EMERGING EBOLA INFECTION AND ITS PREVENTION

Keshav Reddy

Assistant. Professor, Rama College of Nursing, Mandhana, Kanpur, Uttar Pradesh

Abstract

Ebola viral disease (EVD) or Ebola haemorrhagic fever (EHF) is a fatal infectious viral disease which spread through body fluids with symptoms of fever and unexplained hemorrhage. This disease spread quickly within healthcare setting. It is not always possible to identify patients with Ebola disease early in course of illness because initial symptoms may be non-specific. It requires standard precaution for all patients and health care workers regardless of their diagnosis. There are standard guidelines which are mandatory to follow especially the health professionals as it spreads though blood and body fluids commonly found in the hospital settings .It is recommended that every worker must follow universal precaution and specific protection measures to protect self and others.

Key words :Ebola, Personal protective equipment ,Standard precaution, hemorrhagic fever syndrome

Introduction:

Background:

Ebola virus is an aggressive pathogen that causes a highly lethal hemorrhagic fever syndrome in human and nonhuman primates. It was first recognized near the Ebola River valley during an outbreak in Zaire in 1976.

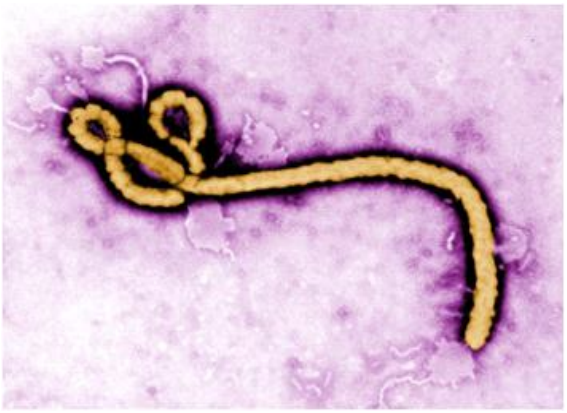

Fig: Ebola virus virion (under electron microscope)

It is highly infectious and rapidly fatal, but it can be prevented, It is transmitted through direct contact with body fluids such as blood, saliva, urine, semen, breast milk etc of an infected person and by contact with contaminated surfaces or equipment, including linen soiled by body fluids from an infected person. Transmission to the health-care workers (HCWs), other patients, and visitors had been reported when appropriate IPC measures were not observed.[1]

Symptoms of Ebola include:

- Infected client shows typical symptoms of mild headache, weakness, joint and muscle ache, headache, tiredness, vomiting, diarrhea, stomach pain and unexplained bleeding.
- Few patients may develop multi-organ failure which may lead to shock as well as death as the disease progress.
- Usually signs of infection occur in 8 to 10 days after exposure to virus; however symptoms appear from 2 to 21 days after the exposure.[2]

Mode of Transmission

The highest risk of getting infection is more among those who are in direct contact with infected patients such as

health care providers, family members and friends as they are in contact of body fluids or blood.

Infected wild animals haunted for food also can spread infection as it was found in Africa.

Diagnosis

Detection of virus in blood is usually after three days of infection.

Laboratory tests used in the diagnosis include:

Antigen-capture enzyme-linked immunosorbent assay (ELISA) testing, IgM ELISA, Virus isolation and Polymerase chain reaction (PCR) within a few days after symptoms begin.

IgM and IgG antibodies detection later in disease course or after recovery

Immunohistochemistry testing, PCR, Virus isolation retrospectively in deceased patients[4]

Treatment

There is no approved vaccine or medicine available for Ebola. Only symptoms and complications are treated as they appear. Survival chances can be improved by following interventions measures such as-

Providing intravenous fluids (IV) and balancing electrolytes (body salts).

Maintaining oxygen status and blood pressure.

Treating other infections if they occur.

Recovery

Recovery from Ebola is based on good supportive care and the patient's immune response. Patients who recover from Ebola infection can develop antibodies that last for at least 10 years or even more. After recovery patients may develop long term complications such as vision problems and joint problems.[5]

Universal Prevention during Ebola outbreak

General public and health care workers should follow universal precaution as there is no approved vaccine available for Ebola.

For the general public

Practice hand washing with soap and water or an alcohol-based hand sanitizer

Avoid contact with blood and body fluids of infected person.

