

## TECHNICAL BRIEF

# Interim IPAC Recommendations for the Care of Individuals with Suspect or Confirmed Ebola Virus Disease (EVD) in the Acute Care Setting

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## Key Messages

- EVD is a severe multisystem illness in which the vascular system is damaged, leading to high morbidity and mortality. Healthcare providers (HCPs) are at risk of occupational exposure, especially during outbreaks where importation into Ontario is more likely. The hierarchy of controls for infection prevention and control in healthcare settings should be applied to protect HCPs and prevent transmission.
- The selection and use of appropriate PPE in the healthcare setting is critical when caring for suspect and confirmed patients. The minimum recommended PPE for direct care of patients with suspect or confirmed EVD includes a fit-tested, seal-checked N95 respirator (or equivalent, or greater protection), eye protection (e.g. full face shield that covers all mucous membranes), fluid resistant or impermeable gown/coveralls and gloves.
- Additional PPE that provides coverage of all skin and mucous membranes of the HCP and that is more resistant or impermeable to fluid penetration may be considered to reduce the potential for exposure to the infectious agent based on the point of care risk assessment (PCRA).

## Background

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 percent.<sup>1</sup> 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. 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.<sup>1</sup> Ebola virus is not known to be an airborne pathogen, however the potential for close range aerosol transmission, in particular when

patients have pulmonary involvement, cannot be excluded. Transmission of EVD during the incubation period while the person is still asymptomatic has not been reported.<sup>2,3</sup>

Outbreaks of EVD have been reported periodically in several central African countries. Beginning in September 2022, an EVD outbreak caused by the Sudan ebolavirus strain was declared in the Mubende District of Uganda.<sup>4</sup> The situation is evolving and preparation for the possibility of a suspect or confirmed case presenting in Ontario is prudent. Effective vaccines are available for some (e.g. Zaire ebolavirus), but not all EVD strains at this point in time. There are currently no FDA or Health Canada approved treatments or vaccine for the Sudan ebolavirus.

## Recommended Risk Assessments

### Organizational Risk Assessment

An organizational risk assessment (ORA) is a systematic approach to identifying areas of infection risk and assessing the efficacy of control measures that are in place to mitigate the transmission of infections in the health care setting. The ORA is central to any health care organization's preparation and planning to protect HCPs. Organizations have a responsibility to provide education and training to HCPs regarding the organization's ORA, and to identify any gaps and provide guidance around the organizational factors that may affect the selection and use of PPE, such as epidemiology. Organizations also have a responsibility for engagement of the Joint Health and Safety Committees and/or Health and Safety representatives, as appropriate.<sup>5</sup>

Health care organizations have the obligation and responsibility to evaluate all of the components in the hierarchy of controls to minimize the risk for transmission of infectious organisms within the setting.

This ORA and planning should consider the likelihood of a suspect or confirmed EVD case arriving at the organization, and an assessment of their capacity to safely manage (or transfer) this patient. The ORA may include elimination controls (e.g. vaccination if/when available), engineering controls (e.g. availability of airborne infection isolation rooms (AIIR), physical barriers), administrative controls (e.g. policies and procedures regarding screening and initiation of infection prevention and control measures) and personal protective equipment (e.g. availability of PPE in accessible locations, appropriate training on donning and doffing).

### Individual Risk Assessment

An individual or personal risk assessment reviews the task at hand, any interaction with others, and interaction with the environment. Performing a risk assessment is the first step in [Routine Practices](#),<sup>6</sup> which are to be used with all patients, for all care and for all interactions. A point-of-care risk assessment (PCRA) as performed by a regulated health professional, also includes assessing the exposure risk specific to the care intervention being performed. Education and training is to be provided to the HCP on how to effectively perform a risk assessment, including information on the efficacy of control measures identified in the ORA that would be pertinent to the individual risk assessment. Risk assessments are dynamic and should be completed by the HCP before each patient interaction or task to determine whether there is risk of being exposed to an infection and for selection of the correct PPE required to protect the health worker and other staff in their interaction with the patient and patient environment. Examples of risk factors that may increase transmission and infection risk to the HCP include:

- **HCP:** Vaccination status (if/when vaccine available), vaccine effectiveness
- **Patient:** Clinical presentation (e.g. duration from symptom onset, type of symptoms), clinical stability (e.g. anticipated need for high risk procedure), ability to mask for source control
- **Interaction:** direct contact with the patient, duration of contact, performing a high-risk procedure (see below), likelihood to contact body fluids (e.g. uncontained vomiting/diarrhea, bleeding)

All staff have the responsibility to work safely and in alignment with organizational policies and procedures in order to protect themselves, their coworkers, patients and visitors, or others present within the setting. Application of the Hierarchy of Hazard Controls

According to the National Institute for Occupational Safety and Health (NIOSH), the fundamental framework for protecting workers is through the application of the [hierarchy of hazard controls](#).<sup>7</sup> The levels of control range from the highest levels considered most effective at reducing the risk of exposure (i.e., elimination and substitution) to the lowest or last level of control between the worker and the hazard (i.e., PPE).

