

Care of the Seriously or Critically Ill Patient with possible or proven Ebola Virus Disease (EVD)

Critical Care Strategic Clinical Network

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It is expected this document is iterative and continuously updated.

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A. Notification

[Ebola Notifiable Disease Management Guidelines \(Alberta Health - Aug. 2014\)](#)

Ensure the Medical Officer of Health (MOH) is aware that a patient with potential or proven EVD is being admitted to the intensive care unit.

Contact the MOH on-call through RAAPID or through the hospital switchboard.

B. Alberta receiving sites for patients with suspected or proven EVD

Patients in Alberta with suspected or proven EVD will be treated in the following centres:

Children:

Calgary: Alberta Children's Hospital
Edmonton: Stollery Children's Hospital

Adults:

Calgary: South Health Campus
Edmonton: University of Alberta Hospital

Patients presenting at other centres will be stabilized and transported utilizing appropriate infection control procedures following discussion with MOH.

C. Case Definition: Ebola Virus Disease (EVD)

<http://www.health.alberta.ca/health-info/ebola-virus.html>

For surveillance purposes, a person with EVD-compatible symptoms is defined as an individual presenting with fever of ≥ 38.6 degrees Celsius **AND** at least one of the following additional symptoms/signs:

- malaise
- myalgia
- severe headache
- conjunctival injection
- pharyngitis
- abdominal pain
- vomiting
- diarrhea that can be bloody
- bleeding not related to injury (e.g., petechiae, ecchymosis, epistaxis)
- unexplained hemorrhage
- erythematous maculopapular rash on the trunk

This definition is slightly different from the National Health definition

<http://www.phac-aspc.gc.ca/id-mi/vhf-fvh/national-case-definition-nationale-cas-eng.php - footnote1>

Person Under investigation (PUI)

A person with EVD compatible symptoms (as defined above) not attributed to another medical condition **AND** at least one of the following **epidemiologic risk factors** within the 21 days before the onset of symptoms:

- Residence in or travel to an area where EVD transmission is active
- **Healthcare worker (HCW) wearing personal protective equipment (PPE)** and adhering to appropriate infection prevention and control precautions with no safety breaches, who directly or indirectly cared for a probable or confirmed case of EVD (e.g. direct patient care or contact with environment or fomites of a case)
- Other patient or visitor without high risk exposures, as defined below, who spent time in a healthcare facility where probable or confirmed cases of EVD are being treated
- Household member of a probable or confirmed case of EVD without high-risk exposures, as defined below
- Laboratory worker processing body fluids of probable or confirmed cases of EVD with appropriate PPE and standard biosafety precautions and no safety breaches
- Direct exposure to human remains (e.g. through participation in funeral or burial rites) in a geographic area where the outbreak is occurring with appropriate PPE and no safety breaches
- Direct unprotected contact with bats or primates from EVD-affected country

Probable Case

A person with EVD-compatible symptoms (as defined above) not attributed to another medical condition **AND** at least one of the following high-risk exposures within the 21 days before the onset of symptoms:

- Percutaneous or mucous membrane exposure or direct skin contact with body fluids of a confirmed or probable case of EVD **OR**
- Sexual contact with a probable or confirmed EVD case **OR**
- Laboratory worker processing body fluids of probable or confirmed EVD cases without appropriate PPE or standard biosafety precautions **OR**
- Healthcare worker (HCW) not wearing personal protective equipment (PPE), who has been contaminated or broken the integrity of their PPE, and/or not adhered to appropriate infection prevention and control precautions, who directly or indirectly cared for a probable or confirmed case of EVD (e.g. direct patient care or contact with environment or fomites of a case) **OR**
- Direct exposure to human remains (e.g. through participation in funeral or burial rites) in the geographic area where the outbreak is occurring without appropriate PPE

Confirmed Case

A person with laboratory confirmation of EVD infection using at least one of the methods below:

