newborn baby if the woman became pregnant after recovering from VHF, however, VHF - specific precautions would still be required if handling fluids from immunologically privileged sites such as breast milk or if the woman is receiving an epidural or spinal anesthetic, because of the potential exposure to CSF. At this time, it is recommended that recovered VHF patients have their breast milk tested for VHF virus.[29] In Ontario, recovered VHF patients may resume breast feeding if they have two consecutive negative tests of their breast milk 48 hours apart.

Elective surgery: If surgery on immunologically privileged sites (eyes, brain, spinal cord, breasts, male genitourinary tract including testes, prostate and seminal vesicles and joints), is elective and can be postponed, it is recommended that it be delayed for one-year post resolution of acute infection with VHF. In addition, if surgery on any of the immunologically privileged sites is to be performed on a recovered VHF patient, VHF- specific IPAC precautions will be required, even if beyond a year from VHF symptom onset. During surgery, testing for VHF is to be taken from the implicated site to assist with IPAC management post-operatively.[29]

Is or May be Related to a VHF Relapse

Patient experiencing a relapse may present with a range of symptoms (e.g., fever, headache, fatigue, joint pain, vision problems or neurologic symptoms such as neck stiffness, photophobia, altered mental status, and/or seizures). When examining a patient who is or may be having a relapse, VHF-specific precautions are used until VHF is ruled out by testing of blood and specific body sites as indicated based on symptoms.

Occupational Health and Safety Considerations

Monitoring and Management of Potentially Exposed Staff

Implementation of Routine Practices and Additional Precautions including hand hygiene, and appropriate training of workers are key to preventing the occupational transmission of a VHF-causing virus.

Organizations are to develop policies for monitoring and management of potentially exposed staff. The follow-up of staff potentially exposed to VHF virus is the role of Occupational Health and Safety (OHS). Health care facilities are required to comply with applicable provisions of the *Occupational Health and Safety Act (OHSA), R.S.O. 1990, c.O.1* and *Health Care and Residential Facilities, O. Reg. 67/93*. Employers, supervisors and workers have rights, duties and obligations under the OHSA.

Additional information is available at the Ministry of Labour, Immigration, Training and Skills Developments Hazards and Issues in the Health and Community Care Sector page.

Staff with percutaneous or mucocutaneous exposures to blood, body fluids, secretions, or excretions from a patient with suspected or confirmed VHF are to:

- Stop working and immediately wash the affected skin surfaces with soap and water. For mucous membrane splashes (e.g., conjunctiva) irrigate with copious amounts of water or eyewash solution.
- Immediately contact a supervisor and OHS for assessment and post-exposure management for blood borne pathogens (e.g., hepatitis B virus, hepatitis C virus, and HIV) as per usual organizational policy.
- Comply with any medical surveillance or work exclusion as per the OHS/local PHU until further confirmation or exclusion of the VHF diagnosis.

Assessment of the risk presented by exposure to a patient with suspected or confirmed VHF requires careful review of the activities undertaken by the staff member along with review of the use of appropriate Routine Practices and Additional Precautions. This may need to be done in consultation with the local PHU and other infectious disease or IPAC experts.

For exposure criteria and work restrictions/limitations refer to sections 3 and 4 of the Appendix B. Public Health Follow-up for Returning Travellers from MOH's Public Health Management of Viral Hemorrhagic Fevers – Interim Guidance.

Appendix 1: VHF Triage Assessment Algorithm

Has the patient developed symptoms consistent with VHF (e.g., fever, chills, unexplained hemorrhagic bleeding, chest pain, headache, cough, sore throat, conjunctivitis, fatigue, weakness, muscle and joint pain, abdominal pain, nausea, vomiting, or diarrhea)?

NO → Continue with usual triage and assessment, applying Routine Practices +/- Additional Precautions accordingly.

YES

In the past 21 days has the patient:

Travelled/ been to a VHF affected area (refer to PHOs VHF Landing Page)?

OR

Had close contact with person(s) known or suspected to have VHF?

OR

Had direct contact with blood or other body fluids of a person (alive or deceased) or animal with VHF?

OR

Worked in a laboratory that handles VHF agents or in animal facility that handles animals known to be natural hosts of VHF agents?

NO → Continue with usual triage and assessment, applying Routine Practices +/- Additional Precautions accordingly.

YES → No further contact with the patient unless staff is wearing PPE (as below), give patient a medical mask, and immediately isolate them in private room with doors closed (consider AIIR) and own bathroom. **Immediately notify IPAC and ID physician for further assessment.** Notify the Ministry of Health Emergency Management Plans and Strategies (HSEMB) and local PHU for further assessment.

Is the patient clinically unstable or confirmed to have VHF (hemorrhagic manifestations, such as, experiencing obvious bleeding, vomiting or, copious diarrhea)?

NO

Implement Droplet and Contact Precautions‡

Place patient in a single room (door to remain closed) with a dedicated washroom. Consider using AIIR if the patient symptoms are worsening.

All staff entering the room must wear, at a minimum:

- Well-fitting medical mask
- Disposable full-face shield
- Disposable fluid-resistant cuffed gown that covers to mid-calf
- Gloves with extended cuffs to pull over gown cuffs

Staff must be trained in donning and doffing PPE for VHF.

A trained observer should monitor compliance with PPE donning and doffing.

If not already, immediately notify IPAC or most responsible person on call.

YES

Implement Droplet and Contact Precautions‡

Place patient in a single room (door to remain closed) with a dedicated washroom.

Consider using AIIR if the patient symptoms are worsening.

All staff entering the room must wear, at a minimum:

- Fit-tested, seal-checked N95 respirator or powered air purifying respirator (PAPR)
- Disposable full-face shield
- Fluid resistant/impermeable hair/head/neck covering
- Impermeable long-sleeved, cuffed gown that covers to mid-calf or impermeable coverall
- Consider double gloves (outer gloves with extended cuffs to pull over gown cuffs)
- Fluid resistant/impermeable shoe covers (maybe part of coverall)

Staff must be trained in donning and doffing PPE for VHF

A trained observer should monitor compliance with PPE donning and doffing.

If not already, immediately notify IPAC or most responsible person on call.

‡Recommend using Airborne Precautions (in addition to Contact and Droplet Precautions), if patient requires invasive or aerosol generating procedures (e.g., intubation, suctioning, active resuscitation) or exhibiting signs of VHF pneumonia or has a differential diagnosis of tuberculosis, varicella or measles.

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