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Infection Prevention and Control Guidance for Patients With Suspected or Confirmed Ebola Virus Disease (EVD) in Ontario Health Care Settings

This document has been updated as of August 29, 2014, based on the best available evidence at that time. Version changes are summarized at the end of this document. Please refer to the Public Health Ontario website at www.publichealthontario.ca/ebola for the most recent version.

IPAC Guidance
August 29, 2014

Public Health Ontario

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NOTES: **This document is intended to provide guidance only.**

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Preamble

About This Document

This document has been produced by Public Health Ontario (PHO) in response to the ongoing outbreak of Ebola virus disease (EVD) in West Africa in order to ensure that health care providers (HCP) and institutions are prepared and understand what is needed for infection prevention and control (IPAC) in case an infected patient requires care in Ontario. For laboratory aspects, please refer to PHO's laboratory guidance[1] available at: www.publichealthontario.ca/en/eRepository/Ebola_Virus_Disease_(EVD)_Sample_Collection_Submission_Guide.pdf

Evidence for Recommendations

This document has been updated as of August 29, 2014, based on the best available evidence at that time. Please refer to the Public Health Ontario website at www.publichealthontario.ca/ebola for the most recent version.

How and When to Use This Document

For recommendations in this document:

- "**shall**" indicates mandatory requirements based on legislated requirements or national standards (e.g., Canadian Standards Association – CSA);
- "**must**" indicates best practices, (i.e., the minimum standard based on current recommendations in the medical literature);
- "**should**" indicates a recommendation or that which is advised but not mandatory; and
- "**may**" indicates an advisory or optional statement.

Assumptions and Best Practices for Infection Prevention and Control

The guidance in this document is based on the assumption that health care settings in Ontario already have basic IPAC systems in place.[2]

Occupational Health and Safety requirements shall be met:

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 its Regulations. Employers, supervisors and workers have rights, duties and obligations under the OHSA. Specific requirements under the OHSA and its regulations are available at:

- *Occupational Health* and *Safety Act,* R.S.O. 1990, c. O.1: www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90o01_e.htm
- *Health care and Residential Facilities,* O. Reg. 67/93: www.e-laws.gov.on.ca/html/regs/english/elaws_regs_930067_e.htm

The *Needle Safety Regulation,* O. Reg. 474/07 has requirements related to the use of hollow-bore needles that are safety-engineered needles. The regulation is available at: www.e-laws.gov.on.ca/html/regs/english/elaws_regs_070474_e.htm.

Additional information is available at the Ministry of Labour Health and Community Care Page: www.labour.gov.on.ca/english/hs/topics/healthcare.php.

Abbreviations

AGMP	aerosol generating medical procedures
AIIR	airborne infection isolation room
ES	Environmental Services
EVD	Ebola virus disease
HPPA	Health Protection and Promotion Act
HCP	health care provider
ICP	infection control practitioner
IPAC	infection prevention and control
MEOC	Ministry Emergency Operations Centre
MOHLTC	Ministry of Health and Long-Term Care
OHS	Occupational Health and Safety
OHSA	Occupational Health and Safety Act
PHAC	Public Health Agency of Canada
PHO	Public Health Ontario
PHU	public health unit
PIDAC	Provincial Infectious Diseases Advisory Committee
PPE	personal protective equipment
RP	Routine Practices
VHF	viral hemorrhagic fever
WHO	World Health Organization

Glossary

Aerosol: Small droplet of moisture that may carry microorganisms. Aerosols may be light enough to remain suspended in the air for short periods of time, allowing inhalation of the microorganism.

Aerosol-Generating Medical Procedure (AGMP): A medical procedure that generates droplets/aerosols which may expose staff to respiratory pathogens and are considered to be a potential risk for staff and others in the area.

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 clients/patients/residents known or suspected of having an illness transmitted by the airborne route (i.e., by small droplet nuclei that remain suspended in the air and may be inhaled by others).

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.

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.

Client/Patient/Resident: Any person receiving care within a health care setting.

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.