- Isolation and identification of virus from an appropriate clinical specimen (e.g., blood, serum, tissue, urine specimens or throat secretions) **OR**
- Detection of virus-specific RNA by reverse-transcriptase PCR from an appropriate clinical specimen (e.g., blood, serum, tissue) using two independent targets or two independent samples **OR**
- Demonstration of virus antigen in tissue (e.g., skin, liver or spleen) by immunohistochemical or immunofluorescent techniques **AND** another test (e.g., PCR) **OR**
- Demonstration of specific IgM **AND** IgG antibody by EIA, immunofluorescent assay or Western Blot **OR**
- Demonstration of a fourfold rise in IgG serum antibody by EIA, immunofluorescent assay or Western Blot from serial samples

D. Preparation and Admission of Potential EVD Patients to ICU

Assessment and accommodation

Assessment of patients with definite or suspect EVD, irrespective of location, must be performed using recommended infection precautions.

1. EVD patients admitted to in-patient units will be cared for using Modified Contact and Droplet precautions.
2. While EVD is not an airborne illness, due to the higher risk of aerosol generation in critically ill patients, admit seriously ill EVD patients to negative pressure rooms. Verify negative pressure system is functioning normally.
3. Ensure appropriate equipment and supplies are available.
4. Notify supply management of increased usage of protective supplies. Ensure the next shift is well stocked.
5. Use manual bagging unit with HME filter attached to the patient's bedside.
6. Place large biohazard receptacle in room.
7. Do not use linen hampers; linen to be disposed of in biohazard receptacles.
8. If patient is intubated, place ventilator in room.
9. If patient is not intubated, prepare oxygen delivery as ordered; do not move a ventilator into the room until needed.
 - a. In ICU rooms where ventilators are mounted to articulating arms, if the ventilator is not required, double bag the ventilator with large plastic covers.
10. Stock IPC approved disinfectant wipes for EVD in patient room for cleaning equipment ie. Accel wipes, Virox wipes (hydrogen peroxide) or PCS 1000 wipes (sodium hypochlorite).
11. Place log book for tracking staff entering patient room outside door.
12. Stock isolation cart - see below.

Ready isolation precautions:

1. Prepare isolation cart.
2. Stock isolation cart with adequate supply of N95 masks (all brands and sizes), face shields, hair covers, gloves (all sizes), impermeable isolation gowns with cuffed sleeves and disinfectant wipes.
3. Post references for use and application and removal sequences of PPE outside and inside patient's room (<http://www.albertahealthservices.ca/assets/info/hp/ipc/if-hp-ipc-donning-ppe-poster-wet-ebola.pdf> <http://www.albertahealthservices.ca/assets/info/hp/ipc/if-hp-ipc-doffing-ppe-poster-wet-ebola.pdf>).
4. Donning and doffing of PPE should be performed in areas that are physically separated and designated as clean (donning) and contaminated (doffing). Donning should always be done outside the patient's room and ante-room (if present) and doffing may take place in a large ante-room or outside the room. Wherever it is located, the doffing area should be frequently cleaned and decontaminated.
5. Ensure canisters of disinfectant wipes inside and outside the patient room are adequately full. Order additional supplies as needed.
6. Ensure products for cleaning blood and body fluid spills and solidifying waste are in room.

Identify Staff:

1. The principle is to minimize the number of staff involved directly with the patient while providing quality care.
2. All staff providing care must be successfully N95 fit tested and fully educated in use of PPE.
3. Staff members who fail fit-testing or who are not N95 fit-tested must not enter room.
4. Names and times of all staff entering room must be entered into log-book by PPE monitor.

IPC at each site will review appropriate isolation precautions with all staff as required.

Place patient in room and enter order "Modified Contact and Droplet Precautions". The doors remain tightly closed.

Discontinuation of Precautions:

Precautions will not be discontinued until IPC consults with a Medical IPC officer to determine when it is appropriate to discontinue precautions.

E. Medication Management

1. Supplies and equipment will not be moved between isolation rooms and other areas of the unit/health care facility.
2. Predetermined medication supplies to be stocked inside room to reduce need to exit and re-enter for medication administration.
3. Medical chart and orders to be kept in clean area, orders scanned to pharmacy.
4. Patient specific medications will be delivered by Pharmacy in a separate container to the patient room and received by the RN in the room.

