



Ebola virus disease (EVD), implications of introduction in the Americas

Corrigendum¹ - 13 August 2014

Given the current situation of Ebola virus disease (EVD) in West Africa, the Pan American Health Organization / World Health Organization (PAHO/WHO) advises its Member States to remain vigilant for potential introduction of EVD in the Americas, to raise the awareness and knowledge of health care providers and to strengthen the implementation of standard precautions for infection prevention and control in health care facilities at all levels.

1. Ebola virus disease (EVD) – Key facts

Ebola virus disease (EVD), formerly known as Ebola haemorrhagic fever), is a severe, often fatal illness, with a case fatality rate of up to 90%. There are no licensed specific treatments or vaccine available for use in people or animals.

Genus Ebolavirus is 1 of 3 members of the Filoviridae family (filovirus), along with genus Marburgvirus and genus Cuevavirus. Genus Ebolavirus comprises 5 distinct species: Bundibugyo ebolavirus (BDBV), Zaire ebolavirus (EBOV), Reston ebolavirus (RESTV), Sudan ebolavirus (SUDV) and Tai Forest ebolavirus (TAFV).

The incubation period of Ebola virus disease (EVD) varies from 2 to 21 days, with an observed average of 8 to 10 days. Following the introduction of Ebola virus in the human population through animal-to-human transmission, person-to-person transmission by direct contact body fluids/secretions of infected persons is considered the principal mode of transmission. Indirect contact with environment and fomites soiled with contaminated bodily fluids (e.g. needles) may also occur. Airborne transmission has not been documented during previous EVD outbreaks.

There is no risk of transmission during the incubation period.

The most common symptoms experienced by persons infected with the virus are the sudden onset of fever, intense weakness, muscle pain, headache and sore throat. This is followed by vomiting, diarrhea, rash, impaired kidney and liver function, and at advanced stage, both

¹ This corrigendum is to amend an oversight regarding the scale of contact tracing of Ebola virus disease (EVD) cases on board of an aircraft and, in particular, the fellow passengers who should be considered contacts as described in section 3.2, on page 4, in the third full paragraph. The corrected paragraph includes the revised scale in bold, as follows: contact tracing of all those passengers **seated in an adjacent seat to the patient in all directions -on the side, in front or behind, including across an aisle-**, as well as the crew on board.

internal and external bleeding. Laboratory findings include low white blood cells and platelet counts and elevated liver enzymes.

2. EVD in West Africa – Situation summary

Table 1. Cases and deaths from EVD in Guinea, Liberia, Nigeria, and Sierra Leone as of 31 July 2014

| Country | Cases | Deaths | Case Fatality Rate (%) | Health care workers affected (Cases/Deaths) |
|---------------------|-------|--------|------------------------|---|
| Guinea | 472 | 346 | 73 | (33/20) |
| Liberia | 360 | 181 | 50 | (47/28) |
| Nigeria | 1 | 1 | 100 | 0 |
| Sierra Leone | 574 | 215 | 37 | (44/23) |
| Total | 1407 | 743 | 53 | (124/71) |

* Note: These numbers need to be interpreted with caution because they are subject to change and may not reflect the situation on the field accurately.

Updated information is available at WHO Diseases Outbreak News <http://www.who.int/csr/don/archive/disease/ebola/en/>.

The spread of EVD between and within the three neighboring countries accounting for the majority of the cases noted so far – Guinea, Liberia, and Sierra Leone – is due to high cross-border movement and the introduction of EVD in additional neighboring countries in the sub-region might not be excluded due to the existence of similarly porous borders.

In addition to the high volume of cross-border movements, the current multi-focal nature of the outbreak, and the involvement of urban areas, efforts to control the outbreaks are hampered by deep-seated beliefs and cultural practices favoring the further spread and constituting a barrier to containment, including by jeopardizing the security of the response teams; by the loss of a critical mass of health care workers lost to EVD because of sub-optimal infection prevention and control practices; by the facts that chains of transmission have moved underground making meticulous early detection and isolation of cases, contact tracing and monitoring – the cornerstone of EVD control – difficult to be carried out.