Critical Medical Equipment/Device: Medical equipment/device that enters sterile tissues, including the vascular system (e.g., biopsy forceps, foot care equipment, dental hand pieces, and others). Critical medical equipment/devices present a high risk of infection if the equipment/device is contaminated with any microorganism, including bacterial spores. Reprocessing critical equipment/devices involves meticulous cleaning followed by sterilization.

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.

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.

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

Droplet Precautions: Used in addition to Routine Practices for clients/patients/residents known or suspected of having an infection that can be transmitted by large infectious droplets.

Drug Identification Number (DIN): In Canada, disinfectants are regulated as drugs under the Food and Drugs Act and Regulations. Disinfectant manufacturers must 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.

Ebola virus disease (EVD): Severe illness that starts with the abrupt onset of fever, usually with headache, malaise and myalgia. Gastrointestinal symptoms are common. Hemorrhagic findings occur in only 50 per cent of cases. Leukopenia, thrombocytopenia and transaminitis are common laboratory findings. The case fatality rate ranges from 50 to 90 per cent.

Environment of the Client/Patient/Resident: The immediate space around a client/patient/resident that may be touched by the client/patient/resident and may also be touched by the health care provider when providing care. In a single room, the client/patient/resident environment is the room. In a multi-bed room, the client/patient/resident environment is the area that may come into contact with the client/patient/resident within their cubicle. In a nursery/neonatal setting, the patient environment includes the insides 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 which 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 must 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.[3]

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.

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.

Health Care Environment: People and items which make up the care environment (e.g., objects, medical equipment, staff, clients/patients/residents) of a hospital, clinic or ambulatory setting, outside the immediate environment of the client/patient/resident. See also, *Environment of the Client/Patient/Resident*.

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

Health Care Provider: Any person delivering care to a client/patient/resident. 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, students and home health care workers. In some non-acute settings, volunteers might provide care and would be included as health care providers. 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.

High-Level Disinfection (HLD): The level of disinfection required when processing semi-critical medical equipment/devices. High-level disinfection processes destroy vegetative bacteria, mycobacteria, fungi, enveloped (lipid) and non-enveloped (non-lipid) viruses, but not necessarily bacterial spores. Medical equipment/devices must be thoroughly cleaned prior to high-level disinfection.

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.

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 clients/patients/residents and visitors and development of health care-associated infections in clients/patients/residents from their own microorganisms.

Infection Prevention and Control Canada (IPAC Canada): A professional organization of persons engaged in infection prevention and control activities in health care settings. IPAC Canada members include infection prevention and control professionals from a number of related specialties including nurses, epidemiologists, physicians, microbiology technologists, public health and industry. The IPAC Canada website is located at: www.ipac-canada.org.

Infection Prevention and Control Professional(s) (ICPs): Trained individual(s) responsible for a health care setting's infection prevention and control activities. In Ontario an ICP must receive a minimum of 80 hours of instructions in an IPAC Canada-endorsed infection control program within six months of

entering the role and must acquire and maintain Certification in Infection Control (CIC®), when eligible. The ICP should maintain a current knowledge base of infection prevention and control information.

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

Low-Level Disinfectant: A chemical agent that achieves low-level disinfection when applied to surfaces or items in the environment.

Low-Level Disinfection (LLD): Level of disinfection required when processing non-invasive medical equipment (i.e., non-critical equipment) and some environmental surfaces. Equipment and surfaces must be thoroughly cleaned prior to low-level disinfection.

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

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.

Medical Equipment/Device: Any instrument, apparatus, appliance, material, or other article, whether used alone or in combination, intended by the manufacturer to be used for human beings for the purpose of diagnosis, prevention, monitoring, treatment or alleviation of disease, injury or handicap; investigation, replacement, or modification of the anatomy or of a physiological process; or control of conception.

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 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. A NIOSH-certified N95 respirator has a filter efficiency of 95 per cent or more for particles that are 0.3 microns or larger in size and provides a tight facial seal with less than 10 per cent leak.

Noncritical Medical Equipment/Device: Equipment/device that either touches only intact skin (but not mucous membranes) or does not directly touch the client/patient/resident. Reprocessing of noncritical equipment/devices involves cleaning and may also require low-level disinfection (e.g., blood pressure cuffs, stethoscopes).

