Ebola Virus Disease:
Isolation & Medical Management

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Case Vignette — The Knock at Your Triage Door

A 38-year-old male visitor from Kinshasa, DRC presents to your emergency triage on Day 5 of illness.

Complaints:
High-grade fever (40.2°C), severe fatigue, diffuse myalgia, pounding headache, sore throat, and profuse vomiting for 4 days.

Exposure history:
Attended a community gathering **in Kinshasa 12 days ago**. Travel: Kinshasa → Dubai → Delhi (landed 6 days ago).

- **What is your FIRST action?**
- **What are the top differentials?**
- **No NPR; how do you isolate?**
- **How do you safely collect samples?**
- **How to TREAT the patient?**

The Concern !!!

Case Fatality Rate is 60%

“**proportion of deaths among those infected was lower (≈40%)**”
Bundibugyo virus outbreak 2007

Kawuki J, Musa TH, Yu X. Impact of recurrent outbreaks of Ebola virus disease in Africa: a meta-analysis of case fatality rates. Public Health. 2021 Jun;195:89-97.
MacNeil A, Farnon EC, Wamala J, et al. Proportion of deaths and clinical features in Bundibugyo Ebola virus infection, Uganda. Emerg Infect Dis. 2010 Dec;16(12):1969-72.

PREPARATION TO ACTION

Practical problems in PPE

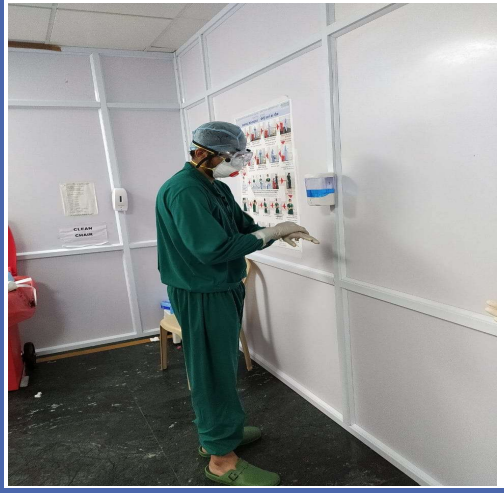
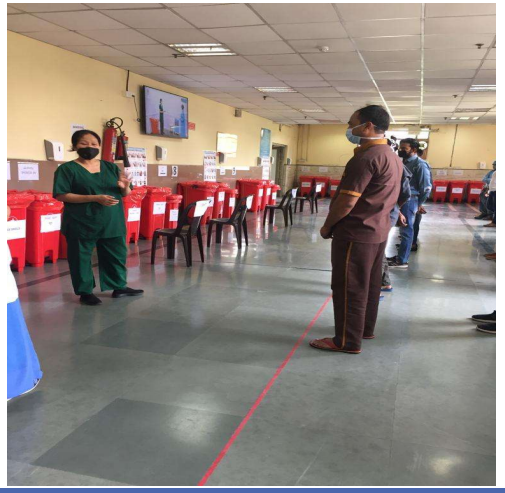
N95 fit-test gaps	Human-factor failures	System issues	Mitigation
• No prior fit test roster • Wrong sizes/brands available • Beard/facial hair seal failure • User seal check skipped	• Heat stress, fogging, dehydration • Communication difficulty • PPE fatigue → shortcuts • Anxiety during doffing	• No trained observer available • Doffing area too cramped • Waste bins overfilled • Specimen route unclear	• Fit-test/ Seal check • PPE drills • Buddy system • Short shifts

Practical rule: do not discover Seal Check failure during the first suspected Ebola admission

Donning & Doffing






Patient placement and isolation zoning

Design the room workflow before the patient arrives

Clean zone

- PPE storage
- Donning checklist
- Buddy/trained monitor

Patient room

- Single room
- Private bathroom
- Door closed
- Dedicated equipment

Doffing / waste zone

- Marked area near room
- No-touch waste
- Stepwise PPE removal
- Hand hygiene points

Maintain an entry/exit log and restrict entry to essential trained personnel.

