Clinical Care in the ETU

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Objectives

At the end of this session, participants should be able to :

- Recognize the symptoms of EVD and the different phases of the disease
- Recognize and monitor the signs of severity
- Provide optimal and safe care to the patients
- Know the criteria for discharge

ETU Motto…

"We *protect ourselves* so we can *save lives*"

- The overriding principle in the ETU is to ensure patients' and health workers' safety

- The ETU is considered a highly contaminated area, so all activities there need to be handled withcare

Clinical Features

Early and late clinical features of Ebola infection

Early Clinical Features	Late Clinical Features
• Fatigue, weakness, malaise • Fever • Headache • Myalgia (muscle pain) • Arthralgia (joint pain) • Nausea and loss of appetite • Throat pain and difficulty swallowing • Abdominal pain (mainly epigastric) • Diarrhoea (watery or bloody) • Conjunctivitis	• Diarrhoea (watery or bloody) • Vomiting (watery or bloody) • Confusion and irritability • Shock (septic or hypovolemic) • Internal and/or external bleeding -oozing from puncture sites -bleeding from the gums • Skin rash • Seizures • Chest pain • Miscarriage in pregnant women • Respiratory distress (less commonly seen in this outbreak) • Hiccups

Recognize other conditions which mimic Ebola VHF

- Initial clinical manifestations are non-specific and mimic many common infections—**making early diagnosis difficult!**
- **Differential Diagnosis** should include malaria, typhoid fever, shigellosis, cholera, leptospirosis, dengue hemorrhagic fever, rickettsioses, relapsing fever, meningitis, hepatitides and other VHF
- **Hemorrhage is seen in less than 30% of patients with Ebola** so it is important to know other signs and symptoms of EVD so that cases are not missed

Case Scenario

- SK, 19 years, male
- Kikandwa, Kassanda
- Presenting complains
  - Fever
  - Headache
  - H/o contact with confirmed case.
- Date admitted- 20/10/22.
- mRDT – positive
- Treated with artesunate, ceftriaxone, metro, ORS, Paracetamol.
- Case confirmed on 22/10/2022.

23/10/22 - Developed diarrhea and vomiting

24-10/22 – Symptoms persisted; Continued Rx

26/10/2022 – Patient found in respiratory distress.

27/10/22- Patient confused, restless, wandering around ETU

30/ 10/22- Agitated, critically ill, abdominal tenderness, Bleeding from cannula site. Given IV RL, IV tranexamic acid.

Phases of Ebola VHF (1)

Early phase

- Day 1 – 2:
  - Mild fever, decreased appetite, headache
  - Usually can drink and eat; ambulating

- Day 3 – 4:
  - Fever, headache
  - Decreased appetite; nausea; onset of diarrhea (2-3 bowel motions/day); epigastric pain; hiccups
  - Still ambulating but onset of severe lethargy, lassitude

Phases of Ebola VHF (2)

Gastrointestinal phase

- Day 4 – 9:
  - Fever, headache, myalgias, arthralgias
  - Diarrhea/ vomiting (up to 10L/day); may be bloody
  - Pulses weak/fast
  - Decreasing urine output
  - Little to no ambulation
  - Delirium; “wide-eyed stare”; seizures
- **Mortality high during this phase due to hypovolemic shock**

Phases of Ebola VHF (3)

Terminal/recovery phase

- Day 10 – 12:
  - Fever and GI symptoms subside
  - Confusion and delirium worsen → comatose
  - Renal failure (may be oliguric / anuric)
  - Death (may be gradual/sudden)

*** Not all patients go through organ failure before recovery

Metabolic & electrolyte abnormalities in EVD

- Renal dysfunction due to shock and hypo perfusion
  - ↑ creatinine and blood urea nitrogen (Very common)
- Metabolic acidosis (↓ HCO3-)
  - Lactic acid build up due to insufficient oxygen in the tissues
  - Loss of bicarbonate due to diarrhea (Very common)
- ↓ ↑ Na+ : due to fluid and sodium losses and fluid shifts from diarrhea and vomiting (Not common)
- ↓ K+ : due to potassium loss in diarrhea
  - with severe renal dysfunction, hyperkalemia will generally occur (more common)
- ↓ glucose: due to lack of food intake, malaria co-infection etc
  - hypoglycemia should be considered in patients with altered mental status (very common)