Historically, cases of hemorrhagic fever disease were diagnosed after long distance travel but none developed the symptoms during the international travel. Long-distance travelers (e.g. between continents) infected in affected areas could arrive while incubating the disease and develop symptoms compatible with EVD, after arrival.

Although most of the Americas' countries don't have direct flights with countries where transmission of EVD is being documented, the introduction of the Ebola virus in the Region may occur through international air travelers nonetheless. Therefore, in the light of the current epidemiological and social context related to the outbreak in West Africa, preparedness efforts by national authorities to face the introduction of EVD cases in the Americas are warranted.

In order to assess whether the ongoing Ebola outbreak in West Africa constitutes a public health emergency of international concern (PHEIC) and, if it does, to recommend appropriate temporary measures to reduce international spread, the Director General of the World Health Organization has convened an Emergency Committee meeting for 6-7 August 2014.

Advice to national authorities

The Pan American Health Organization / World Health Organization (PAHO/WHO) advises its Member States to consider implementing the following measures:

3. Surveillance

3.1. Detection of case with symptoms compatible with EVD

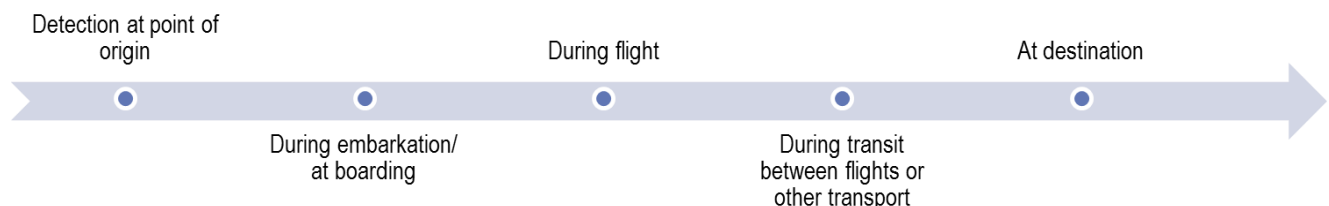
In a scenario such as the current one where the introduction of cases is the most likely, it is important that detection mechanisms be highly sensitive, so as to detect the slightest suspicion that an individual might be infected by the Ebola virus which must be reported to public health authorities and followed by the international ones through the channels established by the International Health Regulations (IHR), given that such an event is considered unusual.

Any case compatible with Ebola virus infection or an unusual event associated with an Ebola virus infection should be reported through the channels established under the International Health Regulations (IHR). Likewise, any confirmed Ebola case must be reported internationally as established in the IHR.

The identification of an Ebola virus case must take into account both the clinical manifestations as well as the travel history and exposure history reported by the patient.

The detection of these unusual health events potentially associated with the introduction of the Ebola virus can occur at different points as described in the below figure. Therefore it is important that the personnel operating at the points described in the figure are properly trained. They need to be kept updated on the status of EVD, and be trained to recognize the symptoms of EVD, in order to ask about travel history, and understand the protocols to inform the proper corresponding authorities.

Figure. Different points of detection of possible EDV cases.



The health facilities staff should be alerted to the possible introduction of EVD and should be alerted to the need to properly follow protective measures.

3.2 Contact tracing

When an individual with clinical and epidemiology history compatible with EVD is identified or if there are unexplained deaths of travelers, with clinical and epidemiological history compatible with EVD, (even though laboratory diagnosis is pending), identification of contacts and monitoring for 21 days (after the last known exposure to EVD) should be initiated.

When any international traveler in transit is among the identified contacts, the national authorities should determine whether or not the traveler should stay in the country for follow up—based on the legal framework existing in the country – or if the contact may continue to travel. If the latter is decided, the country's authorities must inform the recipient country of the arrival of these travelers that will have to be monitored.