5. Automated dispensing cabinet on isolation unit will be stocked as per critical care stock if entire unit is in lock down/isolation. Otherwise the automated dispensing cabinet will be stocked as per regular quotas.
6. Emergency/resuscitation drugs will be stored within or in immediate proximity to the patient room with other emergency supplies on a cart that will hold Crash Cart bins in the same configuration as on the standard Crash Cart.
7. Each nurse entering the patient's room will review and obtain all necessary medication administration supplies for the subsequent 4-6 hours (including medications) and take them into the room at switch over.
8. Medications requiring refrigeration should be placed in a fridge inside the patient's room.
9. Requests from inside the room for unanticipated medications will be made through telephone (land-line or mobile phone) to the clean designated staff outside the room, who will obtain and deliver to room using strict isolation precautions maintaining negative pressure
10. The unit will be provided a code tray by pharmacy to prevent the cross contamination of the code tray that is used for regular codes in the hospital.
11. Nebulization of medication will not be performed.

F. Laboratory Testing

All laboratory testing will be performed in the hospital laboratory using point of care devices. The range of tests is currently includes ABGs, lactate, hemoglobin, electrolytes, PTT, urea and creatinine. Other lab tests will likely become available in the near future. Blood cultures using closed system technology and malaria testing using PCR technology will be available. Point of care testing will NOT be performed in the ICU using blood gas analyzers on patients with potential or proven EVD.

An updated list of available testing can be found at:

Calgary: <http://www.albertahealthservices.ca/assets/info/hp/diseases/if-hp-dis-ebola-lab-patient-testing-calgary.pdf>

Edmonton: <http://www.albertahealthservices.ca/assets/info/hp/diseases/if-hp-dis-ebola-lab-patient-testing-edmonton.pdf>

Laboratories must be informed of any specimens that may contain EVD so that appropriate transport and handling can be arranged. Specimens should be carried by gloved hand in appropriate containers but should not be sent by pneumatic tube, trayveyor or other similar systems.

[Lab Specimen Collection, Handling, Transport and Analysis for patients with suspected EBOLA Virus \(August 14, 2014\)](#)
[AHS Lab Services Operational Update: Aug. 20, 2014](#)

G. Transport and Admission to ICU

1. All health care providers involved in transport must wear full PPE (see below).
2. Transport with minimum number of people.
3. Clear halls and corridors prior to transport to minimize transport time.
4. One transport member will be required to stay clean to open doors and operate the elevator.

Portable oxygen canisters are to be used for all patients dependent on oxygen therapy that require transport. Use of wall connections at receiving departments are not to be used with EVD patients.

If patient is intubated:

1. Transport using an in-line HME filter and a manual bagging unit (with PEEP valve) or appropriate transport ventilator.
2. RT will manage airway and oxygen requirements.
3. Ensure O₂ cylinder(s) and transport stretcher are cleaned with disinfectant wipes before returning to general circulation.

If patient not intubated:

1. Transport with non-humidified (dry) oxygen supply; respiratory to identify the most appropriate oxygen delivery mask.
2. Patients should wear a procedure mask if tolerated.

3. Ensure O₂ cylinder(s) and transport stretcher are cleaned with disinfectant wipes before returning to general circulation.

H. Staffing Considerations

1. An experienced health care professional should be available 24/7 as PPE monitor.
2. Extra staff over and above the usual unit complement will be required.
3. The nurse in charge and the respiratory therapy supervisor are responsible to determine patient assignment and will coordinate care of all patients in the unit.
4. Reduce number of staff that may come in contact with patient and environment.
5. Maintain log of all staff entering patient room.
6. Staff assignment lengths need to be determined to reduce staff fatigue and dehydration.
7. Staff should receive education about self-monitoring and grouping care activities within patient room to reduce number of incidences of entering and exiting patient's room.
8. N95 fit-tested physician consultants, DI, lab personnel and other staff will continue to perform their usual duties. They must adhere to all appropriate isolation precautions.