These are life-threatening, can cause sudden death if untreated

Patient scenario

Vitals	22-Oct	23-Oct	24-Oct	25-Oct	26-Oct	27-Oct	28-Oct	30-Oct
Temp	37.8	37.8	40.3	40	40.4	40.1	36.4	36.4
BP	123/69	110/57	121/67	121/51		94/60	104/80	118/82
Pulse	130	75	52	89		110	105	72
SPO2	100	98	97	98	93	93	96	100
RR	24						Delirious	40

Chemistries				
NR	Parameter	23-Oct	25-Oct	30-Oct
135-146	Na	129	132	135
3.4-4.8	K	4.8	4.6	5.7
5.0-32	Bil	29	27	7
4.0-14	BUN	13	12	76
44-80	Creat	97	109	1013
3.2-6.7	Gluc	6.1	4.8	2.4
11.0-29	AST	32	155	1699
5.0-40	ALT	24	38	

Factors associated with higher risk of mortality (cont.)

- **Age:** the very young children and old (>40 years) are less likely to survive
- **Viral load:** the higher the viral load, the lower the chances of survival
- **Organ failure:** e.g., acute kidney injury
- **Time of presentation at the facility:** the earlier the patients access treatment, the better the outcome
- **Pregnancy**
- **Co-morbid conditions:** e.g., diabetes, immune suppression

Age and Outcome Distribution of Confirmed cases, n = 141

Mortality is spread across all age groups

Age	Total	Alive n (%)	Dead n (%)
0-9	22	6 (27)	16 (73)
10-19	18	10 (56)	8 (44)
20-29	44	29 (66)	15 (34)
30-39	42	26 (62)	16 (38)
40-49	22	9 (41)	13 (59)
50+	13	5 (38)	8 (62)

Immediate Issues identified

- High viral load, liver renal failure
- Acidosis, death within 24 hours of diagnosis
- Hemorrhagic manifestations at presentation
- Malaria co-morbidity

Early presentation is associated with good patient outcomes

Time from Onset to treatment				
Category	0 – 2 Days	3 – 5 Days	6 – 9 Days	10+ Days
Dead	6	20	17	11
Total	26	52	33	20
CFR	**23%**	**38%**	**52%**	**55%**

Active cases; 5%(7/141)
Deaths; 39% (55/141)
Recoveries; 56% (79/141)