Don't handle infected persons items that is in contact with body fluids

Avoiding funeral rights that require the contact of body died with Ebola infection body is to be burned.

Avoid contact and meat prepared from infected bats and non human primates.

After visiting a high risk Ebola area, on return, monitor health for 21 days and seek medical care immediately to indention development if any symptoms of Ebola.

Healthcare workers

Wear appropriate personal protective equipment (PPE).

Practice proper infection control and sterilization measures while caring for infected patient.

Isolate patients with Ebola from other patients in hospital.

Avoid direct or unprotected contact with the bodies of people who have died from Ebola infection.

In case of direct contact with body fluids and blood notify health officials as the virus can enter the body through broken skin or unprotected mucous membrane.

Ebola infection prevention and control

Guidance for patient care providers

(1)Standard precautions for all

As the initial symptoms is not specific it is difficult to identify patients infected with Ebola virus, hence regardless of their diagnosis all levels of health care workers it is important to apply following standard precautions

Hand hygiene and use of disposable medical **gloves** before contact with body fluids, mucous membrane, non-intact skin and contaminated items,

Use of gown and **eye protection** before doing procedures to patients which may

require contact with blood and body fluids.

Use of best practices for injection, safe handling and disposal of sharp instruments including cleaning and disinfection of the environment.

Priority is given for safe laundry and waste management.

(2) Patient placement, staff allocation, visitors

- Isolation of suspected or confirmed cases of infection in single rooms of in specific confirmed areas.
- Assigning clinical and non clinical personnel as well as equipment to infected patient care settings.
- Family members and visitors should be limited and restricted to the patient care setting.
- One staff member or coordinator should be assigned to inspect adherence to the IPC measures and to coordinate and providing advice in each health care setting.[6]

3) Hand hygiene

Training should be given regarding use of personal protective equipment (PPE) and hand hygiene to all health care workers including cleaners. It include Hand Washing.

- **Always perform hand washing with use of alcohol based hand rub solution for20-30 seconds or soap and running water,**
- **Use single towels for 40- 60 seconds as recommended by WHO for universal precaution**

- Wash hands before:
  - Wearing gloves and wearing personal protective equipment (PPE)
  - Following aseptic procedures
  - After exposure to patients blood and body fluids
  - After touching contaminated objects and equipments.
  - After removal of personal protective equipments[7,8,9]

4) Personal protective equipment (PPE)

- Display instructions regarding PPE at the entrance of isolation room.
- Do not wear personal clothing.
- Scrub or medical suits should be worn while working in patient care areas.

Measures to be followed :

a) Correct sized non-sterile examination gloves or surgical gloves.
b) Disposable, long-sleeve, impermeable gown to cover clothing and exposed skin.
c) Medical mask, face shield and goggles for eye protection
d) Fluid resistant shoes.

Additional PPE on risk:

a) Water proof apron in case gown is impermeable.
b) Disposable overshoes and leg coverings when boots are not available.
c) Heavy duty (rubber) gloves while handling waste and during environmental cleaning
d) Particulate respirator (FFP2 or EN certified equivalent or US NIOSH-certified N95) when performing procedures that could promote generation of aerosols. [5,10]

Other precautions related to PPE:

Carefully remove and dispose PPE (including boots) into waste containers and perform hand hygiene before exiting the isolation setting.

Avoid any contact between soiled items such as gloves and gowns and with any area of the face or intact skin while removing PPE.

Use dedicated equipment (e.g. stethoscope) for single patient only; if not possible decontaminate the items between contacts of each patient

Treat all waste generated during decontaminated process as infectious waste.

Do not move items and equipment between isolation setting and other areas of health care setting.

Carefully clean and decontaminate reusable equipment

Do not re-use disposable PPE.

5) Injection safety and management of sharps

Limit the use of needles and other sharp objects.

Have exclusively dedicated injection and parenteral medication equipment for each patient which should be disposed of after care and never re-used.

Never direct the point of a used needle towards any part of the body and never replace the cap on a used needle.

Do not remove used needles from disposable syringes by hand, do not bend, break or manipulate used needles by hand.

Always dispose syringes, needles, scalpel blades and other sharp objects in puncture resistant containers.

Those containers should be placed close to the "point of use" and remain upright at all times.