I. Infection Prevention Precautions

EVD transmission to HCW has usually been associated with patient care in the absence of appropriate PPE to prevent exposure to blood and other body fluids. Most staff acquiring infection in previous outbreaks had multiple contacts with multiple body fluids. The risk for person-to-person transmission of EVD is highest during the later stages of illness and after death, when vomiting, diarrhea, and often hemorrhage, may lead to splash and droplet generation.

When selecting PPE for protection of healthcare staff the potential exposure routes to be considered are

1. Direct contact (through broken skin or mucous membrane) with blood or body fluids.
2. Indirect contact with environments or PPE contaminated with splashes or droplets of blood or body fluids.

It is imperative that the PPE provides a barrier of adequate coverage and integrity to prevent staff contact (direct or indirect) with contamination which must be maintained throughout all clinical/nursing procedures, and when following appropriate procedures for the removal and disposal or decontamination of potentially contaminated equipment by the wearer.

ICU Accommodation

1. Both confirmed and suspected cases of EVD should be immediately placed on Modified Contact and Droplet precautions.
2. A patient categorized as possibly having EVD should be accommodated in a negative pressure isolation room until the possibility of EVD has been ruled out. Although negative pressure capability is not needed for most patients, having the patient in an isolation room avoids the necessity of relocating the patient in the event of an aerosol generating procedure being required.
3. The room should have an en-suite toilet. If no en-suite toilet is available, a commode chair will be placed in the patient room.

PPE

For potential aerosol generating procedures a fit-tested N95 respirator MUST be worn by all HCW in the room (see below).

Potential aerosol generating medical procedures (AGMP) include:

1. Intubation and related procedures (e.g. manual ventilation, open endotracheal suctioning)
2. Cardio pulmonary resuscitation
3. Bronchoscopy
4. Sputum induction
5. Nebulized Therapy
6. Bilevel Positive Airway Pressure (i.e. BiPAP)
7. Respiratory/airway suctioning
8. High frequency oscillatory ventilation
9. Tracheostomy care
10. Aerosolized medication administration
11. High flow heated humidity oxygen therapy devices (ex. Optiflow)

Ideally, AGMPs should not be performed on patients suspected or confirmed of having EVD. There is consensus within the leadership of the Critical Care Strategic Clinical Network that nebulization of medication, Optiflow oxygen delivery, non-invasive ventilation, and high frequency oscillatory ventilation should not be employed in these patients. However, if other AGMPs are absolutely necessary (e.g. intubation), implement strategies to reduce risk to health professionals:

1. AGMPs should be anticipated and planned for.

2. A physician with the necessary experience and skill should perform the procedure. This should be the most senior responsible physician, and should follow the principle of minimizing the number of staff involved.”
3. Consideration should be given to using rapid sequence induction to minimize aerosolization.
4. The number of personnel in the room should be limited to those required to perform the AGMP.
5. AGMPs should be performed in negative pressure isolation rooms.
6. Appropriate ventilation (e.g., level of air filtration and direction of air flow) should be maintained.
7. Fit tested respirators (seal-checked NIOSH approved N95 at minimum) should be worn by all personnel in the room during the procedure.
8. Closed endotracheal suction systems should be used wherever possible.

Enhanced PPE

Due to the unpredictability of AGMP's or sudden vomiting/blood exposure, “dry” PPE is not recommended in critically ill patients.

Modified contact and droplet procedures should be immediately be implemented as outlined below:

<http://www.albertahealthservices.ca/assets/info/hp/ipc/if-hp-ipc-ebola-ppe-requirements.pdf>

Donning Order

<http://www.albertahealthservices.ca/assets/info/hp/ipc/if-hp-ipc-donning-ppe-poster-wet-ebola.pdf>

<http://www.albertahealthservices.ca/assets/info/hp/ipc/if-hp-ipc-donning-ppe-poster-wet-coverall-ebola.pdf>

Doffing Order

<http://www.albertahealthservices.ca/assets/info/hp/ipc/if-hp-ipc-doffing-ppe-poster-wet-ebola.pdf>

<http://www.albertahealthservices.ca/assets/info/hp/ipc/if-hp-ipc-doffing-ppe-poster-wet-coverall-ebola.pdf>