Treatment

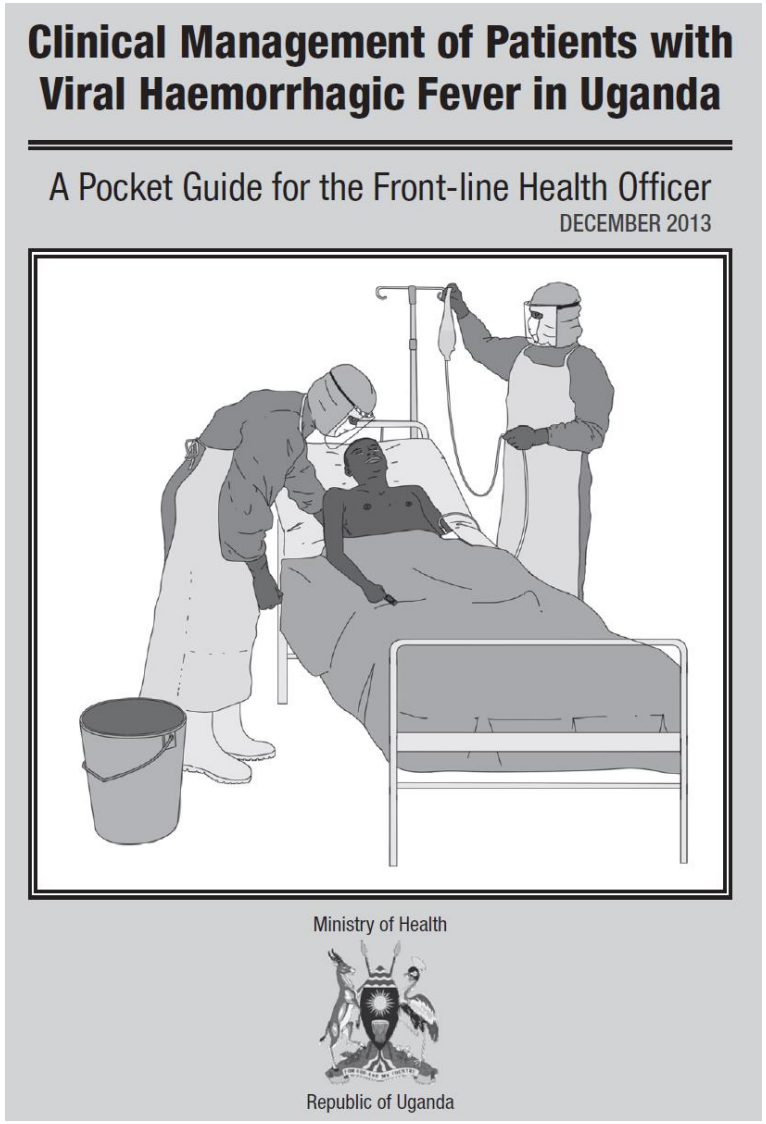
Preparing the ETU

Morning rounds

It is important to develop your care delivery plan before starting rounds inside the ward to maximize efficiency in a challenging environment

Clinical management of Ebola:

Supportive, but aggressive



GI fluid loss from diarrhea and vomiting:
- administer fluids aggressively to keep up with losses

Electrolyte abnormalities (from GI fluid losses and renal injury):
- •Monitoring – Point of Care monitoring devices (e.g., I-STAT©)
- •Oral or IV replacement
- •K+, glucose, HCO3-
- •May be proximate cause of death (arrhythmia, cardiac arrest, seizure)

Septic shock physiology:
- •Aggressive fluids (but monitor for vascular leak/pulmonary edema)

Symptomatic management of nausea, vomiting, diarrhoea, seizures, myalgia & abdominal pain

Prophylactic antibiotic use for possible gut translocation of bacteria and sepsis

Managing common signs/symptoms in the ETU

Symptom	Treatment
Fever	paracetamol (oral, per rectum, intravenous)
Pain	paracetamol; tramadol; morphine
Nausea/vomiting	metoclopramide; promethazine; ondansetron
Dyspepsia	metoclopramide; omeprazole
Hiccoughs	chlorpromazine; haloperidol
Anxiety/confusion	reassurance; haloperidol; diazepam (preferred for children)
Seizures	diazepam; phenobarbitol

Fluid resuscitation (Adults)

- All patients should be given ORS and encouraged to drink it
- **ORS is dependent on self-administration.** Assess if patient can continue to take ORS:
  - Is the patient nauseated or vomiting?
  - Is patient too weak to lift the container?
  - How much ORS remains in the container since the last time you assessed the patient?
  - Can the patient get out of bed and ambulate?
  - Does the patient have signs of shock and dehydration?
  - Is the patient a moderately unwell child without a caregiver?

If patient unable to take ORS, has shock, or signs of moderate or severe dehydration:

- Place IV cannula (≥ 18G) in largest available peripheral vein (consider intra-osseous option if expertise is available)
- IV fluid of choice is **Ringer's Lactate**
- Give 1-1.5 liter IV bolus over 30 min or faster
- Reassess (for ongoing dehydration, fluid overload) after the bolus is finished
- If signs of shock persist, repeat crystalloid bolus

Fluid resuscitation (children)

- No clear recommendations for pediatric resuscitation
  - WHO Plan A, B, C recommendations for fluid management of diarrhea in children may not be directly applicable
  - Further recommendations pending

- Give IV fluids more cautiously than in adults
  - Low threshold for starting IV fluids but provide in small volumes (<500 cc) over 30-60 minutes
  - Provide frequent monitoring

Treating metabolic abnormalities

- Metabolic lactic acidosis
  - Generally improves with volume resuscitation
- Metabolic acidosis due to diarrhea and bicarbonate loss
  - Appropriate to give NaHCO3 1-2 ampules (1 ampule = 50 mEq NaHCO3)
- Hyponatremia
  - Improves with treatment of dehydration (Ringer's lactate has lower [Na+] than normal saline)
- Hypokalemia
  - Oral KCL (if possible) or IV KCL (30-40 mEq/L/hour)
  - Every 1 mmol/L drop in serum K+ requires ~80-100 mEq K+
  - Assisted by repletion of Mg+ deficiency (e.g. MgSO4 2-4 g IV over 1 hour)

