Ebola Haemorrhagic Fever - Is it Really A Reason To Panic In India?

Choudhary / Tayade A. R.[1]

ABSTRACT

The Ebola outbreak that has created panic in West Africa is a daily staple of the lay press and medical publications. Ebola evokes fear among both the public and clinicians. It also evokes a sort of therapeutic nihilism after all, if there is no treatment, what can be done? And without an Ebola-specific antiviral medication, what can be done to curtail it .Particularly with number of cases increasing and being detected worldwide there is panicky situation all over the world. Considering the mode of spread, infection control aspect is really important and should be stressed harder especially in setting where burden of patients is high and infection control aspect is compromised.

Key words : Ebola, antiviral, Infection Control

Background -

The Ebola virus causes an acute, serious illness which is often fatal if untreated. Ebola virus disease (EVD) first appeared in 1976 in 2 simultaneous outbreaks, one in Nzara, Sudan, and the other in Yambuku, Democratic Republic of Congo. The latter occurred in a village near the Ebola River, from which the disease takes its name[1,2,3].

The current outbreak in West Africa, (first cases notified in March 2014), is the largest and most complex Ebola outbreak since the Ebola virus was first discovered in 1976. There have been more cases and deaths in this outbreak than all others combined. It has also spread between countries starting in Guinea then spreading across land borders to Sierra Leone and Liberia, by air (1 traveler only) to Nigeria, and by land (1 traveler) to Senegal. Recently cases diagnosed in Texas, Spain as well as on 15/10/2014[4].

[1]Consultant Infectious Diseases,
Orange City Hospital, Nagpur

Address for Correspondence -
Dr. Ashvini Choudhary / Tayde
E-mail : drashwini.tayade@gmail.com

Countries with Widespread Transmission

Country	Total Cases	Laboratory Confirmed Cases	Total Deaths
Guinea	1472	1184	843
Liberia	4249	950	2458
Sierra Leone	3252	2849	1183
Total	**8973**	**4983**	**4484**

Countries with Travel-associated Cases

Country	Total Cases	Laboratory Confirmed Cases	Total Deaths
Senegal	1	1	0
Spain	1	1	0
Total	2	2	0

Countries with Localized Transmission

Country	Total Cases	Laboratory Confirmed Cases	Total Deaths
Nigeria	20	19	8
United States	3	3	1
Total	23	22	9

The most severely affected countries, Guinea, Sierra Leone and Liberia have very weak health systems, lacking human and infrastructural resources, having only recently emerged from long periods of conflict

and instability. On August 8, the WHO Director-General declared this outbreak a Public Health Emergency of International Concern.

A separate, unrelated Ebola outbreak began in Boende, Equateur, an isolated part of the Democratic Republic of Congo.

The virus family Filoviridae includes 3 genera : Cuevavirus, Marburgvirus, and Ebolavirus. There are 5 species that have been identified : Zaire, Bundibugyo, Sudan, Reston and Taï Forest. The first 3, Bundibugyo ebolavirus, Zaire ebolavirus, and Sudan ebolavirus have been associated with large outbreaks in Africa. The virus causing the 2014 West African outbreak belongs to the Zaire species.

Transmission -

It is thought that fruit bats of the Pteropodidae family are natural Ebola virus hosts. Ebola is introduced into the human population through close contact with the blood, secretions, organs or other bodily fluids of infected animals such as chimpanzees, gorillas, fruit bats, monkeys, forest antelope and porcupines found ill or dead or in the rainforest[5].

When an infection does occur in humans, the virus can be spread in several ways to others. Ebola is spread through direct contact (through broken skin or mucous membranes) with blood or body fluids (including but not limited to urine, saliva, faeces, vomit, and semen) of a person who is sick with Ebola objects (like needles and syringes) that have been contaminated with the virus infected animals.

Ebola is not spread through the air or by water, or in general, food. However, in Africa, Ebola may be spread as a result of handling bush meat (wild animals hunted for food) and contact with infected bats.