Contact person is defined as any person having had contact with an Ebola in the 21 days preceding the onset of symptoms in at least one of the following ways:

- Having slept in the same household with a case
- Has had direct physical contact with the case (dead or alive) during the illness
- Has had direct physical contact with the (dead) case at the funeral,
- Has touched his/her blood or body fluids during the illness
- Has touched his/her clothes or linens
- Has been breastfed by the patient (baby)

If the patient with illness compatible to EVD develops symptoms while on an airplane, contact tracing must be made according to the Risk assessment guidelines for diseases transmitted on aircraft (RAGIDA) protocol², which indicates contact tracing of all those passengers **seated in an adjacent seat to the patient in all directions -on the side, in front or behind, including across an aisle-** , as well as the crew on board. If the cleaning of the aircraft is performed by unprotected personnel, they should be considered as contacts.

As part of contact tracing, the following information for each contact is to be collected: name, address, relationship with the patient, date of last contact, type of contact. Countries should have the tools for efficient information management. For those countries that do not have such tools PAHO/WHO can provide the Field Information Management System (FIMS); countries interested in obtaining FIMS should contact their local PAHO/WHO Country Office.

The daily monitoring of contacts may be made through in person visits or virtually if the system used allows visualization of the individual (e.g. video chat). The contact should be instructed to go to a health care facility if symptoms are present. For household visits of asymptomatic contacts, the use of PPE by healthcare personnel performing the visit is not required.

The asymptomatic individuals identified as contacts do not require use of PPE as long as they remain asymptomatic, and may continue their daily routines and must remain available and notify the health personnel of any change of location that may affect the health personnel's

² Risk assessment guidelines for diseases transmitted on aircraft (RAGIDA). Part 2: Operational guidelines Second edition. November 2009. Available at: http://www.ecdc.europa.eu/en/publications/_layouts/forms/Publication_DispForm.aspx?List=4f55ad51-4aed-4d32-b960-af70113dbb90&ID=332

ability to carry out daily monitoring. For operational reasons, the non-essential travel of contacts during the monitoring period is discouraged.

Both health personnel involved in the direct care of a patient under investigation or of a confirmed case of EVD, as well as laboratory personnel must be registered as a contact and monitored until 21 days after the last chance of exposure to contaminated material have passed.

Contacts that developed symptoms compatible with EVD must be referred to the isolation ward in designated hospital for medical assessment and further investigation. This should trigger an active search for cases in both the community and at health facilities.

Additional guidelines will be provided in the event that local transmission is established.

4. Laboratory diagnostic

Once an individual with illness compatible with EVD is identified, a sample must be taken (whole blood and / or serum) for the diagnosis. The sample should be taken by trained health personnel with extreme biosecurity measures and additional protective equipment (non-sterile gloves, masks, goggles - preferably with an anti-fog visor, apron or waterproof apron and, if possible, the disposable kind). This sample should ideally be taken at the hospital designated to handle cases compatible with EVD and sent to the National Reference Laboratory.

Of note, is that the confirmation of Ebola virus infection can only be performed in patients who have already developed symptoms. The confirmation is not possible during the incubation period.

If patient has died with clinical and epidemiological history compatible with EVD, taking an oral swab is suggested. In these situations, **an autopsy is contraindicated.**

The Ebola virus is classified as a Risk Group 4 pathogen, and therefore requires being handled in an equivalent level of biosafety (BSL-4).

However, molecular assays (for diagnosis of Ebola and other pathogens) can be performed in Biosafety Level 3 (BSL-3) conditions (and even BSL-2) provided that the sample has been inactivated. To minimize the risk of exposure in the laboratory, the presumptive and differential diagnosis should be conducted only through use of molecular techniques.

Due to its low specificity, the use of rapid testing is neither indicated for confirming nor for discarding cases, as such, its use is discouraged.

Personnel of a BSL-2 laboratory that are managing the samples of a patient with illness compatible with Ebola should, in addition to use of routine personal protective equipment (gloves, goggles-preferably with an anti-fog visor), use additional protection (N-95 masks, apron or waterproof apron and if possible, use of the disposable kind) regardless of the type of sample and the test to be performed.