Government of India
Ministry of Health and Family Welfare

Dated 22.05.2026

Isolation Facility Preparedness Checklist for Managing Suspect/Confirmed Ebola Disease

Date of Assessment: _____

Facility Name: _____

District/State: _____

Assessed by: _____

A. Isolation Facility Preparedness

Checklist Item	Status	Remarks
Single isolation room identified		
Private bathroom attached to isolation room		
Negative pressure ventilation can be maintained in isolation room		
Isolation room doors can remain closed		
Access restricted to essential personnel only		
Visitor policy defined and displayed		
Entry/exit logbook available		
Signage for restricted entry available		

Fever in an Africa Returnee — Malaria First, VHF Risk-Assessment in Parallel

Diagnosis	Priority	Key clues	Immediate test / action
Malaria (*P. falciparum*)	**HIGH / STAT**	Fever ± chills, headache/GI symptoms, splenomegaly; rapid deterioration possible	Thick + thin smear or RDT urgently; repeat smear if suspicion persists
Ebola / VHF (Ebola, Marburg, CCHF, Lassa)	**MUST RISK-ASSESS**	Active outbreak/endemic area + body-fluid, funeral, healthcare, sick-contact or animal/bat exposure; bleeding may be absent	Isolate if risk criteria met; PPE; notify public health; test via designated pathway
Enteric fever (Typhi/Paratyphi)	**MOD–HIGH**	Sustained/stepwise fever, headache, abdominal symptoms, relative bradycardia, hepatosplenomegaly	Blood cultures before antibiotics; blood culture and Widal
Dengue / severe dengue	**MOD–HIGH**	Myalgia, retro-orbital pain, rash, leukopenia, thrombocytopenia, warning signs/plasma leak	NS1/ IgM; monitor Hct, platelets
Leptospirosis	**MODERATE**	Freshwater/flood/animal urine exposure; conjunctival suffusion, calf pain, jaundice, AKI, ↑CK	IgM/paired serology; renal/liver profile
Rickettsial fever	**MODERATE**	Tick exposure, eschar, rash	Do not delay doxycycline if clinically suspected
Acute hepatitis / Yellow fever	**CONTEXT**	Jaundice dominant; YF depends on itinerary + vaccination status; ALF/coagulopathy possible	LFT/INR; hepatitis panel; YF PCR/IgM via public health if indicated
Meningococcaemia / bacterial sepsis	**URGENT**	Toxic appearance, petechial/purpuric rash, meningism, shock, rapid deterioration	Blood culture + empiric ceftriaxone immediately

Clinical rule: do not anchor on Ebola alone — rule out malaria urgently, but isolate early if VHF epidemiologic risk is present.

References: CDC Yellow Book—Post-Travel Evaluation of the Ill Traveler; CDC Ebola Clinical Guidance; CDC VHF Infection Control guidance.

Why Optimized Supportive Care matters (oSoC)

No Vaccines or Therapeutics

No FDA-licensed vaccines or targeted therapeutic monoclonal antibodies (such as Inmazeb or Ebanga) exist for the Bundibugyo species.

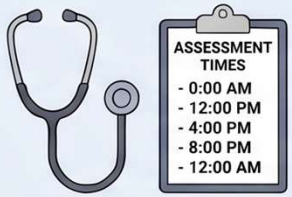
Optimized Supportive Care

Without standard antiviral solutions, clinical outcomes rely completely on optimized, intensive supportive therapy.

- Considerable variability exists in the level of supportive care offered between Ebola treatment units (ETUs) in the same outbreak as well as across outbreaks.
- **Treatable physiology** frequently determines survival.
- Need to have standardized protocols.

