

FILOVIRAL INFECTIONS

(Last updated 2/17/2019; Reviewers: John (Jack) C. O'Horo, MD, MPH, Siddhant Singh, MD)

PRESENTING COMPLAINT: Fever, chills, body ache

FINDINGS

- **A** Check airway
- **B** ↑/N RR, coughing
- **C** ↓/N BP, ↑/N HR, weak/N pulse
- **D** Variable altered (V,P,U,D)*
- **E** Fever+/-, pallor+/-, maculopapular rash with or without desquamation on face, neck, trunk and/or arms, mottling
- **L_{PC}** ↓Hb, ↓platelets and WBC, ABG (metabolic acidosis), ↑PT/↑PTT/↑INR, blood group, cross match
- **U_{PC}** Transabdominal ultrasound to rule out other causes of symptoms

***V** (verbal), **P** (pain), **U** (unconsciousness), **D** (delirious)

U_{PC} (point of care ultrasound) **L_{PC}** (point of care labs)

OTHER HISTORY

Predisposing Conditions: of travel to endemic areas, direct contact with the blood or body fluids of known cases of Ebola, participation in burial/funeral of a possibly infected person, healthcare workers and clinical laboratory workers, Direct contact with rodents, primates or bats

Signs and Symptoms: fever, myalgias/arthralgias, abdominal pain, diarrhea and vomiting, confusion, lethargy, prostration, anorexia and diarrhea, dark stools (GI bleed), wasting, signs of dehydration, shock

DIFFERENTIAL DIAGNOSIS

Other viral hemorrhagic fevers (e.g. Lassa, Crimean-Congo hemorrhagic fever), malaria, typhoid, shigella

OTHER INVESTIGATIONS

- **Non-specific labs:** Leukopenia, thrombocytopenia, elevated amylase and transaminases, coagulation abnormalities, renal abnormalities, decreased plasma protein
- **Specific or diagnostic labs:** indirect immunofluorescence assay (IFA), immunoblot, and enzyme-linked immunosorbent assays (ELISA) (direct IgG and IgM ELISA, and IgM capture assay)
- **Imaging:** abnormal chest X ray should raise concern for other infections, e.g. anthrax, plague or tularemia
- **Prerequisites for labs testing**
 - Filovirus testing can only be performed in biosafety level p4 settings; obtaining samples of blood and/or tissue to confirm diagnosis should be done in consultation with public health authorities who can facilitate testing.

- The World Health Organization Outbreak Surveillance network can be alerted to start testing if the area does not have an established relationship with CDC, Porton Down, the South African National Institute of Communicable Diseases or the Institute Pasteur.
(<http://www.who.int/csr/outbreaknetwork/en/>)
- Labs should NOT be routinely obtained in patients with suspected Ebola or Marburg because of risk of exposure to laboratory workers; protocols for running specific labs should be established in conjunction with local lab and health officials
- Labs present a hazard to laboratory worker and should NOT be performed if one suspects filoviral disease UNLESS performed by a laboratory which has been designed to handle the specimen, and appropriate training and warning has been provided to all laboratory workers.
- **Monitoring:**
 - Fluid shifts mandate close monitoring of fluid status; this can include blood pressure, weight, clinical exam
 - Electrocardiographic monitoring (high risk of arrhythmia)
 - If laboratory test can be obtained, aggressive monitoring and repletion of electrolytes (potassium, magnesium and calcium)

THERAPEUTIC INTERVENTIONS

- **Medications:**
 - **No specific medication treatments are available currently**
 - Experimental medications are in development and are outside of the scope of this guideline
 - However, a recent study found that with high quality supportive care including nutrition support, hydration, electrolyte support, and as needed renal replacement therapy and ventilator support was associated with a good outcome in 81.5% of patients.
 - Acetaminophen can be administered for antipyretic effect
 - Tramadol and opioids can be used for pain control
 - Antiemetics (promethazine and metoclopramide) have been used for symptomatic control of nausea
 - Cimetidine, ranitidine and omeprazole can help with stomach pain
- **Procedures:**
 - Invasive procedures, including central line placement and intubation may be a part of adequate supportive care
 - All procedures carry risk to the operator; the following guidance should be observed for ANY procedure to minimize risk: Only skilled/experienced staff should perform procedures
 - At least two people should be available during the procedure, one to perform the procedure, and one to control the patient

- It is reasonable to tranquilize a patient prior to a procedure to minimize risk of spread to operator. Doctors without borders (MSF) recommend either neuroleptic or benzodiazepine
- Hydration: Oral hydration with an oral rehydration solution can be given to patients who are not having severe diarrhea; however, most will require IV hydration
 - Avoid fluid overload; monitor clinical fluid status
 - Avoid synthetic colloids; adverse effects on clotting may increase mortality
- Standard management of septic shock and complications: DIC, ARDS, AKI