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

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

Provincial Infectious Diseases Advisory Committee (PIDAC): A multidisciplinary scientific advisory body of Public Health Ontario that provides evidence-based advice regarding multiple aspects of infectious disease identification, prevention and control. More information is available at: www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/PIDAC/Pages/PIDAC.aspx

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. There are 36 public health units in Ontario. Health units administer health promotion and disease prevention programs.

Regional Infection Control Networks (RICN): The RICN of Public Health Ontario coordinate and integrate resources related to the prevention, surveillance and control of infectious diseases across all health care sectors and for all health care providers, promoting a common approach to infection prevention and control and utilization of best practices within the region. There are 14 regional networks in Ontario. More information is available at: www.publichealthontario.ca/en/About/Departments/Pages/Regional_Infection_Control_Networks.aspx.

Reportable Disease: Under the Health Protection and Promotion Act, physicians, nurses, and other practitioners including chiropractors, dentists, optometrists, and pharmacists have a legal obligation to report a suspect or confirmed case of a reportable communicable disease to their local Medical Officer of Health. The list of reportable diseases in Ontario is available at: www.e-laws.gov.on.ca/html/regs/english/elaws_regs_910559_e.htm.

Reprocessing: The steps performed to prepare used medical equipment for use (e.g., cleaning, disinfection, sterilization).

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, care when disposing of tissues).

Risk Assessment: An evaluation of the interaction of the health care provider, the client/patient/resident and the client/patient/resident environment to assess and analyze the potential for exposure to infectious disease.

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 for all Health Care Settings[4], available from: www.publichealthontario.ca/en/eRepository/RPAP_All_HealthCare_Settings_Eng2012.pdf.

Safety-Engineered Medical Device: A non-needle sharp 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 must 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 must receive training on how to perform a seal-check correctly.

Semicritical Medical Equipment/Device: Medical equipment/device that comes in contact with nonintact skin or mucous membranes but ordinarily does not penetrate them (e.g., respiratory therapy equipment, transrectal probes, specula). Reprocessing semicritical equipment/devices involves meticulous cleaning followed by, at a minimum, high-level disinfection.

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. See also, Health Care Provider.

Sterilization: The level of reprocessing required when processing critical medical equipment/devices. Sterilization results in the destruction of all forms of microbial life including bacteria, viruses, spores and fungi. Equipment/devices must be cleaned thoroughly before effective sterilization can take place.

Terminal Cleaning: The thorough cleaning of a client/patient/resident room or bed space following discharge, death or transfer of the client/patient/resident, 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. Available from: www.publichealthontario.ca/en/eRepository/Best_Practices_Environmental_Cleaning_2012.pdf

Background Information

Clinical Presentation of Ebola Virus Disease

Ebola virus disease (EVD) is a severe illness that starts with the abrupt onset of fever, usually with headache, malaise and myalgia. Gastrointestinal symptoms (i.e., diarrhea, abdominal pain, vomiting) are common. Additional symptoms and signs may occur (e.g., sore throat, chest pain, cough, rash, conjunctivitis). Hemorrhagic findings (e.g., petechiae, ecchymosis, and hemorrhage) occur in 50% of cases. Leukopenia, thrombocytopenia and transaminitis (elevated liver enzymes) are common laboratory findings. The case fatality rate ranges from 50 to 90 per cent.[5] However, outbreaks have often occurred in areas where the capacity for supportive care is limited and therefore, case fatality rates in well-resourced healthcare systems are uncertain.

The incubation period for EVD is 2 to 21 days. Patients are not infectious during the incubation period and prior to the onset of symptoms. Person-to-person transmission can occur, primarily through direct contact with blood, body fluids, secretions and excretions of someone who is sick or through indirect contact with material contaminated with these substances.[5] Ebola virus is not an airborne pathogen. Transmission of EVD during the incubation period while the person is still well has not been reported.[6]

Outbreaks of EVD have been reported periodically in several central African countries. Beginning in March 2014 an EVD outbreak began in West Africa. See the World Health Organization's (WHO's) Global Alert and Response Website on EVD[7] at http://www.who.int/csr/don/archive/disease/ebola/en/ for the latest details of the outbreak. This is the largest EVD outbreak ever identified. While sporadic cases of EVD and other viral hemorrhagic fevers (VHF) should always be considered in patients with a positive epidemiological exposure history and a compatible clinical syndrome, this is still an unlikely event.