Health-care workers have frequently been infected while treating patients with suspected or confirmed EVD. This has occurred through close contact with patients when infection control precautions are not strictly practiced.

Burial ceremonies in which mourners have direct contact with the body of the deceased person can also play a role in the transmission of Ebola.

People remain infectious as long as their blood and body fluids, including semen and breast milk, contain the virus.

Men who have recovered from the disease can still transmit the virus through their semen for up to 7 weeks after recovery from illness.

Symptoms of Ebola Virus Disease -

The incubation period, that is, the time interval from infection with the virus to onset of symptoms is 2 to 21 days. Humans are not infectious until they develop symptoms. First symptoms are the sudden onset of fever fatigue, muscle pain, headache and sore throat. This is followed by vomiting, diarrhoea, rash, symptoms of impaired kidney and liver function, and in some cases, both internal and external bleeding (e.g. oozing from the gums, blood in the stools)[6].

Symptoms may appear anywhere from 2 to 21 days after exposure to Ebola, but the average is 8 to 10 days.

Recovery from Ebola depends on the patient's immune response. People who recover from Ebola infection develop antibodies that last for at least 10 years.

Laboratory findings include low white blood cell and platelet counts and elevated liver enzymes.

Diagnosis : It can be difficult to distinguish EVD from other infectious diseases such as malaria, typhoid fever and meningitis.

Other diseases that should be ruled out before a diagnosis of EVD can be made include : shigellosis, cholera, Leptospirosis, plague, rickettsiosis, relapsing fever, meningitis, hepatitis and other viral haemorrhagic fevers.

Confirmation that symptoms are caused by Ebola virus infection are made using the following investigations[7]:

Antibody-capture enzyme-linked immunosorbent assay (ELISA)

Antigen-capture detection tests

Serum neutralization test

Reverse transcriptase polymerase chain reaction

(RT-PCR) assay

Electron microscopy

Virus isolation by cell culture.

Samples from patients are an extreme biohazard risk; laboratory testing on non-inactivated samples should be conducted under maximum biological containment conditions.

Timeline of Infection	Diagnostic tests available
Within a few days after symptoms begin	Antigen-capture enzyme-linked immunosorbent assay (ELISA) testing IgM ELISA Polymerase chain reaction (PCR) Virus isolation
Later in disease course or after recovery	IgM and IgG antibodies
Retrospectively in deceased patients	Immunohistochemistry testing PCR Virus isolation

Infection Control When Collecting and Handling Specimens : All laboratorians and other healthcare personnel collecting or handling specimens must follow established standards compliant with the OSHA blood borne pathogens standard, which includes blood and other potentially infectious materials. These standards include wearing appropriate personal protective equipment (PPE) and following all safety rules for all specimens regardless of whether they are identified as being infectious.

Recommendations for risk assessment to staff: Risk assessments should be conducted by each laboratory director, bio safety officer, or other responsible personnel to determine the potential for sprays, splashes, or aerosols generated from laboratory procedures. They should adjust, as needed, PPE requirements, practices, and safety equipment controls to protect the laboratorian's skin, eyes, and mucous membranes.

Recommendations for specimen collection by staff: Any person collecting specimens from a patient with a case of suspected Ebola virus disease should wear gloves, water-resistant gowns, full face shield or goggles, and masks to cover all of nose and mouth Additional PPE may be required in certain situations.

Recommendations for laboratory testing by staff: Any person testing specimens from a patient with a suspected case of Ebola virus disease should wear gloves, water-resistant gowns, full face shield or goggles, and masks to cover all of nose and mouth, and as an added precaution use a certified class II Bio safety cabinet or Plexiglass splash guard with PPE to protect skin and mucous membranes. All manufacturer-installed safety features for laboratory instruments should be used.

GUIDELINES FOR SPECIMEN COLLECTION AND TRANSPORT -

Transporting Specimens within the Hospital / Institution

Specimens should be placed in a durable, leak-proof secondary container for transport within a facility. To reduce the risk of breakage or leaks, do not use any pneumatic tube system for transporting suspected EVD specimens.