The application of the hierarchy of hazard controls is a recognized approach to containment or mitigation of hazards and is fundamental to an occupational health and safety framework. An understanding of the strengths and limitations of each of the controls enables health care organizations to determine how the health care environment (e.g., infrastructure, equipment, processes and practices) increases or decreases a HCPs risk of infection from exposure to a pathogen within the health care setting.

Collaboration between Infection Prevention and Control (IPAC), Occupational Health Services (OHS) and health care building engineers supports the comprehensive evaluation and implementation of measures to reduce the risk of HCPs' exposure to pathogens.

## Elimination and Substitution

Elimination and substitution are considered to be the most effective measures in the hierarchy of controls, but are not often feasible or possible to implement fully, particularly in regard to infectious diseases in health care settings. High vaccination coverage for those at risk of seeing patients (e.g. frontline healthcare workers, including emergency department, intensive care unit staff) is an integral component of protecting healthcare workers from infection risk if/when a vaccine effective against the circulating strain is available. Given the high mortality with EVD, vaccination should be a primary strategy to protect at risk staff when a safe and effective vaccine is available.

## Engineering and Systems Control Measures

Engineering controls reduce or eliminate exposure by isolating the hazard from the individual and/or by physically directing actions to reduce the opportunity for human error (e.g., signage, barriers, isolation or ventilation). Examples include physical barriers between the patient and the HCPs at reception and triage, ventilation (e.g., optimizing fresh air changes in the heating ventilation and air conditioning

[HVAC] system, availability of AIIRs), point of care sharps containers and easily accessible personal protective equipment and alcohol-based hand rub. Other examples include appropriate spaces for donning and doffing PPE (e.g. ante-chamber or designated space), with appropriate training measures.

## Administrative Control Measures

Administrative controls are measures to reduce the risk of transmission of infections to HCPs and patients through the implementation of policies, procedures, training and education. Effective administrative control measures to prevent the transmission of infection require the support of leadership in the health care organization and occur in consultation with management including HCPs, through the Joint Health and Safety Committee and/or Health and Safety representative to provide the necessary organizational procedures, resources, education and training to effectively apply the controls and the commitment of HCPs and other users to comply with their application.

Examples of administrative controls include electronic alert system and infectious disease flags for hospitals for early detection of patients with EVD risk factors (e.g. travel to endemic area). Active screening, passive screening (signage) and restricted visitor policies are other examples of administrative control measures. In addition, administrative controls include policies regarding restricting entrances, cohorting of staff and patients, designated centres for screening or treating patients, and use of a trained observer while donning and doffing PPE.

## Personal Protective Equipment

PPE is the last tier in the hierarchy and should not be relied on as a stand-alone primary prevention program. However, PPE controls is often the most visible of the hierarchy of controls, and is a critical component in the protection of HCPs against EVD. The PPE tier refers to the availability, support and appropriate use of protective gear to minimize exposure and prevent transmission. It requires appropriate training on how to don and doff PPE safely.

# Summary of IPAC Measures

## Patient Screening

Screening patients for a history of travel is part of routine patient evaluation to identify persons presenting with signs or symptoms that could be due to an infectious cause (e.g., fevers, respiratory symptoms, rashes, vomiting and diarrhea).<sup>8</sup> A diagnosis of acute EVD is to be suspected in all patients with fever and/or other symptoms consistent with EVD (such as headache, weakness, muscle pain, vomiting, diarrhea, abdominal pain or unexplained hemorrhage) and **within 21 days before the onset of symptoms**, have:<sup>9</sup>

- travelled in the specific local area of a country where EVD has recently occurred or is endemic (see [CDC Map](#)<sup>10</sup>)
- had direct contact with blood, other body fluids, secretions, or excretions of an animal or person (alive or deceased) with suspected (e.g. contact with a sick individual who has a travel history) or confirmed EVD
- worked in a laboratory that handles Ebola virus, or in animal facility that handles animals known to be natural hosts of Ebola virus agents in a country or region affected by EVD.

Refer to [Appendix 1](#) – Triage Assessment Algorithm for EVD.

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 (See section on [Laboratory Investigations and Diagnosis](#)).

The Chief Medical Officer of Health may institute enhanced and active screening for travelers or visitors returning from areas experiencing widespread transmission of Ebola viruses (or other VHF) when a risk for importation into Ontario exists under section 77.7 of the [Health Protection and Promotion Act, R.S.O., 1990, c.H.7 \(HPPA\)](#).<sup>11</sup>

## Patient Placement

Patients with suspected or confirmed EVD should be cared for in single rooms with dedicated washroom. The use of an AIIR is the recommended standard of care when performing an Aerosol Generating Medical Procedure (AGMP) ([see below](#)). If an AIIR is not available, a single room with the door closed should be used for the procedure. There is no evidence to suggest that a fallow time is required after a patient with suspect or confirmed EVD vacates a room or undergoes an AGMP. The evidence and recommendations supporting fallow times prior to re-entering a room (after an infectious source has been removed) stem from TB literature, and are not reflective of, nor translatable to other infectious agents. Therefore, there are no recommendations on the use of fallow time for EVD in any setting.