The final confirmation of Ebola virus infection should be performed by a WHO Collaborating Center. Samples must be sent the center, by the National Reference Laboratory, as a category A infectious substance, according to the International Air Transport Association (IATA) standards and packed by personnel with international IATA certification for shipping and handling.

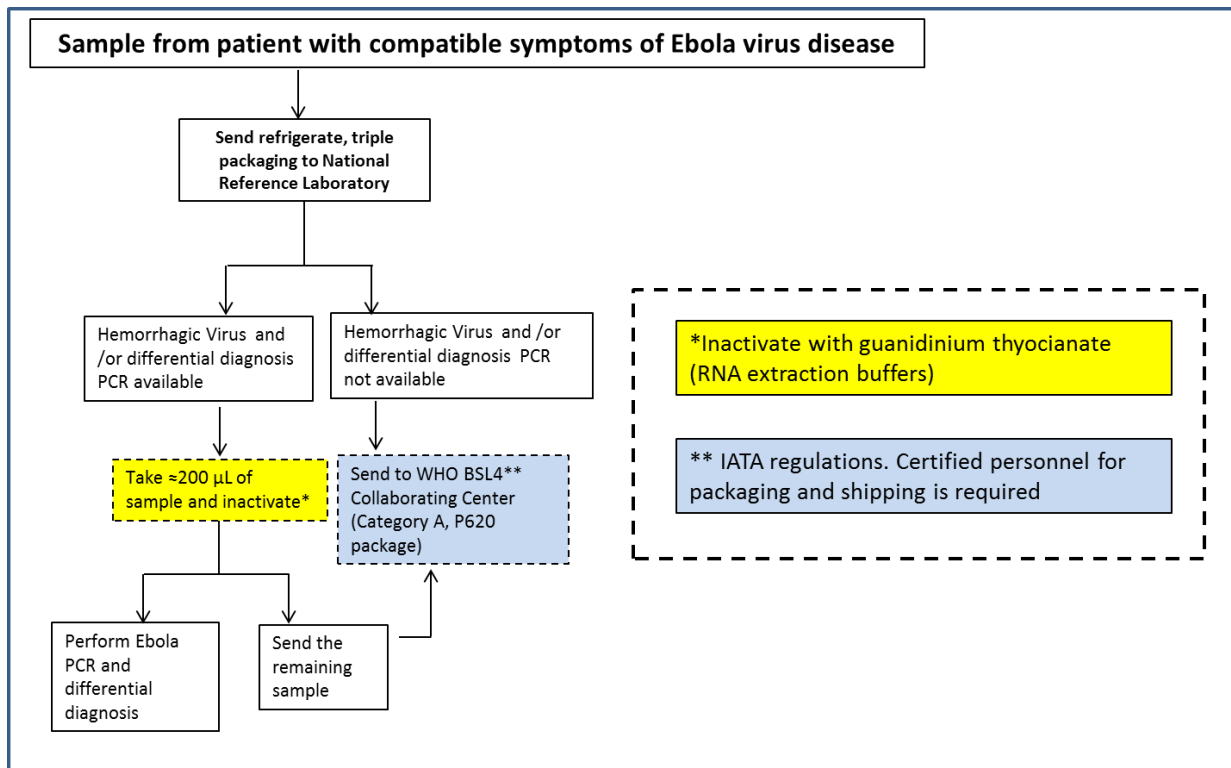
Sending samples presupposes functional delivery channels through a certified company (Courier). The country must ensure a priori that the company is available for the sample shipment.