When Specimens Should Be Collected for Ebola Testing

Ebola virus is detected in blood only after the onset of symptoms, usually fever. It may take up to 3 days after symptoms appear for the virus to reach detectable levels. Virus is generally detectable by real-time RT-PCR from 3-10 days after symptoms appear.

Specimens ideally should be taken when a symptomatic patient reports to a healthcare facility and is suspected of having an Ebola exposure. However, if the onset of symptoms is <3 days, a later specimen may be needed to completely rule-out Ebola virus, if the first specimen tests negative.

Preferred Specimens for Ebola Testing

A minimum volume of 4mL whole blood in plastic collection tubes can be used to submit specimens for testing for Ebola virus. Do not submit specimens in glass containers or in heparinized tubes. Whole blood preserved with EDTA is preferred but whole blood preserved with; sodium polyanethol sulfonate (SPS), citrate, or with clot activator is acceptable. It

is not necessary to separate and remove serum or plasma from the primary collection container. Specimens should be immediately stored or transported at 2-8^{0}C or frozen on cold-packs.

Standard labelling should be applied for each specimen. The requested test only needs to be identified on the requisition.

Treatment and vaccines -

No specific vaccine or medicine (e.g., antiviral drug) has been proven to be effective against Ebola.

Symptoms of Ebola are treated as they appear. The following basic interventions, when used early, can significantly improve the chances of survival:

1. Providing intravenous fluids (IV) and balancing electrolytes (body salts)
2. Maintaining oxygen status and blood pressure
3. Treating other infections if they occur

Some experimental treatments developed for Ebola have been tested and proven effective in animals but have not yet been tested in randomized trials in humans.

Humanized monoclonal antibodies and antiviral drugs are being tried in humans on a compassionate basis. The WHO ethical panel has approved such use.

ZMapp, being developed by Mapp Biopharmaceutical Inc., is an experimental treatment, for use with individuals infected with Ebola virus. It has not yet been tested in humans for safety or effectiveness. The product is a combination of three different monoclonal antibodies that bind to the protein of the Ebola virus

ZMapp still in an experimental stage and has not yet been tested in humans for safety or effectiveness. Some patients infected with Ebola virus do get better spontaneously or with supportive care. However, the best way to know if treatment with the product is efficacious is to conduct a randomized controlled clinical trial in people to compare outcomes of patients who receive the treatment to untreated patients. No such studies have been conducted. It's important to note that the standard treatment for Ebola remains supportive therapy.

However, a range of potential treatments including blood products, immune therapies and drug therapies are currently being evaluated. No licensed vaccines are available yet, but 2 potential vaccines are undergoing human safety testing. Recovery from Ebola depends on the patient's immune response. People who recover from Ebola infection develop antibodies that last for at least 10 years, possibly longer.

Prevention and Control -

Good outbreak control relies on applying a package of interventions, namely case management, surveillance and contact tracing, a good laboratory service, safe burials and social mobilisation. Community engagement is the key to successfully controlling outbreaks. Raising awareness of risk factors for Ebola infection and protective measures that individuals can take is an effective way to reduce human transmission. Risk reduction messaging should focus on several factors:

Reducing the risk of wild life-to-human transmission from contact with infected fruit bats or monkeys/apes and the consumption of their raw meat. Animals should be handled with gloves and other appropriate protective clothing. Animal products (blood and meat) should be thoroughly cooked before consumption.

Reducing the risk of human-to-human transmission from direct or close contact with people with Ebola symptoms, particularly with their bodily fluids. Gloves and appropriate personal protective equipment should be worn when taking care of ill patients at home. Regular hand washing is required after visiting patients in hospital, as well as after taking care of patients at home.

Outbreak containment measures including prompt and safe burial of the dead, identifying people who may have been in contact with someone infected with Ebola, monitoring the health of contacts for 21 days, the importance of separating the healthy from the sick to prevent further spread, the importance of good hygiene and maintaining a clean environment.