## Personal Protective Equipment (PPE)

This guidance is intended to inform recommended and other appropriate PPE for the care of patients with suspect or confirmed EVD. In light of high mortality associated with EVD, low infectious dose and documented HCP infection risk, the recommended PPE for direct care of patients with a suspect or confirmed EVD includes a fit-tested, seal-checked N95 respirator (or equivalent, or greater protection),

eye protection (e.g. full face shield that covers all mucous membranes), fluid resistant or impermeable gown/coveralls and gloves. Additional PPE that provides coverage of all skin and mucous membranes of the HCP and that is more resistant or impermeable to fluid penetration may be considered to reduce the potential for exposure to the infectious agent (see point-of-care risk assessment considerations). The additional barriers can include:

- fluid impermeable apron for additional protection to the front of the body
- additional head/neck and foot coverings (if not part of a coverall suit)
- double gloves

- Each organization will need to develop 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 EVD.

## POINT OF CARE RISK ASSESSMENT CONSIDERATIONS

The clinical presentation of the patient with suspected or confirmed EVD will evolve over time and the 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.

**Table 1** summarizes key aspects of the elements of Additional Precautions that can be applied based on whether or not the patient is experiencing fluid loss through uncontained vomiting, diarrhea, or bleeding.<sup>3, 12-14</sup> The presence of large amounts of fluid loss puts the HCP at a higher risk for body fluid exposure or the environment at higher risk for contamination.<sup>3</sup> Decision making will also need to take into account the anticipated care procedures.

**Patients who are assessed by a clinician to be clinically stable** (e.g., stable vital signs) **and do not have uncontained vomiting, diarrhea, or bleeding**, can be managed using the guidance outlined in **Table 1**. A lower risk of exposure of the HCP exists when caring for these patients when:

- 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 emesis, no bleeding)
- patient is continent of stool and urine
- patient is capable of self-care and hygiene

**Patients who are assessed by a clinician to be clinically unstable** (e.g., abnormal vital signs due to high volume of fluid loss) **or there is risk of exposure to uncontained body fluids (e.g. vomiting, diarrhea, or bleeding)** will require more enhanced measures as included in **Table 1**. These patients may also have a higher likelihood to undergo high risk procedures. A higher risk of exposure of the HCP exists when caring for these patients when:

- patient's body fluids are soiling the environment (e.g., diarrhea, emesis, 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).

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 EVD.

**Table 1: IPAC Recommendations for Patients with a Suspect or Confirmed EVD with considerations for clinical status and risk of body fluid exposure**

Component	Recommendation	Additional Considerations for Patients that are clinically unstable or high risk for uncontained body fluid exposure	Comments
<b>Additional Precautions</b>	<ul style="list-style-type: none"> <li>• Contact and Droplet Precautions with a fit-tested, seal-checked N95 respirator (or equivalent or greater protection) in addition to Routine Practices</li> <li>• notify IPAC team immediately</li> <li>• notify local Public Health Unit (PHU)/Medical Officer of Health</li> </ul>	<ul style="list-style-type: none"> <li>• See PPE below</li> </ul>	<ul style="list-style-type: none"> <li>• Airborne Precautions may also be needed if the patient is exhibiting signs and symptoms of EVD 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</li> </ul>
<b>Personal protective equipment</b>	<p>All staff members entering the room are to wear at a minimum:</p> <ul style="list-style-type: none"> <li>• disposable full face shield</li> <li>• gloves with extended cuffs to pull over gown cuffs</li> <li>• disposable fluid-resistant* cuffed gown that covers to mid-calf</li> <li>• fit-tested, seal-checked N95 respirator (or equivalent or greater protection)</li> </ul>	<ul style="list-style-type: none"> <li>• double gloves should be considered depending on activity to allow for changing of gloves if required between activities while in the patient room. In this case at least one pair of gloves should have extended cuffs</li> <li>• impermeable** long-sleeved, cuffed gown that covers to mid-calf and shoe cover with/plus gaiters that come up to the knee OR impermeable coverall and shoe covers/integral sock</li> </ul>	<ul style="list-style-type: none"> <li>• follow organizational risk assessment for PPE use. PCRA before patient contact is to be done to evaluate the planned care tasks, the patient’s current condition, the patient’s possible response to the procedures, and the potential for exposure to blood and/or body fluids</li> <li>• PPE observer to assure proper donning/doffing of PPE strongly recommended</li> </ul>

Component	Recommendation	Additional Considerations for Patients that are clinically unstable or high risk for uncontained body fluid exposure	Comments
		<ul style="list-style-type: none"> <li>• fit-tested, seal-checked N95 (or equivalent or greater protection)*</li> <li>• hair/head neck covering</li> </ul> <p>*A powered-air purifying respirator (PAPR) is an alternative and may be used based on considerations such as length of time in patient room, and appropriate training and availability.</p>	
<b>Patient placement</b>	<ul style="list-style-type: none"> <li>• Single room with a dedicated washroom</li> <li>• door to remain closed</li> <li>• location allows for separate spaces that are clearly delineated “clean” and “contaminated” areas</li> <li>• storage for clean PPE in clean area</li> <li>• alcohol-based hand rub (ABHR) and waste containers available in “contaminated” or doffing area</li> </ul>	<ul style="list-style-type: none"> <li>• Consider airborne isolation room (AIIR) to accommodate potential clinical changes (e.g. need for AGMP)</li> </ul>	<ul style="list-style-type: none"> <li>• consideration to placement in a room/unit that can accommodate changes in the clinical presentation of the patient (e.g., require AGMP) and reduce the need to transfer patient during admission.</li> <li>• if a dedicated washroom is unavailable, a dedicated commode with appropriate disposable absorbent pads or disposable bedpans may be used as an alternative</li> </ul>