The laboratories in the Region that can receive samples are:

- Viral Special Pathogens Branch (VSPB), Division of High Consequence Pathogens and Pathology (DHCPP), National Center for Emerging Zoonotic Infectious Diseases (NCEZID) Centers for Disease Control and Prevention (CDC):
http://apps.who.int/whocc/Detail.aspx?cc_ref=USA-155&cc_city=atlanta&
- Zoonotic Diseases and Special Pathogens, National Microbiology Laboratory, Infectious Disease and Emergency Preparedness Branch Public Health Agency of Canada:
http://apps.who.int/whocc/Detail.aspx?cc_ref=CAN-22&cc_city=winnipeg&

Patient treatment is empirically started pending the receipt of a definitive confirmation.

Below is an algorithm for the sample flow of a patient with symptoms consistent with EVD.



5. Case management

5.1 In health care services

Recognizing that patients with symptoms compatible EVD can be detected at different levels of the health care system or entry points, which must be handled using standard infection control precautions:

The patient should be transferred and managed in a designated health facility which must comply with the following characteristics:

- Contact isolation conditions,
- Appropriate provisions of personal protective equipment, and
- Health services personnel trained in infection prevention and control.

Ideally, patients should be kept in individual rooms. If this is not possible, patients should be placed in cohort, isolating separately those who have been EVD confirmed by laboratory and those still under investigation for EVD.

The country should consider having a number of designated facilities compatible with their geographical and administrative management.

If the country does not currently have designated hospitals for isolating patients with symptoms consistent with EVD, using those services that have already been identified for isolation of patients during the influenza pandemic and/or those used for isolation of patients with multidrug-resistant tuberculosis should be considered.

When the detection is realized in an airplane or at airport facilities, the patient should be directed to the areas designated as the facilities for isolation and evaluation by health personnel according to the airport contingency plan and prior to transfer to the designated hospital.

5.2 Patient transfer

Patient transfer should be performed by trained health care professionals in an appropriate vehicle for the transfer of patients. The vehicle must only transport essential personnel for patient care.

Personal protective equipment for the transfer:

- The direct care personnel of the patient must wear gloves, impermeable gowns, surgical masks, goggles (preferably with anti-fog visor), and closed shoes.
- The driver does not need to use personal protective equipment unless possible direct contact with the patient is anticipated.

Vehicle cleaning: After a vehicle has been used for patient transfer, it must be cleaned and disinfected with hypochlorite solution 0.05%. The professionals who perform cleaning should use personal protective equipment (gloves, waterproof gowns, surgical masks, goggles (preferably with anti-fog visor), and closed shoes).

6. Infection Prevention and Control

Human-to-human transmission of the Ebola virus is primarily associated with direct or indirect contact with blood and body fluids. Transmission to health-care workers has been reported when appropriate infection control measures have not been observed.

6.1 Standard Precautions

It is not always possible to identify patients with EBV early because initial symptoms may be non-specific. For this reason, it is important that health-care workers at all level apply standard precautions consistently with all patients – regardless of their diagnosis – in all work practices at all times. These include:

- Hand hygiene.
- Safe handling and disposal of sharp instruments.
- Use of personal protective equipment (PPE) according to the risk assessment.
- Clean and disinfect spills, environment, and reusable equipment safely.

6.2 Precautions for direct patient contact:

- Restrict the number of staff dedicated to patient care.
- Limit the number of visits.
- Keep log books to register staff caring for the patient as well as visitors.
- Use of PPE by both health care personnel and visitors.
- Wash hands.
- Use of surgical masks, goggles – preferably with anti-fog visor, waterproof apron, gloves and closed shoes before entering the patient's room.
- Remove PPE before leaving the isolation area. Special care should be taken when removing PPE to prevent contact with eyes and mucous membranes.
- Designate staff dedicated to monitoring the correct use of PPE in both health personnel and visitors.
- General use of disposable personal protective equipment. Where it is not possible to obtain disposable equipment, the following items can be re-used following appropriate disinfection:
 - Goggles or eyewear must be washed with water and soap in advance and then disinfected with 70% alcohol after.
 - Impervious gowns or aprons that cannot be sent to the hospital laundry facilities must be disinfected with hypochlorite 0.05%.