Consult: Infection, disease, infection control, public health

CAUTIONS

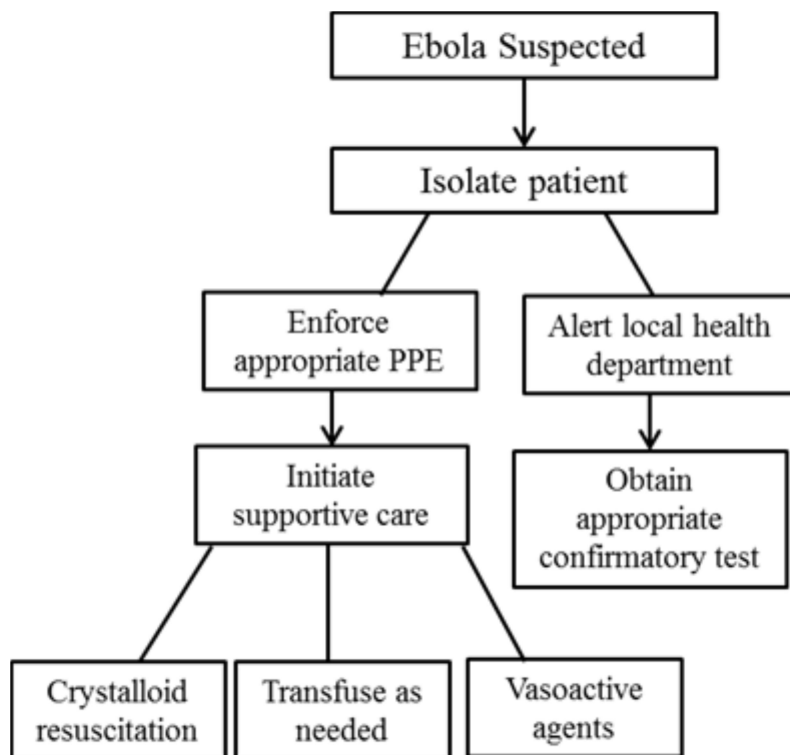
- **Complications:**
 - Avoid NSAIDS, synthetic colloids and any other medications which can decrease clotting or platelet aggregation
 - Pregnant women present particular hazard for fluid exposure, spread, and miscarriage
 - Healthcare worker exposure is a potential complication of treating patients with filovirus; to minimize transmission:
 - Invasive therapies should be avoided whenever a noninvasive alternative is available
 - People allowed into the room to see an EVD patient should be limited to the bare minimum (often just to a nurse or two and a physician). Virtual consultation is often best when subspecialty consultation is needed.
 - Patients should be put in isolation; precautions for isolation are evolving, an up-to-date summary can be found at the CDC website (<http://www.cdc.gov/vhf/ebola/hcp/infection-prevention-and-control-recommendations.html>)
 - At minimum, patients should be in a private room with a private bathroom. Ideally, there should be a separate, attached designated PPE doffing area
 - Use of personal protective equipment: standards for this are not uniform, and providers will have to choose, in conjunction with local infection control, which guidelines can be implemented in each setting. Training should NOT be “just in time “only. People who are taking care of EVD patients should be well-practiced in the proper donning and doffing of PPE.
 - CDC recommendations are evolving, and most recent guidance can be found at <http://www.cdc.gov/vhf/ebola/hcp/infection-prevention-and-control-recommendations.html>
 - MSF has slightly different recommendations designed for field hospitals; the applicability of these to fully equipped ICUs has not been established and is included below for reference/consideration for designing local policies.

- Low risk areas (anterooms/ areas outside of treatment units): Providers should wear scrub suits, gloves and rubber boots to avoid contamination of personal clothing
- High risk zones (direct patient contact): patients should wear waterproof gown, single use, or two pairs of gloves
 - Examination gloves (all staff, underneath): 2nd pair dependent on work to be done
 - Medical staff: Surgical gloves
 - Cleaning staff: Rubber gloves
 - Waste handling: Latex gloves
- High filtration masks, disposable
- Waterproof head cover, including coverage of the head, hair, ears, neck and any part of face not covered by mask and goggles
- Plastic or rubber apron for protection of front of body
- Goggles or face shields
- Medical equipment that is in close patient contact (e.g. thermometers) should be destroyed after use if possible. Disposable and dedicated equipment should be used whenever possible

ALGORITHM

DIRECTIONS FOR PUTTING ON PERSONAL PROTECTIVE EQUIPMENT:

<http://www.cdc.gov/HAI/pdfs/ppe/ppeposter1322.pdf>



REFERENCES & ACKNOWLEDGMENTS

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- Sterk, E; Filovirus Haemorrhagic Fever Guidelines Medicins Sans Fronteieres, 2008
- Infection Prevention and Control Recommendations for Hospitalized Patients with Known or Suspected Ebola Virus Disease in U.S. Hospitals Centers for Disease Control and Prevention, 2014,
<http://www.cdc.gov/vhf/ebola/hcp/infection-prevention-and-control-recommendations.html>
- Bray, M Diagnosis and Treatment of Ebola and Marburg Virus Disease UpToDate, Hirsh MS ed. 2014
- Uyeki TM et al. N Engl J Med 2016;374:636-646