PPE MONITOR

1. A trained individual should be available continuously to monitor appropriate selection and application, removal and disposal of PPE, to observe and ensure HCW not contaminating self and to monitor entry to room (i.e., limit entry to only essential HCWs).
2. The PPE monitor should maintain a log of all staff who enter the patient room.
3. The PPE monitor should don and doff PPE as below:

<http://www.albertahealthservices.ca/assets/info/hp/ipc/if-hp-ipc-donning-ppe-poster-buddy-ebola.pdf>

<http://www.albertahealthservices.ca/assets/info/hp/ipc/if-hp-ipc-doffing-ppe-poster-buddy-ebola.pdf>

J. Injection Safety

Each patient should have *exclusively dedicated injection and parenteral medication equipment* which should be disposed of at the point of care.

1. Safety engineered devices should be available and used.
2. Syringes, needles or similar equipment should never be reused.
3. Limit the use of needles and other sharp objects as much as possible.
4. Limit the use of phlebotomy and laboratory testing to the minimum necessary for essential diagnostic evaluation and patient care.

K. Management of Sharps

If the use of sharp objects cannot be avoided, ensure the following precautions are observed:

1. Never replace the cap on a used needle.
2. Never direct the point of a used needle towards any part of the body.
3. Do not remove used needles from disposable syringes by hand, and do not bend, break or otherwise manipulate used needles by hand.

4. Dispose of syringes, needles, scalpel blades and other sharp objects in appropriate, puncture-resistant containers.
5. Ensure that puncture-resistant containers for sharps objects are placed as close as possible to the immediate area where the objects are being used ('point of use') to limit the distance between use and disposal, and ensure the containers remain upright at all times.
6. If the sharps container is far, never carry sharps in your hand but place them all in a kidney dish or similar to carry to the sharps container.
7. Ensure that the puncture-resistant containers are securely sealed with a lid and replaced when 3/4 full.
8. Ensure the containers are placed in an area that is not easily accessible by visitors, particularly children.

L. Communication Once Admitted

1. All services that may come in contact with patient, or patient environment or wastes should be notified by Clinician/Charge Nurse.
2. Laboratory services should be notified of possible or confirmed diagnosis before any samples are sent to lab.
3. Infection precautions and PPE requirements will be clearly visible on patient's room and designated staff will be available at all times to communicate around isolation PPE needs when coming into contact.
4. Provide communication and education about signs and symptoms of disease, appropriate control measures and correct PPE donning and doffing.
5. ICU Nurse Clinician/Charge Nurse will ensure Modified Contact and Droplet Isolation signage is in place outside the room. Unit staff member will ensure all persons entering the room are aware of isolation precautions and don appropriate PPE prior to entering the room.
6. Clear communication of correct handling and process for disposal of waste from patient room.

M. ICU logistics

General Principles

1. The number of staff entering the room should be limited.
2. All HCW entering the patient's room must have been fit-tested with a N95 mask and have been in-serviced on proper isolation precautions.
3. HCW who are not fit tested must not care for patients with potential or proven EVD.
4. The door to all rooms must remain tightly closed at all times except to allow staff to enter or exit. If the patient is not in a negative pressure room, it is still important to keep the door closed.

Patient Room Supplies

1. Use disposable supplies wherever possible.
2. Disposable tempadot thermometers will be used.
3. Additional supplies should be delivered by the nursing attendant to the room at the request of the in-room nurse/RT.
4. All equipment should be kept in the patient's room to avoid transmission via objects.
5. Dedicate equipment to isolation room or clean and disinfect with hospital grade disinfectant after use prior to returning to general circulation.

Management of linens and waste

1. Soiled linens should be considered as contaminated and will not be laundered.
2. Dirty sheets, etc. should be placed into biohazard bags for disposal.

Charting

1. Do not take the paper chart or laboratory results into the patient room.
2. Mobile computer terminals to remain outside the patient room at all times.
3. Chart on paper in patient room.
4. Use code blue standardized charting sheets.

Family Visitation

1. Access to patients with suspected or proven EVD is strictly restricted.
2. Visitors should be limited to one adult family member trained in the donning and doffing of PPE.
3. Consideration should be given to communication by phone, Skype or FaceTime if patient not seriously or critically ill.
4. Before allowing visitors, screen for symptoms of EVD.