Component	Recommendation	Additional Considerations for Patients that are clinically unstable or high risk for uncontained body fluid exposure	Comments
<b>Staffing</b>	<ul style="list-style-type: none"> <li>only staff members who have been trained and demonstrate competency in donning/doffing of recommended PPE are to be assigned to provide care for the patient</li> <li>assess the need for secondary personnel to monitor donning and removal of PPE</li> </ul>	<ul style="list-style-type: none"> <li>institute observed PPE donning and doffing</li> </ul>	<ul style="list-style-type: none"> <li>if unfamiliar PPE is being worn, refresher training is to be provided prior to use (just-in-time training may be needed)</li> <li>maintain a log of all people entering the room</li> </ul>
<b>Hand hygiene</b>	<ul style="list-style-type: none"> <li>access to hand washing sink and ABHR for staff</li> <li>separate patient sink</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>	<ul style="list-style-type: none"> <li>clean hands is the most important measure in preventing self-inoculation of eyes or mucous membranes including during tasks and removal (doffing) of PPE</li> </ul>
<b>Patient care equipment</b>	<ul style="list-style-type: none"> <li>dedicate patient care equipment to the room</li> <li>use disposable equipment where possible</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>	<ul style="list-style-type: none"> <li>continue to ensure all dedicated, non-disposable equipment is cleaned with an approved hospital-grade disinfectant after each use to reduce bio burden within the patient environment</li> </ul>
<b>Environmental cleaning</b>	<ul style="list-style-type: none"> <li>communicate with the environmental services department</li> <li>experienced environmental services staff members trained in IPAC practices and</li> </ul>	<ul style="list-style-type: none"> <li>Consider additional cleaning (e.g., twice daily or more frequent) based on level of environmental contamination</li> </ul>	<ul style="list-style-type: none"> <li>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</li> </ul>

Component	Recommendation	Additional Considerations for Patients that are clinically unstable or high risk for uncontained body fluid exposure	Comments
	<p>use of recommended PPE are to be assigned</p> <ul style="list-style-type: none"> <li>• PPE to be worn by staff performing environmental cleaning should be consistent with that worn by HCPs caring for clinically unstable patients, or high risk for uncontained body fluid exposure</li> <li>• environmental services cleaning equipment is to be disposable or remain in the room for duration of patient admission</li> <li>• 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</li> <li>• use appropriate hospital-grade disinfectant with a Drug Identification Number (DIN) and claim sufficient to inactivate enveloped viruses</li> </ul>		<ul style="list-style-type: none"> <li>• Ebola viruses have a lipid envelope which make them relatively easy to inactivate with most approved hospital-grade disinfectants</li> </ul>

Component	Recommendation	Additional Considerations for Patients that are clinically unstable or high risk for uncontained body fluid exposure	Comments
<b>Waste management</b>	<ul style="list-style-type: none"> <li>• general patient care waste from patients undergoing investigation for possible EVD is to be stored in a labelled leak-proof container if possible until such time as an EVD diagnosis is confirmed or eliminated</li> <li>• liquids/body fluids from patient or patient care activities can be disposed of through the regular sewer system</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• Ebola virus is classified under <a href="#">Transport Canada</a> regulations as Class A agent and requires special handling and packaging<sup>15</sup></li> <li>• do not use hand hygiene sinks or patient sinks for disposal of body fluids/liquids</li> </ul>
<b>Linen management</b>	<ul style="list-style-type: none"> <li>• staff members handling soiled linen in a patient room are to wear the required PPE based on PCRA</li> <li>• linen that is not soiled with body fluids can be held for laundering or disposal until such time as an EVD diagnosis is confirmed or eliminated</li> <li>• linen soiled with body fluids is to be placed into a leak-proof bag at the point-of-use. The external surface of the bag/container is to be disinfected prior to removal from the area for disposal</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	

Component	Recommendation	Additional Considerations for Patients that are clinically unstable or high risk for uncontained body fluid exposure	Comments
<b>Duration of precautions</b>	<ul style="list-style-type: none"> <li>duration of precautions is to be determined on case-by-case basis based on laboratory findings and patient symptoms</li> <li>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</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>	<ul style="list-style-type: none"> <li>other co-existing conditions may require specific Additional Precautions be continued for the patient (tuberculosis, ARO colonization, etc.)</li> </ul>

\* Fluid resistant gowns meet CSA or AAMI level 2 or 3 standards ([See Table 2](#))

\*\*Impermeable gowns meet CSA or AAMI Level 4 standard ([See Table 2](#))

## Laboratory Investigations and Diagnosis

Testing for EVD requires the concurrence of a PHO Laboratory microbiologist. Before collecting appropriate specimens for investigation of suspected VHF, the clinician is to:

- consult with a PHO Laboratory microbiologist available through the PHOL Customer Service Centre at 416-235-6556 or toll free at 1-877-604-4567
  - contact the local PHU
- For current testing and laboratory guidance on VHF, including EVD, see:

- [Viral Haemorrhagic Fever including Ebola Virus Disease](#)<sup>9</sup>
- [Laboratory Guidance - Viral Haemorrhagic Fevers including Ebola Virus Disease](#)<sup>16</sup>

Specimens are to be taken by staff experienced in the required techniques. As per the IPAC section above, the same protective clothing as described for other hospital staff is to 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 is to be wiped with a hospital- grade disinfectant and the outer layer of gloves can be removed.