Controlling infection in health-care settings -

Health-care workers should always take standard precautions when caring for patients, regardless of their presumed diagnosis. These include basic hand hygiene, respiratory hygiene, use of personal protective equipment (to block splashes or other contact with infected materials), safe injection practices and safe burial practices.

Health-care workers caring for patients with suspected or confirmed Ebola virus should apply extra infection control measures to prevent contact with the patient's blood and body fluids and contaminated surfaces or materials such as clothing and bedding. When in close contact (within 1 metre) of patients with EBV, health-care workers should wear face protection (a face shield or a medical mask and goggles), a clean, non-sterile long-sleeved gown, and gloves (sterile gloves for some procedures).

Laboratory workers are also at risk. Samples taken from humans and animals for investigation of Ebola infection should be handled by trained staff and processed in suitably equipped laboratories.

Key Components are Standard, Contact, and Droplet Precautions.

Environmental infection control : Be sure environmental services staff wear recommended personal protective equipment (PPE) including, at a minimum, disposable gloves, gown (fluid resistant/ impermeable), eye protection (goggles or face shield), and facemask to protect against direct skin and mucous membrane exposure of cleaning chemicals, contamination, and splashes or spatters during environmental cleaning and disinfection activities. Additional barriers (e.g., leg covers, shoe covers) should be used as needed. If reusable heavy-duty gloves are used for cleaning and disinfecting, they should be disinfected and kept in the room or anteroom. Be sure that the staffs are instructed in the proper use of personal protective equipment including safe removal to prevent contaminating themselves or others in the process, and that contaminated equipment is disposed of appropriately.

Although there are no products with specific label claims against the Ebola virus, enveloped viruses such as Ebola are susceptible to a broad range of hospital disinfectants used to disinfect hard, non-porous surfaces. In contrast, non-enveloped viruses are more resistant to disinfectants. As a precaution, selection of a disinfectant product with a higher potency than what is normally required for an enveloped virus is being recommended at this time. EPA-registered hospital disinfectants with label claims against non-enveloped viruses (e.g., norovirus, rotavirus, adenovirus, poliovirus) are broadly antiviral and capable of inactivating both enveloped and non-enveloped viruses.

Avoid contamination of reusable porous surfaces that cannot be made single use. Use only a mattress and pillow with plastic or other covering that fluids cannot get through. Do not place patients with suspected or confirmed Ebola virus infection in carpeted rooms and remove all upholstered furniture and decorative curtains from patient rooms before use.

The Ebola virus is a classified as a Category A infectious substance, hence medical equipment, sharps, linens, and used health care products (such as soiled absorbent pads or dressings, kidney-shaped emesis pans, portable toilets, used Personal Protection Equipment (gowns, masks, gloves, goggles, face shields, respirators, booties, etc.) or by-products of cleaning) contaminated or suspected of being contaminated with a Category A infectious substance should be disposed as per hospital policy.

Although infection prevention and outbreak control are essential components of the Ebola response, they need not be at odds with equally essential syndrome-specific therapy for people who are already infected. Excellent clinical care and improved outcomes will result in improved community compliance, will help to break transmission chains, and will lead to a greater willingness of health care workers to engage in care delivery

To quote William Osler, "The best preparation for tomorrow is to do today's work superbly well.

QUICK FACTS -

Currently, Ebola virus and EHF do not pose a threat to most INDIAN workers. However, exposure to the virus or someone with EHF may be more likely in certain sectors, including the healthcare, mortuary/death care, and airline servicing industries.

At this time, there is not a widespread Ebola outbreak in INDIA. The ongoing outbreak is limited to countries in West Africa and Few cases outside, who had close contact with Ebola patients.

Ebola is typically spread through contact with body fluids from a living or deceased person or animal with EHF, though some medical and housekeeping tasks may expose workers to aerosolized droplets containing Ebola virus.

Until a person develops symptoms of EHF, he or she is not considered contagious.

Employers must take steps to protect their workers from exposure to Ebola virus on the job

Public health interventions including characterizing the outbreak epidemiology, contact tracing, social mobilization, and public education are essential steps in stopping Ebola and will ultimately save many more lives than can be saved by individual patient care.

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