Media Attention

1. Information is not to be provided to the media.
2. Direct all media inquiries to AHS public relations.

Patient Confidentiality

1. Patient confidentiality to be protected.
2. Do not discuss clinical issues outside of the ICU or within open areas of the unit.

N. ICU clinical management

Infectious diseases should be consulted as soon as possible, ideally, before ICU admission. It is likely that most patients from Africa who present with a febrile illness have either malaria or bacterial sepsis, (usually some form of G.I. infection, urosepsis or pneumonia). Malaria is the most likely diagnosis in febrile patients recently arrived from regions affected by EVD outbreaks. Consequently, the initial approach to management should seek to diagnose and treat these more usual causes of sepsis while also seeking to assess whether they may have EVD. It is important to note that some patients with proven EVD in Africa have had both EVD and another infection. Consequently, even if another disease is identified, it does not rule out the possibility of EVD.

Diagnostic studies

Calgary: <http://www.albertahealthservices.ca/assets/info/hp/diseases/if-hp-dis-ebola-lab-patient-testing-calgary.pdf>

Edmonton: <http://www.albertahealthservices.ca/assets/info/hp/diseases/if-hp-dis-ebola-lab-patient-testing-edmonton.pdf>

Antimalarial therapy

1. Antimalarial therapy as directed by the infectious diseases consultant should be started early if there is a strong clinical suspicion of malaria.

Antibiotic therapy

Commence empiric broad-spectrum antibiotic therapy intravenously in doses appropriate for severe sepsis/septic shock based on the clinical presentation and advice from the infectious diseases consultant.

Oral fluid and electrolyte replacement

1. Oral fluid and electrolyte replacement is preferred in patients who are not critically ill. Rehydration solutions should be used.
2. If unable to swallow, early placement of nasogastric tube should be considered.
3. Severe hypokalemia is a frequent finding in patients with EVD, has been associated with poorer outcomes and should be actively managed, ideally by enteral potassium chloride or by peripheral IV. If possible, avoid insertion of central venous catheters.

IV fluid replacement and resuscitation

1. The amount of IV fluid required depends on each patient's clinical status.
2. It is recommended that Ringer's lactate or Plasmalyte be used for volume replacement.
3. Starch-based colloid solutions should be avoided as their use may increase risk of coagulopathy and acute kidney injury.

Fluid resuscitation/vasoactive medications

1. Patients with EVD or other causes of severe sepsis require aggressive fluid resuscitation and, often, titrated infusions of vasoactive medications.
2. If the patient is hypotensive following empiric crystalloid fluid resuscitation via peripheral IV, a central venous catheter should be inserted by the most experienced physician available using full PPE for infusion of vasoactive medications.
3. Subsequently, clinical management should be as for severe sepsis/septic shock but with complete attention to infection control at all times.

Blood product replacement

1. Patients with EVD may develop severe coagulopathy.
2. Treatment is generally only required for those bleeding or requiring invasive procedures.
3. Standard laboratory coagulation tests (platelet count, INR, PTT, fibrinogen) will not be available.
4. If there is concern regarding status of patient's coagulation status and/or if an invasive procedure is planned, consult the hematopathologist on call for a thromboelastogram. Alternatively, consider empiric blood component therapy.

Vascular access

1. Peripheral IV's are adequate for patients who are hemodynamically stable but central venous catheters should be considered for patients who are clinically unstable.
2. Central venous catheters (CVC) should be inserted for patients requiring vasopressor therapy or requiring large amounts of potassium replacement or those having no easily accessible peripheral veins.
3. CVCs should be inserted by the most experienced staff physician with the patient calm or sedated, using full PPE.
4. If an arterial catheter is required, it is preferable to insert in the radial artery as patients with EVD may have profound diarrhea making management of a femoral catheter difficult.
5. Consideration should be given to using non-suture securing devices (e.g. Statlock) to minimize skin punctures and the risk of needle stick injuries.

