Ebola Virus Disease

Sensitization of Health Workers

Disease Surveillance and Response Unit
Ministry of Health
Kenya

World Health Organization
Objectives and Expected Outcomes of HWs Sensitization on Ebola Virus Disease
**Objective**

**General Objective**
- To build capacity for country preparedness to potential Ebola Virus Disease (EVD) outbreak

**Specific Objectives**
- To update participants on the ongoing EVD outbreak
- To orient participants on the available knowledge, policies, guidelines, strategies and tools for prevention and control of EVD
Expected Outcomes

At the end of the training participants,
- Will be updated on the ongoing EVD outbreak
- Will appreciate the risk that the country faces
- Be knowledgeable about EVD
- Will be familiar with the current policies, guidelines, strategies and tools for EVD prevention and control
- Will be able to detect and appropriately manage/respond to Ebola cases (suspect or confirmed)
- Will be able to identify and resolve gaps in their respective areas
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Update of Current Ebola and Marbug Outbreaks
Outline of the presentation

- Current outbreak
- Actions taken on response
- Lessons
- Priority activities for Kenya
Started in Guinea

First case reported to WHO on 21 March 2014

Evidence indicates outbreak started from Dec 2013

Cross-border Spread into Sierra Leone, Liberia, Nigeria and Senegal

This is the first time Ebola outbreaks in these countries

This outbreak has the highest number of cases and deaths and widest geographical spread ever known for an Ebola outbreak

Total of 9936 cases and 4,877 deaths reported from the 7 affected countries by 22nd October 2014
### Current updates (15 October 2014)

<table>
<thead>
<tr>
<th>Country</th>
<th>Cases</th>
<th>Deaths</th>
<th>% New cases in 21 days/Total</th>
<th>CFR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guinea</td>
<td>1,519</td>
<td>862</td>
<td>289 (24%)</td>
<td>57%</td>
</tr>
<tr>
<td>Liberia</td>
<td>4,262</td>
<td>2,484</td>
<td>1,089 (26%)</td>
<td>56%</td>
</tr>
<tr>
<td>Sierra Leone</td>
<td>3,410</td>
<td>1,200</td>
<td>1,330 (36%)</td>
<td>31%</td>
</tr>
<tr>
<td>Totals</td>
<td>9,191</td>
<td>4,546</td>
<td>2,816 (31%)</td>
<td>48.5%</td>
</tr>
<tr>
<td>DRC (separate outbreak)</td>
<td>71</td>
<td>43</td>
<td></td>
<td>60%</td>
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</table>
EVD cases and deaths in Nigeria, Senegal, and the USA, 15 October

<table>
<thead>
<tr>
<th>Country</th>
<th>Cases</th>
<th>Deaths</th>
<th>CFR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nigeria</td>
<td>20</td>
<td>8</td>
<td>40%</td>
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<tr>
<td>Senegal</td>
<td>1</td>
<td>0</td>
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</tr>
<tr>
<td>Spain</td>
<td>1</td>
<td>0</td>
<td>0</td>
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<tr>
<td>USA</td>
<td>3</td>
<td>1</td>
<td>33%</td>
</tr>
<tr>
<td>Totals</td>
<td>25</td>
<td>9</td>
<td>36%</td>
</tr>
<tr>
<td>Country</td>
<td>Cases</td>
<td>Deaths</td>
<td>CFR</td>
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<tr>
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<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>Guinea</td>
<td>76</td>
<td>40</td>
<td>52%</td>
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<tr>
<td>Liberia</td>
<td>209</td>
<td>96</td>
<td>45%</td>
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<tr>
<td>Nigeria</td>
<td>11</td>
<td>5</td>
<td>45%</td>
</tr>
<tr>
<td>Sierra Leone</td>
<td>129</td>
<td>95</td>
<td>73%</td>
</tr>
<tr>
<td>Spain</td>
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<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>USA</td>
<td>1</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>427</td>
<td>236</td>
<td>55%</td>
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The 7th reported outbreak of Ebola virus disease (EVD) in DRC began on 26 Jul 2014 as another large EVD epidemic continued to spread in West Africa. The 2 outbreaks were not linked even though same Ebola virus strain. As at 5 Oct 2014, there have been 71 cases and 43 deaths. HWs: 8 HCWs affected and all died. 816 contacts have now completed 21-day follow-up. 305 contacts still currently being monitored.
Epidemic trend