As per usual practices, laboratory specimens are to be transported in compliance with the [Transportation of Dangerous Goods Act, 1992](#).<sup>17</sup> Specimens are not to be transported in a pneumatic tube system.

For patients in which EVD is being considered, it is important that other common travel-associated diseases (e.g., malaria, vaccine-preventable diseases) and emerging pathogens (e.g., chikungunya, MERS-CoV) be investigated as appropriate.

# Additional IPAC Considerations

## Aerosol-Generating Medical Procedures (AGMPs)

An AGMP is to be performed in an AIIR, if feasible, with the use of Airborne Precautions. If an AGMP is required and an AIIR is not available, the procedure should be performed in a single patient room with the door closed. Limit the number of staff to the minimum required to safely perform the procedure. Visitors are not to be present. Whenever possible, the procedure is to be performed by the most highly experienced staff member available.

### PROCEDURES WITH INCREASED TRANSMISSION RISK

The procedures that are listed as aerosol-generating medical procedures (AGMPs or AGPs) are those procedures/encounters that have epidemiological data that indicate they may significantly increase risk of infection to health care workers within close range of the procedure and thus fit-tested, seal-checked N95 respirators (or equivalent) are required as a minimum level of respiratory protective equipment, as well as eye protection.<sup>18</sup>

### PROCEDURES CONSIDERED AGMPs<sup>19</sup>

- Intubation, extubation and related procedures e.g., manual ventilation and open deep suctioning
- Tracheotomy/tracheostomy procedures (insertion/open suctioning/removal)
- Bronchoscopy
- Surgery using high speed devices in the respiratory tract
- Some dental procedures (e.g., high-speed drilling and ultrasonic scalers)
- Non-invasive ventilation (NIV) e.g., Bi-level Positive Airway Pressure (BiPAP) and Continuous Positive Airway Pressure ventilation (CPAP)
- High-Frequency Oscillating Ventilation (HFOV)
- Induction of sputum with nebulized saline
- High flow nasal oxygen (high flow therapy via nasal cannula)

## Transportation of Suspect or Confirmed Patients with EVD

### INTERNAL TRANSPORTATION

Patients with suspected or confirmed EVD are not to leave the room or be transferred internally except for essential medical procedures or diagnostic tests that cannot be performed in the patient's room. Transport staff members are to be aware of the patient's status and the required PPE. Patients are to wear a mask to contain respiratory droplets during transport,<sup>6</sup> if tolerated and not contraindicated.

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 are to discard PPE as they leave the room, and put on new PPE for transport.<sup>20</sup> Prior to transporting the patient for essential procedures, the receiving

unit is to be fully aware of the patient's impending arrival and be prepared to accept the patient immediately. Patients are to be transported using the most direct route to their destination. Staff transporting the patient is to wear PPE based on the point of care risk assessment and institutional policies, considering their role in both transportation and upon arrival to the receiving area. For transporters that may be in close, non-transient contact with the patient, the minimum recommended PPE includes an N95 respirator (or equivalent or greater protection), eye protection, fluid resistant gown and gloves. If the patient is clinically unstable and/or there is risk of body fluid exposure, additional PPE as outlined in Table 1 should be considered. Additional individuals that are in proximity to the transport team, but not in contact with the patient (e.g. an individual opening doors or pushing elevator buttons), are recommended to wear at a minimum a fluid resistant mask, eye protection, gown and gloves, with additional PPE based on the point of care risk assessment and institutional policies. A surgical mask is to be placed over the mouth and nose of the patient, if tolerated and not contraindicated (e.g. < 2 years). Following the procedure, the room is to be cleaned as per the organizational policies and procedures that are specific to EVD.

## EXTERNAL TRANSPORTATION

Transport companies and Emergency Medical Services staff members are to be notified of the patient's status to determine the requirements for the most appropriate PPE based on the risk assessment.

## Visitor Restrictions

Visitors are to be restricted to only those absolutely necessary (i.e., to help with patient history if patient unable to communicate). Case-by-case exceptions may be made when it is essential for the well-being of the patient and in consultation with local Public Health and Infection Prevention and Control teams.

Visits are to be controlled and scheduled to allow for:

- screening for symptoms of EVD before entering or immediately on arrival to hospital for those persons who may have been exposed to the patient (or index case) prior to or following admission
- evaluation of the current risk to the visitor and ability of the visitor to comply with precautions. A log is to be maintained of all visitors entering and leaving the patient room (with times documented).