Consideration of co-infections during the management of EVD

- Co-infections in EVD should be considered and aggressively managed if present
- Consider use of broad spectrum antibiotics for:
  - Commonly available broad-spectrum antibiotics
    - 1st line: ceftriaxone
    - 2nd line: ciprofloxacin (if taking oral, can give by mouth)
  - Consider IV metronidazole if patient has GI symptoms (e.g., to empirically treat amoebiasis)

Consideration of co-infections during the management of EVD, cont.

- If malaria:
  - **Option 1:** Test everybody for malaria (RDT) if you can and treat if applicable
  - **Option 2:** If not, then treat for malaria according to the Ugandan treatment guidelines:
    - Uncomplicated malaria – oral Coartem
    - Complicated/Severe malaria – injectable Artesunate
- If HIV, TB:
  - Follow existing national guidelines
  - Be on the look for drug interactions (e.g. ARVs)

Therapeutics

Compassionate approval for monoclonal antibodies (MBP134) and remdesivir

Products acquired through donations from respective manufacturers

Successful shipments of remdesivir and MBP134, including maintenance of cold chain for products.

Trained ETU personnel on storage, preparation, and administration of RDV and MBP134

Special considerations

Pregnant patients

- **Pregnancy poses special challenges in EVD**
- **On initial contact, ask about reproductive age and date of last menstrual period:**
  - Where necessary, perform a pregnancy test
  - Document and communicate results to other health care providers
  - Privacy should be provided
- **Pregnant patients with Ebola are at increased risk of complications:**
  - Postpartum hemorrhage (PPH)
  - Fetal death/stillbirth
  - Spontaneous abortion
- **Minimize health worker exposure to blood and other body fluids:**
  - Plan and organize an extra person, before performing procedures
  - For PPE, wear apron and consider extra gloves
  - Blood transfusion, if available, may be necessary

Monitoring the severely ill patient

- Regular monitoring of vital signs (temp, HR, RR, BP, O2 sats) and other clinical signs and symptoms
- Use Quick Check or other severity indicators for triage
- Record results of input and output at patient bedside
  - Output may need to be mixed vomit, diarrhea and urine in bedside bucket
- Priority lab tests (for those moderate and severe):
  - Electrolytes especially **potassium, sodium, glucose**
  - Renal function: creatinine
  - Haemoglobin / Haematocrit
- Consistent use of patient monitoring forms
- Update “white board” outside ward after every shift to help with information transfer

Patient nutrition

- Ebola VHF may lead to vomiting, diarrhoea, reduction in appetite
- High protein diets should be provided regularly, preferably in semi-solid form if possible
- Ensure patients take plenty of oral fluids (preferably ORS)
- Parenteral feeds may be necessary and used for some cases
- If patients are too weak to feed themselves (e.g., young children, elderly, and severely frail patients):
  - Non-routine rounds dedicated to feeding patients may be necessary
  - Some recovering patients may be encouraged to help feed other patients

Psychological and Palliative care

- Provide holistic care (medical, psychosocial, spiritual, etc.)
- Important to counsel and educate both patient and family:
  - Special needs for mothers (especially when asked to stop breastfeeding, baby is sick or dies)
  - Recovering patients and their family members:
    - Potential long-term sequelae of disease (e.g., paresthesia, blindness)
    - Acceptance of survival and survivors
    - Support child and mother when breastfeeding stops
    - Abstinence or protected sex for at least 5 months
    - Destruction and disinfection of selected belongings
  - In case of death, involve family members in burial arrangements

Psychological support for health workers

- All members on clinical team should contribute
- Use buddy system as a way to:
  - Ensure adherence to standard IPC protocol (in an out of ETU)
  - Monitor each other for fatigue and changes in mood or behavior (in and out of the ETU)
  - Communicate onset of new signs or symptoms
- Ideal to have dedicated psychologist or psychosocial support nurse on staff