When to Suspect Ebola Virus Disease

EVD should be suspected in all patients with fever and a positive travel history or epidemiological exposure within 21 days of illness onset. A positive travel history includes travel to any country where EVD outbreaks are occurring. Check the PHO website[8] at: http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/Pages/EVD_Geographic_Areas_Affected.aspx for an updated list of geographic areas currently affected by EVD.

Additionally, EVD (or other VHF) should be suspected in patients with a compatible clinical illness that have travelled within 21 days to any country where sporadic cases of VHF occur, or where Lassa fever is endemic.[9] Clinical assessment of risk of EVD, including risk factors of exposure, clinical status and consideration of differential diagnoses is required prior to requesting testing for Ebola virus.

Infection Prevention and Control Measures

IPAC measures for the management of patients with confirmed or suspected EVD must take into consideration the risk of human-to-human transmission, the high mortality rate in infected patients and the lack of a vaccine or therapeutic agents for treatment of infected patients.

Routine Practices

In some cases, patients with EVD may not be recognized immediately. The consistent and appropriate use of Routine Practices (RP) remains the best defense against the transmission of EVD and other infections[4] (http://www.publichealthontario.ca/en/eRepository/RPAP_All_HealthCare_Settings_Eng2012.pdf).

RP include the use of hand hygiene according to the 4 moments of hand hygiene, cleaning and disinfection of all shared equipment, regular environmental cleaning using a hospital approved disinfectant, meticulous attention to safety around the use of needles and sharps, and a complete and careful risk assessment performed prior to any patient encounter.

Patient Placement

When a suspected case of EVD is identified, the patient should be moved immediately to a single room with a dedicated washroom and the door should be closed.[10] The facility's IPAC team should be notified immediately.

Although EVD is not transmitted by the airborne route, it may be practical for facilities with airborne infection isolation rooms (AIIR) to isolate suspected EVD patients in an AIIR as this will allow an appropriate space (anteroom) for donning and doffing personal protective equipment (PPE), ensure the presence of a dedicated washroom, and allow aerosol generating medical procedures (AGMP) to be performed, if required. Given the infectivity and high mortality related to EVD it is preferable that patients not be moved unless medically required. In determining placement, consideration should be given to ensuring that the patient is placed in a room that can accommodate changes in their clinical condition.

The first choice for patient placement is a single room with a dedicated washroom. If this is not possible, bags with absorbent pads and a dedicated commode should be used for patient waste management (i.e., urine and feces). The used bags should be treated as other waste from the room (See Waste Management section).

Commodes should be wiped down with disinfectant wipes during routine cleaning. Upon patient discharge, the commode should be wiped with disinfectant then sent for reprocessing.

Contact/Droplet Precautions

Transmission of EVD can occur:

- directly through contact with blood and/or body fluids or droplets,
- indirectly through contact with patient care equipment or surfaces contaminated with blood and/or body fluids, and
- possibly when performing AGMPs. See PPE recommendations for AGMPs.

Therefore, patients with suspect or confirmed EVD must be managed using both Contact and Droplet Precautions in addition to RP.

A single patient room with a dedicated bathroom is the minimum requirement for patients with confirmed/suspected EVD.[10] The door to the room must remain closed. For ease of care the use of an isolation room that has a dedicated anteroom for donning and doffing of PPE should be considered.

A log of all individuals entering the room must be maintained.[10,11] Only essential people should enter the room to minimize the risk of inadvertent exposure.