Renal replacement therapy (RRT)

1. While not wishing to interfere with the treating physician's care plan, RRT should only be initiated in patients with possible or proven EVD following comprehensive discussions with the unit and zone medical and administrative leadership.
2. If available, intermittent hemodialysis may be preferable to CRRT in patients with possible or proven EVD even if vasopressor therapy is required. (Decreased exposure time and no need for manual drainage of effluent bags).

Cardiopulmonary resuscitation

1. There is no data available for survival following CPR in EVD since the disease has only occurred in developing countries with no significant critical care resources.
2. Appropriate Goals of Care should be determined early for all patients in ICU and re-evaluated daily .
3. Patients with late stage proven EVD and progressive multi-organ failure have minimal expectation of survival and withholding CPR may be appropriate to avoid unnecessary risk to health professionals.
4. In the event of a 'code blue', responding staff must not rush into the room without first applying the appropriate PPE including N95 respirators for aerosol generation before entering the patient's room.
5. The resuscitation equipment will be brought into the patient's room and used as required.
6. The resuscitation equipment must be appropriately decontaminated according to the equipment cleaning guidelines before it is removed from the room.

O. Respiratory Care

The basic principles are to always use appropriate isolation precautions and minimize aerosol-generating procedures.

For Non- Intubated Patients:

1. Provide O₂ as ordered with continuous SpO₂ monitoring.
2. Nebulization, Optiflow O₂ therapy and non-invasive mask ventilation must not be employed in these patients as these may generate aerosols.
3. Bronchodilator delivery should be provided via MDI and spacer (+/- mask) only.

If the patient is not improving consideration should be given to early, elective intubation and mechanical ventilation.

Intubation guidelines:

1. Endotracheal intubation should be performed by the most senior responsible physician using full PPE for an AEGP, including an N95 respirator. If emergent intubation is necessary, in the absence of the attending Intensivist, it should be to be performed by the most experienced clinician available.
2. Minimize number of people involved. **Close the room door.** Nursing and Respiratory Therapy support by same individuals assigned to patient.
3. Don full EVD PPE including N95 mask, face shield, head cover, gown and gloves.
4. Direct laryngoscopic and video-laryngoscopic equipment and a difficult airway cart should be available nearby.
5. Use of rapid-sequence-induction technique as much as possible to minimize chances of cough and aerosolization. The best pharmacotherapy will be determined by the physician on a case-by-case basis but in general should include significant sedation (narcotic / propofol/ketamine/benzodiazepines/) +/- paralysis.
6. Place in-line suction catheter in all patients.
7. If difficult airway cart is utilized, do not bring entire cart into the room - only the necessary equipment.

For Intubated Patients:

1. Bronchodilator delivery via MDI and spacer only. No small volume nebulizer therapy.

2. Use in-line suction only for all ventilated patients. No open suctioning.
3. Bronchoscopy is to be avoided, if possible, as it is considered to be high risk for aerosolization of secretions and potential transmission of EVD. If it needs to be done, the patient should be in a negative pressure room with staff wearing full PPE including N95 respirator.
4. Post ventilation handling of ventilator: Strip ventilator of all disposable parts and place waste in biohazard bag and discard in room. Send reusable components for processing. Clean the surfaces of unit with IPC approved disinfectant wipes

P. Code Blue/MET/Rapid Response Team call outside of ICU

1. In the event of a 'code blue' or Rapid Response Team call on a potential or confirmed EVD patient, responding staff MUST all apply the appropriate protective equipment before entering the patient's room.
2. Hospitals with rover carts will place PPE supplies on the crash carts. For sites with a decentralized crash cart model staff will carry PPE to the Code Blue or Rapid Response Team call.
3. The crash cart will be brought into the patient's room and used as required.
4. The cart must be appropriately decontaminated according to the equipment cleaning guidelines before it is removed from the room.
5. Regardless of isolation status, N95 respirators and full EVD PPE should be worn by all staff in the room for intubation/aerosol generating procedures on all patients.

Q. Transport of ICU Patients with possible or proven EVD

See Section F above for details.