In Bundibugyo outbreaks, no species-specific mAb is available; oSoC is the entire treatment framework

OPTIMIZED SUPPORTIVE CARE BUNDLE

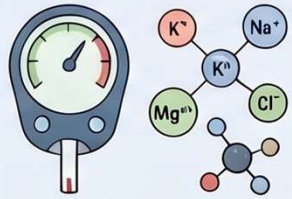


Assess repeatedly

At least three clinical assessments per 24 hours; hourly if high risk.

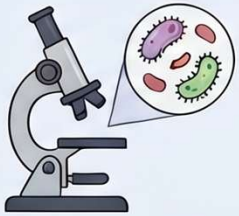
Resuscitate rationally

ORS if able; IV isotonic crystalloid for severe dehydration or shock.



Correct physiology

Glucose, potassium, magnesium, sodium, calcium and acid-base abnormalities.



Treat co-infections

Empiric malaria and bacterial co-infection protocols with reassessment.

Symptom Control & Prevent complications

Fever

Pain

Vomiting

Stress-Ulcer

Nutrition

Reference: WHO Optimized Supportive Care for Ebola Virus Disease SOP, 2019

Daily Monitoring and documentation

• **Vital signs set** Temperature, HR, BP, RR, SpO_2, GCS, point-of-care glucose and intake-output.

• **Examination focus** Volume status, pulse, perfusion, urine output, bleeding, oedema, jaundice, pain, nutrition .

• **Laboratory minimum** Daily hemogram, LFT, KFT, electrolytes; Acid-base status and coagulation as clinically indicated.

• **Operational rule** Record trends. Any clinical change triggers repeat observations and a treatment plan.

WHO Optimized Supportive Care for Ebola Virus Disease SOP, 2019

Daily assessment checklist

1. **Identify high-risk complications**
   Airway/respiratory distress, shock, severe dehydration, altered mentation/seizure, oliguria/anuria, bleeding, severe hypoglycaemia or severe electrolyte derangement.

2. **Classify fluid status**
   Can drink? Ongoing losses? Sepsis/shock signs? Decide oral fluids, maintenance IV, bolus or shock algorithm.

3. **Review labs and correct**
   Potassium/magnesium replacement, renal failure, glucose strategy, catheter need and ultrasound if available.

4. **Reassess active treatments**
   Antibiotics, malaria therapy, nutrition, IV/urinary catheter removal.

WHO Optimized Supportive Care for Ebola Virus Disease SOP, 2019

High-risk red flags

- **Perfusion** Low SBP, weak/rapid pulse, cold extremities, delayed capillary refill or altered mentation.
- **Respiratory** Tachypnoea or SpO_2 <92%; target >94% during shock/resuscitation.
- **Renal** Oliguria <0.5 ml/kg/h in adults or <1 ml/kg/h in children; anuria.
- **Metabolic** Glucose <54 mg/dl, severe electrolyte disturbance or acid-base abnormality.
- **GI/volume** Severe vomiting/diarrhoea, inability to eat/drink or severe weakness.
- **Bleeding/CNS** Haemorrhagic manifestations, seizure, delirium or encephalopathy.

WHO Optimized Supportive Care for Ebola Virus Disease SOP, 2019

Fluid physiology in EVD

- **Volume depletion** GI loss, vomiting, insensible loss or rarely bleeding; usually responds to volume repletion.
- **Sepsis** Dysregulated host response with organ dysfunction; requires fluids plus pathogen-specific therapy and antibiotics.
- **Septic shock** Hypotension refractory to fluids; requires vasopressors to maintain organ perfusion.

WHO Optimized Supportive Care for Ebola Virus Disease SOP, 2019

Fluid resuscitation algorithm

Bolus — reassess — escalate/ maintain

- **Shock or severe dehydration?** Adult: SBP <90/MAP <65 or hypoperfusion. Child: delayed CRT, cold extremities, weak rapid pulse.
- **Give isotonic crystalloid** Use Ringer's lactate or Normal saline. Avoid hypotonic fluids and dextrose boluses for resuscitation.
- **Reassess after each bolus** Perfusion, pulse, RR, mental status, urine output, CRT, SpO_2 and **fluid overload.**
- **If persistent shock** Repeat bolus if responsive; start vasopressor early if refractory or overload develops.
- **Typical bolus guidance** Adults: Each bolus 500- 1000 ml up to 30 ml/kg.