White board—Patient information to pass from shift to shift

Date of Admission (DD/MM)	**Bed #**	**Name -Age -Sex - Pregnant?**	**Vital Signs**	**G.I**	**Fluid Therapy**	**Other Meds**	**Lab Results & Date:**	**Comments & Complications**	**Disposition**
		Name: Age: Sex: Pregnant: [] Y [] N	Fever (> 38C): [] Y [] N HR: [] weak [] strong AVPU score:	Vomiting? [] Y [] N Diarrhea? [] Y [] N Bleeding? [] Y [] N L (OUT) / shift: _____	Oral Fluid? [] Y [] N IV Fluid? [] Y [] N IV placed? [] Y [] N IV needs replacement? [] Y [] N L (IN) / shift: _____	1. 2. 3. 4. 5. 6. 7. 8.	Ebola PCR: [] Pos [] Neg Date (DD/MM): _____ Malaria RDT: [] Pos [] Neg Date (DD/MM): _____ Other results:		Date of last symptom: Date last PCR: Counseling: Yes / No Package: Yes / No

Discharge and Survivors

Discharging EVD patients from the ETU

Discharge criteria:

- ≥ 3 days without fever or any significant symptoms (e.g., diarrhea, vomiting, bleeding)

AND

- Significant improvement in clinical condition

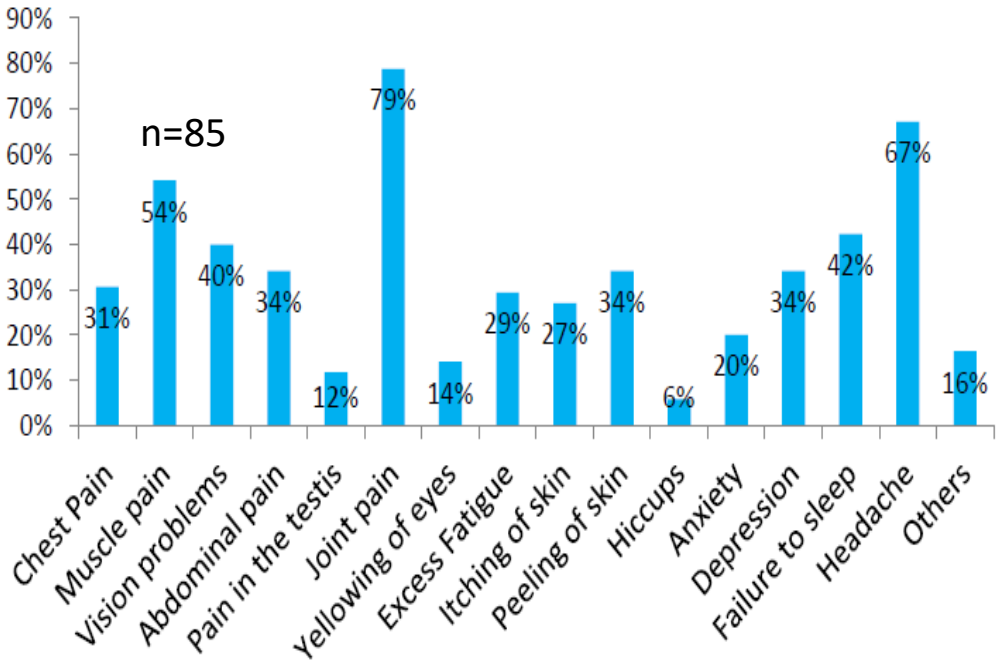
AND

- Able to perform Activities of Daily Living

AND

- Two negative blood PCR starting on the 3rd day of being asymptomatic.
  - If PCR positive, repeat in 48 hours (PCR can sometimes take several days to become undetectable despite resolution of symptoms)

Symptoms commonly reported in EVD survivors



- Even after discharge, persistent symptoms may include:
  - Joint and muscle pains
  - Headache
  - Vision problems
  - Mental health issues (depression, insomnia, etc.)
- Make long-term follow up available
- Link patients to social support and psychological counseling, if necessary
- Develop a survivor registry

WHO preliminary data

Summary

- Early identification of EVD cases is key in Ebola management
- Robust supportive treatment enhances survival
- There are many aspects of management including such as fluid resuscitation, symptomatic treatment, nutritional support, and psycho-social support
- The overriding principle in the ETU is to ensure patients' and health workers' safety

"We protect ourselves so we can save lives"

Clinical team briefing