- Epidemic in Guinea, Liberia and Sierra Leone is still ongoing and has not stabilized
- Senegal and Nigeria outbreak contained, waiting for 42 days countdown
- WHO estimates epidemic may last about six months
- Unaffected countries need to implement Ebola preparedness and early response plans according to WHO roadmap
Challenges facing the outbreak control

- It is a complex outbreak involving multiple countries
- Different types of setups involved: urban and rural
- Transmission is intense, with hidden transmission
- Community resistance, traditional and cultural beliefs and practices acting as drivers of the outbreak
- Health systems challenges
- High number of deaths among health workers
  - By 15 October 427 infected and 236 died
- Limited Ebola treatment centers which are fully operational
- Limited number of HWs
- Considerable gaps in resources needed to fund response activities in affected countries
Launched by WHO on 28th August 2014

Objective 3
To strengthen preparedness of all countries to rapidly detect and respond to an Ebola exposure, especially those sharing land borders with areas of active transmission and those with international transportation hubs

Kenya falls under this objective 3
In all unaffected countries
Screen at Points of Entry (POEs) and manage suspect cases
Provide advice to travelers to Ebola-affected areas
Identify an isolation unit where any suspect Ebola case could be properly investigated and managed
Verify access to diagnostic capacity in a WHO-recognized laboratory
Establish a strategy for identifying and monitoring the contacts of any suspect Ebola case
Where appropriate, ensure that preparedness activities include contingency planning for health centres, schools and other vital infrastructure and services
Need for coordinated response
Response measures

- Activated of National Task Force
- Prepared contingency plan
- Started screening at POEs with 100% screening at JKIA started on 14th October 2014
- High level advocacy and resource mobilization done
- Engagement of regional member states
- Convening of Emergency Ministerial meeting for EAC and IGAD in NBI (16-17 Sep)
- Procuring commodities needed
- Established isolation sites
- Prepared guides, protocols and other IEC material
- Training/sensitizing HWs
- Started communication with public through mass media
Lessons learned

1. Weaknesses of surveillance systems: first outbreak detected three months after the putative index case

2. Weaknesses of health systems unable to cope with the EVD outbreak

3. Poor adherence to IPC measures leading to a high number of health care workers affected

4. Limited human resources at country and regional level impacting on other priority health programs

5. Government ownership of the response and leadership key
Let no one think this outbreak is far away from you.

It has demonstrated that it can spread.

Hence need for knowledge and right attitude and practice to protect self and others.
Overview of Ebola Virus Disease
Presentation Outline

- Etiology and history of EVD
- Mode of transmission of EVD
- Clinical presentation
- Diagnosis of EVD
- Treatment and Prevention of EVD
Ebola virus disease (EVD), formerly known as Ebola haemorrhagic fever, is a severe acute viral illness.

- A disease of humans and non-human primates (Zoonosis)
- It is often fatal with up to 90% fatality
- Outbreaks have appeared sporadically since initial recognition in 1976 in DRC.
Ebola Virus- Taxonomy

- The Ebola virus belongs to the
  - Genus: Ebolavirus
  - Family: Filoviridae (Filovirus).
  - Order: Mononegavirales

- Ebola Virus comprises 5 distinct species:
  - Bundibugyo ebolavirus
  - Zaire ebolavirus
  - Reston ebolavirus
  - Sudan ebolavirus
  - Ivory Coast ebolavirus
Ebola virus

- Natural history/reservoirs unclear
- Endemic to Africa

Image courtesy of the Centers for Disease Control
Ebola first appeared in 1976 in 2 simultaneous outbreaks

1. Nzara, Sudan
2. Yambuku, Democratic Republic of Congo
Previous EVD Outbreaks and Impact

Heavy Toll
The impact of the latest outbreak of the Ebola virus compared to earlier outbreaks