Appropriate PPE for all staff entering the room include: [10]

- fluid-resistant*, long-sleeved cuffed gown
- gloves**
- full face protection (face shield)
- surgical or procedure mask

*fluid resistant is sufficient unless there is uncontrollable drainage
**gloves must be pulled over the cuff of the gown so that there is no exposed skin or clothing

Health care providers (HCPs) must conduct a risk assessment with each patient to evaluate their potential exposure to blood and/or body fluids. This should be used to determine the need for additional PPE. The need for additional PPE such as the use of double gloves, foot/leg coverings, head coverings, waterproof gowns or specific biohazard suits depends on the potential for fluid contact as determined by the procedure being performed and the presence of clinical symptoms that increase the likelihood of contact with body fluids. It should be noted that these instances will be rare and the PPE identified above is appropriate to protect the HCP from exposure to infection. As the patient's condition changes, the risk to HCPs may also change. On-going risk assessments related to appropriate PPE should be performed at least once daily.

PPE should be removed and disposed of in the anteroom and hand hygiene performed before touching the face. If an anteroom is not available, PPE should be removed at the doorway upon exiting the room. PPE should be discarded in the patient room. Consideration should be given to having a second HCP observe the application and removal of PPE to ensure that inadvertent contamination of eyes, mucous membranes, skin or clothing does not occur.[10] This is of particular importance if the PPE being worn is new or different from what the HCP normally wears. If unfamiliar PPE is being worn, just in time refresher training is recommended prior to application and during removal until the HCP is comfortable with the PPE. Health care organizations have an obligation to ensure staff are trained in the use of PPE.

When removing PPE, avoid contact between contaminated gloves/hands and equipment and the face skin or clothing. Hands must be cleaned before contact with the face. If there is any doubt, clean hands again to ensure mucous membranes (eyes, nose, mouth) are not contaminated.

Aerosol Generating Medical Procedures

Aerosol generating medical procedures (AGMP) should be performed only if medically necessary. All AGMPs should be performed in an AIIR with the use of Airborne Precautions. Limit the number of staff to the minimum required to safely perform the procedure. Visitors should not be present. Whenever possible the procedure should be performed by the most highly experienced staff member available.[10]

All staff entering the AIIR must wear:

- fluid-resistant*, long-sleeved cuffed gown
- gloves**
- fit-tested, seal-checked N95 respirator
- full face shield
- shoe covers
- hair covering

*fluid resistant is sufficient unless there is uncontrollable drainage
**gloves must be pulled over the cuff of the gown so that there is no exposed skin or clothing

Following the procedure, the room should be cleaned.

Medical Devices and Sharps

Only essential equipment should be taken into the patient room.[11] Medical devices and equipment should be disposable whenever possible. Non-disposable equipment should be dedicated to the patient until the diagnosis of EVD is excluded, the patient is discharged or the precautions are discontinued. All re-usable, noncritical equipment must be cleaned and disinfected using a hospital grade disinfectant and according to the manufacturer's instructions prior to re-use on a subsequent patient. Semicritical and critical equipment should be cleaned and high-level disinfected or sterilized using standard procedures.

Use of needles and sharps should be kept to a minimum and used for medically essential procedures only. A needleless system and safety-engineered medical devices **must** be used. Extreme care should be used when handling all sharps. A puncture resistant sharps container must be available at point-of-use.[10,11]

The risk of transmission of EVD through percutaneous injury is high, therefore only those individuals extremely skilled in performing phlebotomy should draw bloods or start lines (e.g. IV, arterial).

Environmental Cleaning, Waste Disposal and Linens

ENVIRONMENTAL CLEANING

Blood and all body fluids including sweat from EVD patients are highly infectious. Cleaning of the patient room is important to reduce environmental contamination, which in turn decreases the risk of transmission to HCPs. Safe handling of potentially infectious materials and the cleaning and disinfection of the patient's environment is paramount.[10]

Experienced environmental services (ES) staff trained in IPAC practices and use of PPE should be assigned to perform these tasks. ES staff cleaning the room must use the same PPE as other HCPs. Routinely used hospital grade disinfectants following the manufacturer's recommendations are sufficient for cleaning the room.

The frequency of cleaning should be based on the level of contamination with blood and/or body fluids.

Housekeeping equipment should be disposable or remain in the room for the duration of the patient admission.