6.3 Cleaning in the hospital and of households of patients symptomatic of EVD

At home: If a patient develops symptoms at home before being isolated, the home should be disinfected, and the clothing and the patient's bedding and clothing should be incinerated.

Disinfection of the environment:

- Clean surfaces with blood or other body fluids with water and detergent prior to disinfection.
- Disinfection should be done with hypochlorite solution 0.05%.
- Use gloves, gowns and closed shoes for cleaning and disinfecting surfaces with blood and / or body fluids.

In the hospital: Both the bedding and clothing of the patient should be placed in a bag before washing and routed separately to the hospital laundry facilities where staff is to be adequately protected. Hand washing these items is not recommended.

6.4 Waste management in the hospital setting

- All sharp-edged objects must be disposed of in puncture-resistant containers. These containers should be discarded when 75% of their capacity is reached.
- All solid waste, with no sharp edges, must be disposed of in appropriate medical waste disposal plastic bags.
- All solid waste and sharp-edged objects related to a patient suspected or confirmed for EVD must be incinerated.

6.5 Infection control in aircraft

- If the presence individual is suspected with illness compatible with EVD on board, the crew will have to implement recommendations made by IATA with respect to infection control and meet the ICAO requirements regarding notification.³ This cabin crew should be using the Universal Precaution Kit such as that recommended by the International Civil Aviation Organization (ICAO): <http://www.capsca.org/CAPSCARefs.htm>.

Cleaning of affected aircraft: Since disinfection of aircraft surfaces depends on the disinfecting product compatibility with the material of the surface to be disinfected, the aircraft manufacturers should be consulted.

While the most probable scenario for the introduction of the Ebola virus would by air travel, there is a high volume of cruise ships in the Region of the Americas, as such prevention and control measures onboard a cruise ship or other boat are available in English.⁴

6.6 Safe disposal of dead bodies

The dead body must be kept whole and its handling should be limited.

³ Available at: [IATA guidelines for air crew to manage a suspected communicable disease or other public health emergency on board;](#) and

[IATA guideline for cleaning crew for an arriving aircraft with a suspected case of communicable disease](#)

⁴ [WHO Aviation Guide which includes information on sanitizing of aircraft](#)

Regardless of the funerary practice of family or friends of the patient, the body must not be embalmed. It should be disinfected with hypochlorite solution 0.05%, placed in resistant fluid extravasation body bags, which must be properly closed and placed in a closed casket before burial.

The staff for the management of dead bodies should be designated, equipped, trained and supervised by the national public health authorities to carry out the management of dead bodies under biosafety conditions. Personnel should use PPE at all times when handling a dead body, which includes aprons, overalls, waterproof gowns, surgical masks, eye protection (preferably with an anti-fog visor) and closed shoes.

7. Clinical Management

General medical support is critical. Severely ill patients require intensive supportive care. Such care must be administered with strict attention to barrier isolation. Patients are frequently dehydrated and require oral rehydration with solutions containing electrolytes or intravenous fluids.

Currently, no specific licensed therapy has demonstrated efficacy in the treatment of EVD.

Invasive procedures should be limited for EVD confirmed cases as well as for EVD suspected patients.

Criteria for patient isolation suspension

The duration of precautions should be determined on a case-by-case basis, once the symptoms have ended, determining if a patient should be removed from isolation should also take into consideration laboratory information.

Special Considerations

- Breastfeeding: Because the virus is transmitted through breastfeeding it is recommended that women symptomatic for EVD pending confirmation and those who have been confirmed for EVD not breastfeed.
- Since the Ebola virus can still be transmitted through semen up to seven weeks after recovery from the illness. For this reason, it is important for men to avoid sexual intercourse for at least 7 weeks after recovery or to wear condoms if having sexual intercourse during 7 weeks after recovery.

8. Raising awareness and communication

8.1 Health professionals

All institutions at different levels of the health care system and all health care workers (clinical, public health professionals, laboratory, janitorial staff, etc.) must be constantly informed about:

- The evolution of the EVD outbreak in West Africa and the international level recommendations.