<table>
<thead>
<tr>
<th>Significant outbreaks of the virus</th>
<th>Deaths</th>
<th>Cases*</th>
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</thead>
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<tr>
<td>1976 Dem. Rep. of the Congo</td>
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<td>Sudan</td>
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<td>1979 Sudan</td>
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<td>1994 Gabon</td>
<td>0</td>
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<td>1995 Dem. Rep. of the Congo</td>
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<td>1996 Gabon</td>
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<td>2000 Uganda</td>
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<td>0</td>
</tr>
<tr>
<td>2001-02 Gabon Republic of Congo</td>
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<td>2003 Republic of Congo</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Republic of Congo</td>
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</tr>
<tr>
<td>2004 Sudan</td>
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</tr>
<tr>
<td>2005 Republic of Congo</td>
<td>0</td>
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<td>2007 Dem. Rep. of the Congo</td>
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<td>0</td>
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<tr>
<td>Uganda</td>
<td>0</td>
<td>0</td>
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<tr>
<td>2008 Dem. Rep. of the Congo</td>
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<td>0</td>
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<tr>
<td>2012 Uganda</td>
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<tr>
<td>2014 Nigeria</td>
<td>1</td>
<td>0</td>
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<tr>
<td>Liberia</td>
<td>156</td>
<td>329</td>
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<tr>
<td>Guinea</td>
<td>233</td>
<td>460</td>
</tr>
<tr>
<td>Sierra Leone</td>
<td>339</td>
<td>533</td>
</tr>
</tbody>
</table>

*Confirmed, probable and suspected
Source: World Health Organization

The Wall Street Journal
Natural hosts and Mode of transmission of Ebola Virus

- EVD is believed to be a zoonotic
- Certain species of fruit bats are considered possible natural hosts for Ebola virus
- Not clear how an ebola outbreak is initially started but it is believed to occur when humans come in contact with infected animal’s body fluids or flesh
Infection of index case(s) from bush animals

Animal found dead in forest or hunted

Chimpanzees, gorillas, monkeys, antelopes, fruit bats, porcupines

Thence transmission from person to person
1. Virus reservoir: Fruit bats

The virus maintains itself in fruit bats. The bats spread the virus during migration.

2. Epizootic in primates

Infected fruit bats enter in direct or indirect contact with other animals and pass on the infection, sometimes causing large-scale epidemics in gorillas, chimpanzees and other monkeys or mammals (e.g. forest antelopes).

3. Primary human infection

Humans are infected either through direct contact with infected bats (rare event), or through handling infected dead or sick animals found in the forest (more frequent).

4. Secondary transmission

Secondary human-to-human transmission occurs through direct contact with the blood, secretions, organs or other body fluids of infected persons. High transmission risk when providing direct patient care or handling dead bodies (funerals).
Human to human transmission

- Directly through:
  - Contact with blood or body fluids of infected persons
  - Contact with bodies of Ebola victims during embalming or unsafe burials

- Indirectly through:
  - Contact with unsterilized medical instruments
  - Sharing of contaminated piercing instruments

- Male survivors can transmit the virus for close to 2-3 months through semen after recovery

- Amplification: Where transmission is amplified
  - Hospital: health care workers, in-patients, unsafe injections
  - Community: household contacts when caring for ill, funeral
Ebola transmission risk from body fluids

- Infected people are not contagious until symptomatic.
- Viral load and infectiousness of body fluids increases as patient become more ill.
  - Women at more risk as they often care for sick.
  - Dead body highly infectious → many people infected by traditional burial practices.
- Important to educate survivors about transmission risk from other compartments:
  - Can persist in the semen up to 3 months after clinical recovery.
  - Persists in breast milk in convalescent patients.
- Take precautions with contaminated items including bed sheets and used needles.
Ebola Pathogenesis

- Enters bloodstream through skin, membranes, open wounds
- Viral RNA
  - Released into cytoplasm
  - Production of new viral proteins/ genetic material
- Capable of rapid mutation
- Very adaptable to evade host defenses and environmental change/challenges
Early signs and symptoms