Upon discharge of the patient, discharge/terminal cleaning of the room should follow the recommended practice for discharge/terminal cleaning of a room on Contact/Droplet Precautions. In addition to routine cleaning:[12]

- Remove all dirty/used items (e.g. suction container, disposable items),
- Remove curtains (privacy, window, shower) before starting to clean the room,
- Discard everything in the room that cannot be cleaned,
- Use fresh cloths, mop, supplies and solutions to clean the room,
- Use several cloths to clean a room. Use each cloth one time only, do not dip a cloth back into disinfectant solution after use. DO NOT RE-USE CLOTHS,
- Clean and disinfect all surfaces and allow for the appropriate contact time with the disinfectant,
- All housekeeping equipment must be cleaned and disinfected before being put back into general use.

WASTE MANAGEMENT

Routine management for regular waste disposal is sufficient.[11] Waste should be contained at the point-of-use.[11] Collect all solid, non-sharp medical waste using leak-proof waste bags and covered bins. The outside of all waste bags should be wiped down with a hospital grade disinfectant solution prior to removal. Liquids from patient or patient care activities can be disposed of through the normal sanitary sewer system. Biomedical waste should be disposed of in accordance with Ministry of Environment guidelines.[13]

LINEN MANAGEMENT

Linen from patients with EVD may be heavily soiled with blood and body fluids. Care needs to be taken to minimize the risk of transmission to other patients and/or HCPs.

Soiled linen should be placed in leak-proof bags at the point-of-use and the container surfaces should be disinfected before removal from the site. Linen should be transported directly to the laundry area and handled as per routine protocols.[11] Any staff handling contaminated linen should wear protective PPE.

Duration of Precautions

For patients with confirmed EVD, precautions should remain in place until all symptoms have resolved. Patients should be assessed on a case-by-case basis in consultation with an infectious disease specialist.

Additional Infection Prevention and Control Considerations

Diagnosis

Patients with suspected EVD should be tested for EV and should have appropriate testing performed to rule out more common infectious causes of fever in the returned traveler (e.g. malaria, typhoid). Consultation with a microbiologist and/or infectious disease specialist is recommended to ensure appropriate diagnostic tests are collected. Blood testing should be minimized and only testing essential to the diagnosis and acute management of the patient should be performed.

Specimens should be taken by staff experienced in the required techniques. The same protective clothing as described for other hospital staff should be worn by those obtaining laboratory specimens, 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 should be wiped with a hospital grade disinfectant and the outer layer of gloves can be removed.

To ensure safe transportation and handling of specimens, the laboratory must be contacted prior to collection and transport of specimens. Specimens should not be transported in a pneumatic tube system.

Prior to specimen collection, consult the PHO document: *Ebola Virus Disease (EVD) – Interim Sample Collection and Submission Guide*[1], available at: www.publichealthontario.ca/en/eRepository/Ebola_Virus_Disease_(EVD)_Sample_Collection_Submission_Guide.pdf

Monitoring and Management of Potentially-Exposed Health Care Providers

Organizations should develop policies for monitoring and management of potentially-exposed HCPs. Follow-up of HCPs who are potentially exposed is the role of occupational health and safety (OHS).[10]

Persons with percutaneous or mucocutaneous exposures to blood, body fluids, secretions, or excretions from a patient with suspected EVD should:[10]

- 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 occupational health for assessment and post-exposure management for bloodborne pathogens (e.g., hepatitis B virus, hepatitis C virus, and HIV) as per usual organizational policy. HCPs who have been caring for or exposed to EVD patients, and subsequently develop fever, should:[10]

- Not report to work or immediately stop working
- Notify their supervisor and Occupational Health Department
- Seek prompt medical evaluation and testing as clinically indicated
- Comply with work exclusion as per their OHS/local public health unit (PHU) until they are deemed no longer infectious to others

For asymptomatic HCPs who had an unprotected exposure (e.g., not wearing recommended PPE at the time of patient contact or through direct contact to blood or body fluids) to a patient with EVD:[10]

- They should receive medical assessment and follow-up care including fever monitoring twice daily for 21 days after the last known exposure.
- Organizations should consider policies ensuring twice daily contact with exposed HCP to discuss potential symptoms and document fever monitoring checks.
- They may continue to work with twice daily fever monitoring checks, based upon policy and discussion with local PHU/Occupational Health.
- HCPs returning to work after working with EVD patients in affected areas in West Africa should notify their organization prior to returning to work and should perform twice daily fever monitoring as above.