1. Transport of EVD patients (either within or between hospitals) should be minimized.
2. Only take patient out of room if they are free of virus or for life saving investigations and avoid transport unless absolutely essential. Always weigh the risk/benefit of transport.
3. Transport of patient should be limited to essential diagnostic and therapeutic procedures that cannot be carried out in the patient's room
4. Maximize use of portable imaging, investigations and procedures.
5. Receiving area should be notified early so they can implement appropriate measures as directed by infection control.

R. Environmental Control

Room cleaning

1. All rooms occupied by suspect, probable or confirmed EVD patients will be cleaned using Environmental Services (ES) protocol Occupied Patient Cubicle (Isolation).
2. ES staff must wear PPE as per Modified Contact and Droplet precautions.
3. All horizontal and frequently touched surfaces should be cleaned at least twice daily and when soiled. Additional cleaning measures or frequency may be warranted in situations where excessive environmental soiling has occurred.
4. All discharge isolation rooms will be cleaned using ES Discharge – Transfer Isolation protocol <http://insite.albertahealthservices.ca/les/tms-les-discharge-transfer-isolation.pdf>

Linen handling

1. Handle soiled or used linens with minimal agitation and place directly in biohazard bags/containers.
2. Soiled linens will be disposed of as bio-hazardous waste.

Waste management

1. All waste and disposable supplies will be placed in Biohazard containers in the patient room – including patient linens.
2. Containers will be clearly labeled indicating Ebola waste.
3. Hard shell biohazard containers will be used for non-linen.
4. Linen will be placed in yellow biohazard bags.
5. The bio-hazardous waste containers will be cleaned with bleach solution and picked up daily by waste disposal from isolation area patient rooms.
6. Transfer of bio-hazardous wastes from patient room to waste disposal container transport will follow IP&C guidelines and WH&S guidelines for safe handling of bio-hazardous waste material.
7. PPE/Isolation staff monitor will monitor process.
8. Wastes will be disposed of by incineration.

Contain biomedical waste (e.g., sponges, dressings and surgical drapes soaked with blood or secretions) in biohazard bags/containers. Use solidifying powders or products such as the Hygie Disposal System™ to enable the safer disposal of blood, suctioned fluids, excretions

and secretions into biohazardous containers. All biomedical waste will be disposed of as biohazardous waste.

Dishes/cutlery

Use disposable dishes/cutlery to minimize the removal of contaminated items from the patient room and minimize the movement of support staff in and out of the patient room.

Patient belongings

Bag and seal patient belongings on admission. These items are to remain with patient. Disposition of items will be determined on a case-by-case basis in consultation with IPC.

Patient Care Equipment

Ensure that equipment is designated to the patient. Any equipment or objects being removed from the patient's room must be decontaminated before leaving the room.

Equipment that requires sterilization should be placed by the door. Consider the use of a Central Supply (CS) bin inside the room for readily available items and have CS porters retrieve them once a day. In the absence of CS porters, when you are ready to leave the room, put on clean gloves and transport the items directly to the grey bins. Remove gloves and perform hand hygiene.

Transfer or discharge of a patient

When an EVD patient is discharged or transferred, all disposable items in the room should be discarded. All re-usable items/equipment should be cleaned and disinfected in the room and then placed in clean storage area. All unused linen should be placed in a soiled hamper.

Care of deceased bodies

1. PPE must be maintained by all staff when handling and transporting the deceased.
2. Labelling of the body must comply with the Public Health Act Bodies of Deceased Persons Regulation, 2008.
3. Labels must be attached to the body and to the head end of the container and must read: "This body is infected with a communicable disease specified in schedule 1 to the Bodies of Deceased Person Regulation", and must be handled in accordance with that regulation.
4. Do not remove this label and do not open this hermetically sealed container.'
5. Refer to schedule 1 of the regulation:
http://www.qp.alberta.ca/1266.cfm?page=2008_135.cfm&leg_type=Regs&isbncIn=9780779734313
6. See <http://www.albertahealthservices.ca/assets/info/hp/diseases/if-hp-dis-ebola-deceased-body-acute-care-setting-algorithm.pdf>
7. <http://www.albertahealthservices.ca/assets/info/hp/diseases/if-hp-dis-ebola-body-handling-protocol.pdf>

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