- Incubation period 2 to 21 days
- Initial clinical manifestations are non-specific and mimic many common infections—makes early diagnosis difficult!
- Fever, chills
- Headache
- Joint pain, muscle pain, backache
- Nausea, vomiting
- Diarrhea
- Fatigue/weakness
- Sore throat, cough
Late Symptoms

- **Bleeding:**
  - From eyes, ears, nose, mouth, anus
  - Seen in less than half of patients with Ebola
- **Eye inflammation** (conjunctivitis)
- **Depression**
- **Increased feeling of pain in skin**
- **Rash over whole body that often contains blood**
- **Roof of mouth looks red**
- **Seizures, coma, delirium**
- **Patients usually die from shock rather than from blood loss**
Clinical presentations of EVD patients in advanced stages
Immune Response to infection

Antigen & Antibodies response among patients with Ebo

Level of detection

days after symptom onset

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36

antigens
AC - IgM
AC - IgG

Disease Surveillance and Outbreak Response Unit
Early diagnosis very difficult as signs & symptoms similar to other infections

Laboratory Test
- PCR detection
- ELISA (enzyme-linked immuno-absorbent) assay

Tests done in biosafety level 3 or 4 labs
- KEMRI or CDC

Not possible or viable or necessary to have multiple testing centers in the country for now
Treatment

- No curative treatment available

- Only supportive therapy
  - Treating complicating infections
  - Addressing fluids and electrolyte imbalances
  - Maintaining oxygen status
  - Maintaining blood pressure and circulation
  - Maintaining nutrition needs
  - Management of pain
  - Treating fever
Who is at risk of infection?

- Travelers to affected countries/localities
- Contacts of such travelers
- Family members of EVD cases
- Health workers (HWs) taking care of patients with Ebola
- People handling bodies of Ebola victims
- People handling bush animals
Ebola prevention and control in health settings

- Early identification and prompt referral and isolation of suspect cases
- Basic universal precautions of hand hygiene and gloving in health set-ups during routine work
- Wear full personal protective equipment when handling cases (suspect or confirmed)
- Avoid contact with body fluids of suspect cases
- Handle well specimen taken from Ebola
- Handle appropriately and immediately bury bodies of Ebola victims
- No vaccines yet
Ebola prevention and control in the community

- Avoid bush meat to reduce wild life to human transmission
- Early identification and prompt release of patients to HFs
- Avoid unnecessary contact with human beings during outbreaks
- Avoid home care of patients who have any illness
- Surrender bodies of Ebola victims to trained HWs for appropriate handling and immediately burial
- Avoid risky cultural practices e.g. care for sick, dead and funeral practices
Other prevention and control considerations include:

- Early diagnosis and reporting of suspect cases
- Early referral for treatment and laboratory testing
- Increased awareness in the community
- Awareness and high index of suspicion among HWs
- Contact identification, tracing and follow and effective epidemiological surveillance
Intervention Strategies

- Support cases in care unit / isolation
  - Reduce the transmission
  - Control of the epidemic
  - Reduce mortality / suffering of patients

- Monitoring / tracking and tracing contacts
  - Identification of transmission chains and follow up of possible new cases

- Public awareness campaign
Ebola Kampungu – health promotion

Ebola - patient house decontamination
Principles of Surveillance During an Ebola Outbreak
Introduction to EVD surveillance

- **Defn of surveillance:** Surveillance is the ongoing systematic collection, analysis, and interpretation of health data. It includes the timely dissemination of the resulting information to those who need them for action.

- Surveillance plays a key role in understanding the epidemic dynamics guiding response and monitoring of response activities.