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Vasopressors in refractory shock

Do not delay perfusion support

- **When to start** Persistent shock despite adequate volume, no response to crystalloid, or overload preventing further bolus.
- **Adults** First line: noradrenaline. Target SBP >90–100 mm Hg or MAP >65 mm Hg.
- **Delivery safety** Large vein/ CVC, infusion pump, correct dilution, close haemodynamic and extravasation monitoring.
- **Titration** Start commonly at 0.1 mcg/kg/min; use lowest dose that restores perfusion markers.

The use of vasopressors should NOT be delayed while assessing response to fluid bolus as it is essential to maintain organ perfusion.

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Maintenance and replacement fluids

Daily fluid therapy

- **Formula** Total daily intake = maintenance fluid + replacement for ongoing losses.
- **Maintenance estimate** Adults usually 25–30 ml/kg/day.
- **Replacement estimate** Replace urine + stool + vomit + blood loss + insensible losses; adjust for fever.
- **Route principle** Prefer ORS/enteral fluids if tolerated; use IV when oral intake cannot match losses.
- **Safety point** Avoid D5W as maintenance in acute EVD; hypotonic free water may worsen hyponatraemia.

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Hypoglycaemia

Treat first, confirm when possible

- **Definition in EVD** Glucose <54 mg/dl.
- **Symptoms** Altered mentation, seizure, tremor, tachycardia and diaphoresis.
- **Adult symptomatic** D50 25 g IV; recheck in 15 min; repeat if needed and start continuous dextrose infusion.

For patients with evidence of hypoglycaemia WITHOUT altered mentation or seizure:
Patients should be encouraged to eat and drink to maintain glucose levels.

D5W should not be used to treat symptomatic hypoglycaemia

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Electrolyte management priorities

Correct carefully, monitor repeatedly

- **Hypokalaemia** Prefer oral potassium if tolerated. IV if severe hypokalemia or not tolerating orally.
- **Hyperkalaemia** Repeat if spurious; ECG if available. Calcium for ECG changes, insulin–dextrose, bicarbonate and elimination strategies.
- **Hyponatraemia** Often hypovolaemic in EVD. Avoid free water/hypotonic fluids; maximum correction 9 mmol/l per 24 h.
- **Hypernatraemia** Usually net water loss. Calculate deficit and correct slowly, not >9 mmol/l per day.
- **Calcium/Magnesium** Treat severe/symptomatic hypocalcaemia; magnesium helps refractory hypokalaemia.

WHO Optimized Supportive Care for Ebola Virus Disease SOP, 2019

Treatment of potential co-infections

Do not miss treatable co-pathology

- **Malaria** Empiric antimalarial therapy for all febrile suspect/confirmed EVD patients; stop once test negative or course complete.
- **Severe malaria** Treat with IV artesunate; transition to oral therapy once able.
- **Bacterial co-infection** Empiric antibiotics on admission; reassess after 48 hours and de-escalate/stop when appropriate.

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Nutrition and symptomatic care

Comfort supports physiology

- **Nutrition** Encourage oral nutrition daily.
- **Nausea/vomiting** Antiemetics (ondansetron) can enable oral fluids and feeding; monitor QT-prolonging combinations where ECG is available.
- **Pain/fever** Paracetamol first line. Opioids for severe pain with BP/RR monitoring. Avoid NSAIDs.
- **Anxiety/agitation** Counselling first; sedatives only if mentation and airway protection are adequate.
- **Diarrhoea** Manage conservatively. Anti-motility drugs are generally not recommended because of ileus risk.