Ensure that the containers are securely sealed with a lid and replaced when it is ¾ full. [11,12]

6) Environmental cleaning, waste and linen management

All cleaners should wear rubber gloves, impermeable gown and boots

Use facial protection when performing activities with increased risk of splashes or in contact with blood and body fluids including handling of linen.

Clean and then disinfect contaminated environmental surfaces or objects should be as soon as possible using standard hospital detergents/disinfectants (e.g. a 0.5% chlorine solution).

Clean floors and horizontal work surfaces at least once a day with water and detergent.

Spraying (i.e. fog) occupied or unoccupied clinical areas with disinfectant should not be done because of no any proven disease-control benefit and it is a potentially dangerous practice.

Place the soiled linen in clearly labeled, leak-proof bags or buckets at the site of use

The container surfaces should be disinfected before transporting directly to the laundry area.

7. Safety with laboratory samples

While laundering at low-temperature wash linen with detergent and water, rinse and then soak in 0.05% chlorine for approximately 30 minutes.

Then linen should be dried according to routine standards and procedures.

Segregation of waste must be done at the point of generation to enable appropriate and safe handling.

All solid, non-sharp and infectious waste to be collected in leak-proof waste bags and covered bins.

Limit the use of phlebotomy and laboratory testing to the minimum if necessary for essential diagnostic evaluation and patient care.

Follow WHO recommendations for procedures to collect blood or other samples safely from persons suspected or confirmed to be infected.

Laboratory personnel should wear full PPE while handling potential EVD clinical specimens and use particulate respirators (e.g., FFP2, or EN certified equivalent, or US NIOSH- N95) or powered air purifying respirators (PAPR) when aliquotting,

Perform all laboratory samples processing under a safety cabinet or at least a fume cabinet with exhaust ventilation.

8) Post-mortem examinations

Post-mortem examination must be limited to essential evaluations and performed by trained personnel.

Personnel who handling should use PPE including eye protection, mask (a particulate respirator or a PAPR if performing internal autopsy), double gloves and disposable impermeable gowns.

Placing of specimens should be in clearly-labeled, non-breakable, leak-proof containers and delivered directly to designated specimen handling areas.

All external surfaces of specimen containers must be thoroughly disinfected prior to transport.

Carefully place tissue or body fluids for incineration disposal in clearly marked, sealed containers

9) Movement and burial of human remains

- The handling of human remains should be kept to a minimum.
- Following precautions should be used in case of some adaptations according to cultural and religious habits.
- **Wear PPE** (impermeable gown, mask, eye protection and double gloves or heavy duty gloves and rubber boots or closed puncture or fluid-resistant shoes and overshoes to handle the dead body of infected and suspected cases.
- Do not spray, wash or embalm the dead body;
- Place the body in a **double bag**, wipe over the surface of each body bag with a disinfectant (e.g., 0.5% chlorine solution) and indicate highly infectious material with seal and label.
- **Remove PPE** immediately after the procedure and perform hand hygiene immediately after removing PPE.
- After wrapping in sealed, leak-proof material (bag), the dead body should be immediately moved to the mortuary and placed inside a coffin if possible, and buried promptly.

10) Managing exposure to virus through body fluids

- **In case of accidental exposure to blood, body fluids and secretion *i***mmediately stop any current tasks, leave the patient care area, and safely remove PPE.
- After leaving the patient care area immediately wash the affected skin surfaces or the percutaneous injury site with soap and water.
- Irrigate mucous membranes (e.g. conjunctiva) with adequate water or an eyewash solution, and not with chlorine solutions or other disinfectants.
- Report the incident immediately to the local coordinator.
- Evaluate exposed persons medically and receive follow-up care.

11) Prevention of infection through sexual transmission

- Although Ebola virus has been detected in semen after patients have recovered, it is not known if the virus can be spread through sex (including oral sex).
- As a precaution, men who have recovered from Ebola are advised to abstain from sex (including oral sex) for three months. If abstinence is not possible, condoms may help to prevent the spread of disease.

Conclusion

It can be concluded that Ebola is a newly emerging disease which is highly contagious that spread through body fluids and infected articles which requires thorough protection measures among general public as well as health care workers to prevent the spread of infection among health care setting.

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