- Systematic contact tracing is critical in breaking the chains of transmission.
Purpose of Ebola surveillance

- Confirm an outbreak
- Identify all cases and contacts
- Detect patterns of epidemic spread
- Estimate the potential for further spread of the disease
- Determine whether control measures are working
Surveillance strategies

- Response to rumours/alerts: Log and verify them
- Active case search
- Contact tracing and follow-up for all contacts
- Documentation
- Prompt notification
- Data management
Surveillance before EVD outbreak

- Implement surveillance under IDSR
- Train health personnel at all levels so as to be able to detect outbreak
- Share surveillance data regularly
- Involve animal health: Ebola outbreaks are often preceded by outbreak in wildlife, so surveillance of wildlife die-offs should alert public health system
- Involve other key players/partners
- Prepare contingency plan
Surveillance During Threats of Outbreaks or EVD Outbreaks
General considerations

- Activate contingency plan
- Activate a multi-sector national Task Force
- Train health personnel at all levels
- Establish Rapid Response Teams (RRTs) at all levels
- Establish EVD alert management system at all levels
- Communicate: to media, to stakeholders and to public
- Share surveillance data regularly
Rapid Response Teams (RRTs)

- At all health levels and HFIs. **Do you have one here?**
- Respond to alerts 24/7 of Ebola
- Epidemiologists, clinicians, IPC expert, data manager, lab personnel, environmental health, health educator...
- Train them in:
  - In-depth knowledge of EVD
  - Case identification based on case definition
  - Personal protection
  - Use of surveillance tools
  - Contact tracing, follow up and referral
  - Communication skills
  - Line listing and documentation
Identifying cases using Ebola case definition

The Current working case definition is:

- Any person with fever of acute onset
  
  Plus

- One or more of the following: Vomiting, diarrhea, abdominal pain, headache, sore throat, measles-like rash, red eyes and bleeding from body openings
  
  Plus

- History of travel within the last 3 weeks to/from a country with an outbreak of Ebola or contact with an ill person who has travelled to/from a country with an outbreak of Ebola within the last 3 weeks
Intensify case identification using case defn

- All HWs and POE staff MUST know the case definition and use it to detect possible cases then follow available protocols

- Monitor rumours and other alerts
  - H. Facilities, media, politicians, community

- Respond to each alert/rumour
  - Investigate to see if case definition is met
  - Investigate by lab
  - Identify and record contacts
  - Use appropriate surveillance tools
Currently in Kenya, do not strain to make a distinction between suspect and probable cases.
When an Ebola suspect case has been identified
(Case meets working case definition)
Handling a suspect case

Refer to the steps on the Ebola case definition chart

- **Immediately notify** the Sub-County health office and also DSRU through hotlines 0732-353535/ 0729-471414
- Immediately don **full PPE**
- **Isolate** the patient and give supportive care
- **Withdraw** 5 to 10mls of blood in a plain sterile tube or vacutainers
- Fill the Ebola case investigation form (**www.ddsr.or.ke**)
- **Triple package** the specimen as whole blood and put in a cooler box.
Handling a suspect case 2

- Transport the packaged specimen using the fastest means available to KEMRI Centre for Viral Research.
- If the sample cannot be transported immediately, refrigerate but do not freeze.
- Inform anyone handling the specimen that they are handling potentially infected samples. If possible stick a bio-hazard label sticker on it.
- Restrict/limit the number of medical and support personnel visiting or seeing the patient.
Stop cleaners going to the isolation room

Stop relatives from visiting the patient. Only one relative may be allowed to stay with the patient. However, the relative must be well trained and given personal protective clothing too as if she is a HW.

Manage waste appropriately.

Avoid contact with your body parts e.g. through scratching.

Create an adjacent room where staff will change their clothes. As soon as anyone leaves the isolation room they must change all clothes in the changing room.
Handling a suspect case 4

- If the case is not in a HF ......
  - Explain to the patient/family the need for hospital care
  - Arrange for hospital transfer
  - If the subject has died, explain to the family the need for safe burial
  - After obtaining consent, coordinate funeral arrangements with the burial team

- Start identifying, listing and following contacts
  - Ebola contact listing form
  - Ebola contact tracing and follow-up form
Fill case investigation form

- A record of all cases MUST be kept as a line-list
- A case investigation form should be completed for every case meeting the standard case definition
- Case investigation form should also be completed for all suspect deaths either in the community or in the health facility
- Case investigation form should accompany all laboratory specimens collected from suspect cases
Maintain a line list of all cases

- The designated treatment centre or the admitting HF should maintain a line list of all the suspect/ probable/ confirmed cases.