Transportation of Suspect or Confirmed Patients

INTERNAL TRANSPORTATION

Patients should not leave the room or be transferred internally except for essential medical procedures. Transport staff must be aware of the patient's status and the required PPE. Patients with respiratory symptoms should wear a mask to contain respiratory droplets during transport.[4]

If an internal transfer cannot be avoided ensure new room is ready before transfer to minimize time outside of the patient room. HCPs providing transport must discard PPE as they leave the room, and put on new PPE.[4] Prior to transporting the patient for diagnostic testing, the receiving unit must be fully aware of the patient's impending arrival and be prepared to perform testing immediately. Patients should be transported using the most direct route to their destination. Staff transporting the patient should wear full PPE (gown, gloves, full face shield) as such patients are potentially unstable and may require care during transportation. If the patient is coughing, a surgical mask should be placed over the mouth and nose. Following the procedure, the room should be cleaned.

EXTERNAL TRANSPORTATION

Transport companies and Emergency Medical Services staff must be notified of the patient's status to determine the requirements for the most appropriate PPE.[4] In most cases, PPE for specific Contact/Droplet Precautions will suffice.

Visitor Restriction

Visitors must be restricted to only those absolutely necessary to assist in patient care (i.e. to help with patient history if patient unable to communicate). A log must be maintained of all visitors entering and leaving the patient room (with times documented). Case-by-case exceptions may be made when it is essential for the well-being of the patient. Visitors who were exposed to the patient before they were admitted should be screened for infectious symptoms and sent immediately for EVD medical assessment if febrile. They should be educated on the importance of self-monitoring for fever and to report to their local PHU if they become febrile.[10]

Communications

INTERNAL COMMUNICATIONS

For cases of suspected or confirmed EVD, IPAC must be notified immediately. Laboratory directors and microbiologists must be contacted prior to the collection of any specimens. In addition, it is prudent to notify administrative leadership and public relations, as EVD can generate significant media interest. 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 varied educational and language levels are examples. Maintaining patient confidentiality in the face of media interest is a challenge. HCPs should be reminded of their legal responsibilities under the *Personal Health Information Protection Act*[14].

EXTERNAL COMMUNICATIONS

All cases of suspect or confirmed EVD shall be reported to the local PHU immediately. Hospitals and health care facilities caring for patients with suspect or confirmed EVD should have a communications plan in place to deal with media interest while ensuring patient confidentiality.

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

Education of Staff and Visitors

EDUCATION FOR STAFF

IPAC education is essential and should be provided to all staff, especially those providing direct patient care. In addition to scheduled ongoing continuing education related to EVD, hospitals and community settings such as medical clinics and physicians' offices should refresh their learnings on the following IPAC practices:

- Risk assessment – is the first step in the effective use of RP done before each interaction with a client/patient or their environment. For more information, please refer to: Provincial Infectious

Diseases Advisory Committee's (PIDAC) *Routine Practices and Additional Precautions in All Health Care Settings*[4], available from: www.publichealthontario.ca/en/eRepository/RPAP_All_HealthCare_Settings_Eng2012.pdf

- Hand hygiene – is considered the most important and effective IPAC measure to prevent the spread of health care-associated infections. For more information, please refer to: PIDAC's *Best Practices for Hand Hygiene in All Health Care Settings*[15], available from: www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/PIDAC/Pages/Best_Practices_Hand_Hygiene.aspx

- RP and Additional Precautions are IPAC practices to be used with all clients/patients during all care to prevent and control the transmission of microorganisms in all health care settings. For more information, please refer to: PIDAC's *Routine Practices and Additional Precautions in All Health Care Settings*[4], available from: www.publichealthontario.ca/en/eRepository/RPAP_All_HealthCare_Settings_Eng2012.pdf

EDUCATION FOR VISITORS

Visitor teaching should include:[4]

- correct hand hygiene
- basic hygiene practices that prevent the spread of microorganisms, such as respiratory etiquette
- appropriate use of PPE
- self-screening for fever

Infection prevention and control professionals (ICPs) may assist staff in education of visitors through developing and/or reviewing informational materials pertaining to RP.