Follow-up of contacts, including those who may have accompanied a patient with suspected or confirmed EVD to the emergency department, will be done by the local PHU/Medical Officer of Health.

## Education of Staff and Visitors

### EDUCATION FOR 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 EVD (see below), all HCPs should be aware of, and have the skills to complete the following IPAC practices, in the care of patients with suspect or confirmed EVD:

- [Point-of-care risk assessment](#) is the first step in the effective use of Routine Practices done before each interaction with a client/patient or their environment.<sup>21</sup> For more information, please refer to: [Provincial Infectious Diseases Advisory Committee's \(PIDAC\) Routine Practices and Additional Precautions in All Health Care Settings<sup>6</sup>](#)

- 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](#)<sup>22</sup>
- Routine Practices 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](#)<sup>6</sup>
- [Infection Prevention and Control \(IPAC\) core competencies](#) are basic knowledge and skills all health care workers in Ontario need to possess about IPAC,<sup>23</sup> regardless of their role or position, education, experience or culture

### TRAINING FOR EVD PREPAREDNESS

Staff members require training on the protocols, policies and procedures that are developed by the organization for the testing or treatment of patients with suspect or confirmed EVD.

The training is to include the proper selection, use, and limitations of all PPE that would be used in the care of a patient.

- Each organization is to have specific guidance and training on the donning and doffing of PPE that has been selected by the organization, where additional barriers are. 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

### EDUCATION FOR VISITORS

For patients with suspected or confirmed EVD, visitors are to be restricted to those considered essential. For visitors deemed essential, teaching is to include:<sup>13</sup>

- hand hygiene
- hygiene practices that prevent the spread of microorganisms
- appropriate selection and use of PPE based on recommendations
- self-screening for fever or symptoms of EVD

Infection prevention and control professionals (ICPs) or other trained HCPs may assist staff in education of visitors through developing and/or reviewing informational materials pertaining to Routine Practices and Additional Precautions.

## Handling of Deceased EVD Patients in the Acute Care Setting

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 and the process for handling the body of a patient infected with EVD 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.<sup>24</sup> 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:

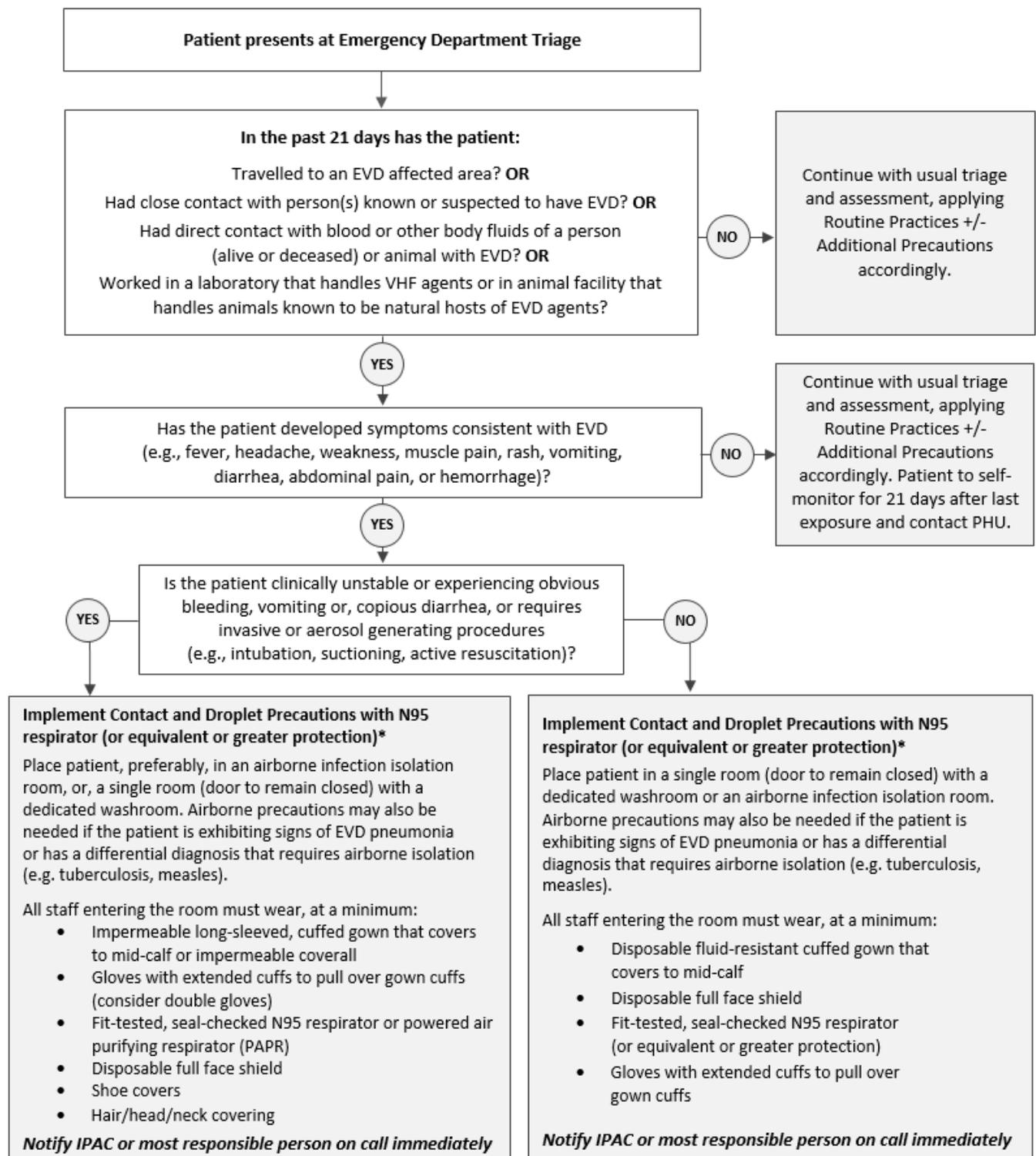
- clamp and leave all intravenous lines, endotracheal tubes or other invasive devices in place to avoid additional splashes or leakage, cover any leaking tubes with absorbent material
- do not wash, spray or clean the body
- use the bed linens to wrap the body
- immediately place the wrapped body into a leak-proof plastic body bag (ideally 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 accidentally accessed if there will be any delay in retrieval of the body by the designated funeral home staff.