- The characteristics and modes of transmission of the disease.
- Any type of protocol that the country has developed, is developing, or is changing related to any response or requirements.

Based on the areas of expertise, health care personnel should be trained to respond to the situation, prioritizing the implementation of infection prevention and control of infections and the systematic and comprehensive collection of comprehensive patient travel history.

8.2 Other sectors

Given that the most likely scenario for the introduction of Ebola is through international passengers using air transportation, the following is recommended:

- Link and establish close coordination mechanisms with civil aviation authorities, airport authorities and airlines operating in the country in order to increase and coordinate detection of cases in passengers, manage contacts and access to information to enable the tracking and tracing. Therefore it is essential to involve, at all times, to governmental authorities responsible for transportation and immigration authorities.
- Coordinate with the aforementioned authorities to:
 - Determine the exact country of origin of the infection: via immigration authorities through passports and via airlines to obtain complete airline itineraries.
 - Facilitate identifying the exact location of potential contacts both in and outside the country: through immigration for those who are in the country, through the airline manifest of to determine contact final destination and to inform the relevant national authorities appropriately.
 - Activate the airport contingency plan within the airport in case of a required response to a public health emergency.
 - Emphasize to travel industry personnel the importance of infection prevention and control.
 - Reiterate the need for airlines to adhere to compliance guidelines developed by the IATA.
 - Disseminate information so a traveler with symptoms knows where to go to seek medical attention.
- In conjunction with the Ministry of Tourism, inform those in the tourism sector (hotels, cruise lines, travel agencies, etc.) about the outbreak evolution, the international recommendations and of the government's preparation efforts.
- Reach out to the Embassies and diplomatic channels, the private sector, or national institutions that have personnel or operations (commercial, scientific, humanitarian or other) in the countries where EVD is documented, to inform them of:
 - The evolution of the outbreak.

- The recommended measures at the international level.
- The need to basic information about the modes of transmission and arrangement for the treatment of cases that may occur in this group of expatriates.

8.3 General Population

It is recommended to implement the existing communication plan to ensure transparency on preparedness activities undertaken by the government as well as the detection of EVD compatible cases and/or confirmed cases. Communication with the public must be established to facilitate communication on the eventual implementation of public health measures that could impact society at large as well as individuals.

National health authorities are encouraged to identify cultural and religious practices and beliefs that may have the potential to prevent the acceptance of public health measures to control EVD by the community, should there be one or more suspected and/or confirmed case of EVD.

8.4 Informing travelers

Given the evolution of the outbreak and considering the international recommendations published, national authorities should inform and advise travelers who want to travel to countries with documented transmission of EVD, at the time of their trip the characteristics of the disease and transmission and inform them about personal protection measures.

Channels to disseminate this information: This information should be disseminated through medical care centers or travel agencies and/or web pages dedicated to this purpose.

8.5 Informing expat communities (from countries where EVD transmission has been documented)

Engage appropriate national authorities to reach out to expat community leaders to ensure open dialogue with the communities, to facilitate the health monitoring operations, and provide access to the health care services.

8.6 Media

National health authorities are invited to engage with the media to inform them about the modes of transmission and clinical presentation of EVD; about efforts made by national authorities to prepare for the introduction of EVD; and to seek in advance their collaboration and cooperation for the delivery and dissemination of health messages to the population, especially in case of suspicion or confirmation of EVD in the countries.

Related Links

- [WHO Ebola virus disease outbreak.](#)
- [Ebola virus disease WHO disease fact sheet](#)
- [Case definition recommendations for Ebola or Marburg Virus Diseases](#)
- [Frequently asked questions on Ebola virus disease](#)
- [Disease Outbreak News \(DON\) on Ebola](#)
- [WHO Interim manual - Ebola and Marburg virus disease epidemics: preparedness, alert, control, and evaluation](#)
- [WHO Risk Assessment. Human infections with Zaire Ebolavirus in West Africa, 24 June 2014](#)

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