WHO Optimized Supportive Care for Ebola Virus Disease SOP, 2019

Prevention of complications

Small omissions become major harms

1. **Early enteral nutrition**
   Start as soon as tolerated; avoid forced feeding in reduced consciousness due to aspiration risk.

2. **Early mobility**
   Daily mobility assessment; sit, stand and ambulate when improving; if immobile, turn every 2–4 hours.

3. **Device stewardship**
   Remove IV lines and urinary catheters when no longer needed to reduce secondary infection risk.

4. **Stress ulcer prophylaxis**
   Use PPI/H2 blocker in critically ill patients at high bleeding risk.

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Neurologic complications

Search for reversible causes

- **Seizure: first steps** Recovery position, oxygen, IV access if safe, and rapid glucose/electrolyte assessment.
- **Likely causes** Hypoglycaemia, sepsis, meningoencephalitis, intracranial haemorrhage, uraemia or hyponatraemia.
- **Altered mental status** Consider acidosis, uraemia, hepatic encephalopathy, viral encephalitis and medication effects.
- **Practical caution** Avoid centrally acting drugs unless needed for safety; use non-pharmacologic delirium care where possible.

WHO Optimized Supportive Care for Ebola Virus Disease SOP, 2019

Haemorrhage and coagulopathy

Less Common but high consequence

- **Stabilize first** Two large-bore IV cannulae; measure Hb, platelets and coagulation.
- **Transfusion targets** Consider transfusion for active bleeding with instability or Hb <7 g/dl; target Hb >7.
- **Adjuncts** GI bleed: high-dose PPI. Vitamin K and TXA may be considered **(Cautious, rule out DIC)**
- **Clinical nuance** Bleeding may coexist with endothelial injury, inflammation, coagulopathy and shock; **use haemostatic adjuncts selectively**.

WHO Optimized Supportive Care for Ebola Virus Disease SOP, 2019
World Health Organization. Clinical management of patients with viral haemorrhagic fever: a pocket guide for front-line health workers. Feb 2016

AKI, acidosis and respiratory failure

Navigating Critical Crises

- **Acute kidney injury** Recognize creatinine rise or low **urine output**. Maintain renal perfusion; avoid nephrotoxins.
- **Metabolic acidosis** Check blood gas; calculate **anion gap**; treat the cause.
- **Fluid choice** Switch away from chloride-heavy fluids if hyperchloraemic acidosis develops.
- **Hypoxic respiratory failure** Evaluate overload, pneumonia, haemothorax, bronchospasm, acidosis or shock; titrate oxygen to SpO_2 >94%.
- **Resource-limited reality** Preventing AKI and shock progression is often more effective than rescue therapies.

WHO Optimized Supportive Care for Ebola Virus Disease SOP, 2019

Take Home Messages

1. **Isolate on risk criteria, not confirmed diagnosis**
   Fever + Africa travel + exposure history = isolate immediately with full PPE; do not wait for laboratory confirmation

2. **Rule out malaria urgently — assess VHF in parallel, not sequentially**
   P. falciparum is the most common and immediately treatable cause; both diagnostic pathways must run simultaneously

3. **Prepare the system before the patient arrives**
   PPE fit-testing, isolation zoning, donning/doffing drills, and buddy system must be rehearsed protocols — not improvised at triage

4. **Optimized Supportive Care (oSoC) is the entire treatment framework**
   No species-specific mAbs exist for Bundibugyo EVD; protocolized fluid, electrolyte, vasopressor and co-infection management determines survival

5. **Treatable physiology drives survival — find it, fix it, daily**
   Hypoglycaemia, hypokalaemia, shock, malaria and bacterial co-infection are all reversible; systematic daily assessment closes the gap between ETU and ICU outcomes

EVD care isn’t just isolation and PPE

Optimized Supportive Care is what transforms outcomes and saves lives