Cremation is the preferred option. Embalming is not to be done. 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.<sup>25</sup>

# Appendix 1: Triage Assessment Algorithm for EVD



Note: Donning and doffing recommended to be monitored by a trained observer.

\*A powered-air purifying respirator (PAPR) is an alternative and may be used based on considerations such as length of time in a patient room, and appropriate training and availability.

## Appendix 2: Decision Guide on Selection of PPE

### Isolation Gowns or Coveralls for EVD

Selection of the range of PPE supplied by an organization for the assessment and care of a patient with suspected or confirmed EVD needs to be based on a site-specific risk assessment that includes a review of the care level and tasks anticipated, work and environmental conditions, and all of the environmental and administrative controls in place. This assessment will determine the correct PPE required for protection of the staff members who provide direct care or support services throughout the continuum of care, from out-patient assessment to critical care to recovery or mortuary care. Organizations will need to customize their inventory to ensure that the PPE selected offers effective protection for the users. Several different designs or options may be required to be able to fit different staff. If different types of gowns or coveralls are available, ensure it is clear to staff, in which situation each are used, either in how it is packaged or labeled and/or stored.

PPE provides physical coverage for the user that prevents the exposure of non-intact skin or the mucous membranes of the eyes, nose and mouth to blood, other body fluids, secretions or excretions. Hand hygiene at key moments and sequencing of PPE removal (doffing) is critically important to prevent accidental self-contamination. Staff training on the care, use, benefits and limitations of all of the PPE selected by the organization for care of a patient with suspected or confirmed EVD is required as part of a comprehensive planning and preparation process.

The type of gown or protective clothing selected is to be based on the nature of the interaction with the client or patient, including:

- anticipated degree of contact with infectious material
- risk posed by EVD
- potential for blood and body fluid penetration of the gown
- duration of potential exposure
- Comfort and usability of the PPE (wearability) is important in the selection of PPE for EVD and each setting is to consider the following factors:
  - available in a wide range of sizes to fit different body types (PPE that is too small may tear)
  - design allows for proper range of motion involved in the completion of expected tasks and does not impede movement (e.g., potential for injury, trip hazard)
  - ease of donning and doffing without self-contamination in the process
  - assessment of comfort when wearing for extended periods of time
  - supply chain availability and ability to source and replenish stock and sizes easily if needed

### Isolation Gown Standards

There is currently no established guidance that specifies performance criteria for PPE that is specific to EVD. The performance criteria included in the Canadian Standards Association (CSA) Z314-10 selection and use of gowns and drapes intended for use in health care facilities is to be used in selecting isolation

gowns.<sup>26</sup> See [Table 2](#). These CSA standards also mirror the Association for the Advancement of Medical Instrumentation (AAMI) standards and Health Canada<sup>27-29</sup>

It is important to note that in the CSA standard the “critical zones” for isolation gowns encompasses the entire gown including the front and back. For surgical gowns the critical zones are the front panel and sleeves only. Using a surgical gown in an isolation setting would not necessarily provide full protection.

**Table 2: Summary of Liquid Barrier Classification and Tests (Adapted from CSA Z314-10 and AAMI PB70: 2012)<sup>26,27</sup>**

Reference	Material	Resistance to Fluid Penetration	Testing Measure	Isolation
CSA Level 1 AAMI Level 1 (Fluid resistant)	Spunbond nonwoven fabric	Minimal water resistance	AATCC 42 Test for resistance to spray)	This would be the minimum standard for isolation gowns where minimal amounts of spray or droplets are anticipated
CSA Level 2 AAMI Level 2 (Fluid resistant)	Single layer microfibers or is a topically treated textile material	Resistant to water spray and some resistance to water absorption on contact	AATCC 127 (Test for resistance to water on contact; hydrostatic pressure) AATCC 42 (Test for resistance to water spray)	Commonly used as an isolation gown; suitable for situations involving low amounts of fluid or low risk of sprays
CSA Level 3 AAMI Level 3 (Fluid resistant)	Laminated or coated material e.g., polypropylene coated polypropylene gowns	Resistant at a higher standard to water spray and resistance to water absorption on contact	Meets a higher test standard (compared to Level 2) for fluid resistance based on ATCC 127 (Test for resistance to water on contact; hydrostatic pressure) AATCC 42 (Test for resistance to water spray)	Used where more moderate amounts of fluid exposure or sprays may be anticipated in the course of providing patient care or handling of body fluids