Reporting to Public Health Unit

VHFs, including EVD, are designated as a reportable disease in Ontario[16]. As per subsection 25(1) and subsection 27(1) of the *Health Protection and Promotion Act, 1990*, c. H7 (HPPA)[17], physicians, health care practitioners and hospitals administrators are required by law to report to the medical officer of health of the PHU in which professional services are being provided, any patient who has or may have a reportable disease such as EVD. Therefore, any patient being investigated for EVD must be reported to the appropriate medical officer of health. A list of Ontario PHUs can be found at: www.health.gov.on.ca/en/common/system/services/phu/locations.aspx.

Those reporting a patient who has or is under investigation for EVD are required to provide the medical officer of health with the patient's full name and address, date of birth, sex and date of onset of symptoms[18]. In addition, physicians and HCPs described in HPPA subsection 25(2)[17] are required to provide the following information regarding the patient who has or is under investigation for EVD to the medical officer of health:[16]

i. The date of diagnosis.

ii. The name and address of the physician or registered nurse in the extended class attending the person.

iii. The name of the hospital and the date of admission if the person is admitted to a hospital.

iv. Travel history outside Canada.

   A. Date and place of entry into country where disease acquired.
   B. Date of departure from country where disease acquired.
   C. Date and time of entry into Canada and carrier and flight number if applicable.
   D. Travel within country where disease acquired by date, place and length of stay.
   E. Any other places visited en route to Canada.

v. List places and method of travel within Canada in the week prior to and since onset of illness.

vi. Exposure to any of the following: (provide date and time).

   A. Direct contact with the blood or sections of an infected individual.
   B. Exposed to objects that have been contaminated with infected secretions.
   C. Handled corpses with EVD including at the time of burial.
   D. Ingestion of fruit bats, antelope or other animals potentially infected with EVD.
   E. Worked with the virus in a laboratory.

vii. Clinical history.

   A. Date of onset of illness.
   B. Symptoms and signs of the illness.
   C. History of malaria or malaria prophylaxis.

viii. Laboratory specimens.

   A. List all specimens collected by type and date.
   B. Name of laboratory where specimens may be located.

ix. State if ambulance was used and date of use.

Following receipt of a report of a suspect case of EVD, the PHU will notify PHO immediately by phone. Any weekend or after hour notifications should be immediately referred to the PHO manager on-call via the Spills Action Centre: 416-325-3000 or 1-800-268-6060. Once reported, PHO will report confirmed and probable cases of hemorrhagic fever immediately to the 24-hour PHAC emergency line and to the MOHLTC. PHAC will be responsible for contacting the International Public Health Authorities under the International Health Regulations[19].

Contact Management

The period of communicability of EVD begins with symptom onset, typically fever. Individuals who should be considered contacts of EVD are those who have had direct contact with the blood, body fluids, secretions or excretions of cases (including deceased cases) of EVD once they have become symptomatic.

Based on the communicability of EVD, those at greatest risk of contracting Ebola are HCPs providing care to an infected individual, and the family and friends who have had close contact with the infected individual or corpse of deceased infected individual without appropriate PPE. Patients should be interviewed and/or medical charts should be reviewed, in order to determine who may have had contact with the infected individual's blood and body fluids since symptom onset.

Contacts of cases who are feeling completely well need to be screened over the phone by PHUs to inquire about symptoms, receive education/counselling and guidance on follow-up action through the incubation period. All contacts should be monitored for the development of fever or other symptoms associated with EVD for 21 days from the last time they were potentially exposed. Contacts of infected individuals who develop fever or other symptoms within the 21-day time period should be investigated for EVD. They should receive immediate medical assessment at a hospital and the receiving hospital should be notified that the person will be presenting for assessment of EVD.

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Document Change History

Revision Number	Date of Implementation	Description and Change
001	August 25, 2014	Revised the list of affected geographic areas by adding Lagos to Nigeria. Replaced WHO's links to Geographic Areas Affected by EVD with PHO's links.
002	August 29, 2014	Replaced specific countries/areas with the link to PHO's list on http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/Pages/EVD_Geographic_Areas_Affected.aspx

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