- The case investigation form and the line list should be submitted to the next higher level daily.

- The surveillance team at the County and MoH level will regularly analyze data to describe/ characterize the epidemic and monitor its evolution.
Who is a contact?

- A person without any symptoms having had physical contact with a case or the body fluids of a case within the last three weeks.

- The notion of physical contact: we may say there is contact:
  - If we can prove or we know that there was contact or
  - Even when we only highly suspect that there was contact

- Contact situations: having shared the same room/bed, cared for a patient, touched body fluids, or closely participated in a burial.
Contact listing, tracing and follow up

- When a suspected case is identified, all individuals that had direct contact with the case (since onset of the symptoms) should be listed using the contact listing form.

- Identify a competent to follow up all the contacts on a daily basis for the next 21 days from the day of last exposure using the contact follow up form.

- The team should comprise of CHWs supervised by HWs.
Contacts

- They MUST be observed daily, usually at home
  - We only quarantine contacts at particularly high risk of infection, e.g., a mortician who did postmortem on confirmed case

- Monitor body temp at least once and, where possible twice daily for 21 days after the exposure

- They MUST report to the local HF if they develop fever

- Febrile contacts should be evaluated immediately by the public health clinician responsible for contact-tracing

- Any contact having temp of 38.5 and above, MUST be considered a new case and isolated
Residents in the affected areas must be taught to avoid high-risk behaviors during the outbreak, including:

- Bathing or touching corpses
- Touching blood or body fluids of sick individuals
- Re-using injection equipment or needles
- Hunting, preparing or eating bush animals

Communities should also be urged to report any suspect case immediately to the nearest HF or to the command centre.
Establish an Alert Desk

- An alert desk (command centre) should be established at the National and County levels equipped with toll free telephone lines and manned by a trained team.
- Widely disseminate the toll free numbers.
- Members of the public should be encouraged to call in when they have suspect/ alert cases or when they have any query.
- All in-coming alert calls should be registered and the information passed on to the relevant team for appropriate verification/ investigation.
- All hospitals should also have an alert desk.
During an outbreak, all HFIs in the affected county/Sub-county should provide daily updates including zero reporting (passive surveillance).

The County/Sub-county team may also call the HFIs (active surveillance).

This is to ensure that the county/district team monitors the epidemic situation.
Verbal autopsy

- During an outbreak, community deaths could be a signal of an undetected transmission.
- All community deaths should therefore be verified and the likely cause of death established.
- If the verification indicates that the likely cause of death is EVD, a case investigation should be completed and the case line listed.
- Contacts to the case should be identified and followed up.
Hospital Based Surveillance
Objective

- To assure proper isolation of suspected VHF patients, barrier nursing care and management of the patients
- To assure proper implementation of the universal precautions, preparation and utilization of disinfectants
Med Sups are responsible for the hospital based surveillance in their respective hospitals.

Designate one staff in each ward to carry out day-to-day surveillance activities.

This surveillance agent will be followed up by the chief of the hospital.
The surveillance agent
Duties and responsibility

- Each morning ask the night nurse/physician whether a patient(s) suspected of EVD has been admitted to the hospital.
- If yes, see the patient immediately.
- Each day walk through all wards and isolation unit in the health establishment and visit the outpatient department.
- Detect and identify patient(s) having signs and symptoms suspected of EVD.
If an EVD suspect case is present,

- Take history or assist in questioning of suspect case(s) about the possible source of infection and the presence of similar disease in the patient's community
- Ensure immediate clinical examination
- Take or assist in taking proper specimen
- Assist in filling out prescribed forms
- Assist in storage, proper packing and dispatch of specimen
- Urgently notify or assist in notification of each case or death by the quickest means
Data Management

- Outbreak linelist
- Number of cases and deaths
- Number of contacts per case
- Demographic data
- Epi curve
- Data organised by time, place and person
- Attack rates
- Case fatality rates