Reference	Material	Resistance to Fluid Penetration	Testing Measure	Isolation
CSA Level 4 AAMI Level 4 (Fluid impermeable)	Laminated or coated materials (e.g. impervious polyethylene)	Resistant to penetration of viruses based on penetration of a surrogate microbe for Hepatitis (B and C) and the Human Immunodeficiency Viruses	All critical components meets requirements of the bacteriophage penetration test ASTM F1671	Used where large amounts of fluids or sprays may be anticipated or encountered

Manufacturers may cite other references to testing criteria used for gowns or protective clothing. For instance a manufacturer may cite an ISO standard for fluid resistance (for example ISO16603 or ISO16604).<sup>30,31</sup> Others may simply reference the test method used such as ASTM 1670 or ASTM 1671, without actually referencing the AAMI or CSA standard. For instance, with full body suits, there is no reference in CSA or AAMI because both of these standards are more specific to gowns (e.g., drapes)

Protective clothing that meets ASTM for fluid resistance has been tested for resistance to a synthetic blood challenge (see below). All materials that pass ASTM test 1671 have also passed ASTM 1670. A product that has passed ASTM 1671 (which includes any gown that is level 4 based on AAMI/CSA) is therefore one of the most desirable protective clothing for circumstances where there is high probability for blood and body fluid exposure where infectious agents are present.

It is important to note that these tests utilize arbitrary values that may not always reflect the actual reality of end-use.

## Isolation Gown Selection Criteria

Gowns used as PPE are to be cuffed and long-sleeved, and offer full coverage of the body front, from neck to mid-calf or below and fully overlap in the back with adequate closures to keep the gown secured.

### SCREENING/TRIAGE SETTINGS

A gown that meets the CSA/AAMI standard for isolation gown as a level-2 or 3 (fluid resistant) gown is sufficient for interactions at triage, initial screening, brief interactions and moving of a patient to an isolation room for further investigation or assessment.

### PATIENT CARE

In selection of gowns for use in providing direct care for patients with increasing symptoms of EVD, the gown is to meet the CSA/AAMI standard for isolation gown as a level-3 (fluid resistant) or level-4 (fluid impermeable). Choice of fluid resistant or fluid impermeable will be made based on the risk and amount of fluid exposure anticipated during the patient or patient environment encounter.

## Protective Clothing/Coverall Selection Criteria

There are a wide range of full body coveralls available that provide coverage of the body and head, depending on their design. Integrated foot coverings, gloves and face protection or respiratory protection may be available. These suits have been designed for wide variety of applications from protection against dry particulates to chemical and liquid splash-resistance.

Coverall are not part of the AAMI or CSA standards for gowns. However, in the selection of coveralls for use in caring for patients with EVD, the fabric is to meet at least the CSA/AAMI standard level 3 or 4 (fluid resistant or fluid impermeable), or reference ASTM 1670 or 1671 or other standard that is based on ASTM testing. The seams and closures may have less barrier performance than the material.

Coverall that are constructed with taped or sealed seams would require other coverings or measures that reduce the risk and volume of contact with body fluids (e.g., addition of fluid impervious aprons, absorbent materials to reduce volume of fluids, other barriers).

Manufacturers are to be consulted to review the performance criteria of the selected coveralls and suitability of that suit for use in a medical setting

End-users need to also determine if the coveralls provide enough range of sizes to be able to fit all staff. Coveralls that are too small may tear as the user bends or squats. Suits that are too large may catch or snag on equipment or objects. The coverall also needs to accommodate the use of any additional PPE required.

A final area of consideration is the ease of donning or doffing of the coverall and the amount of dedicated space and extra assistance required to do this safely.

## Use of Gowns or Coveralls with Other PPE

When a protective gown or coverall is selected it is important that other PPE is compatible and fits to make a proper ensemble. For example gloves may leave a gap between the sleeve and the glove when the arm is outstretched. Longer gloves will be needed if there is a gap. Shoe covers may provide sufficient protection when a coverall is worn, but a boot cover or gaiter may need to be worn to ensure coverage of the entire leg when a gown is worn.

Where hoods are part of the PPE, it is important that masks or respirators and face-shield will not dislodge or become occluded as the hood is applied and the health care worker moves during the provision of care.

### SELECTION OF OTHER PPE

For further information on the selection PPE including medical gloves, masks and respirators and eye protection, please refer to Appendix M: Advantages and Disadvantages of PPE in [PIDAC's Routine Practices and Additional Precautions, November 2012](#)<sup>6</sup> and to any applicable CSA Standards (e.g., CSA Z94.4 for respirators).

All PPE selected are to meet the performance criteria determined by the organization based on the ORA.

Occupational health and safety requirements are to 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](#)<sup>32</sup> and its Regulations.

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