



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

6 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 bodily 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 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 in 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 outbreak 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 Ebola virus in the Region may occur through international air travelers. 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

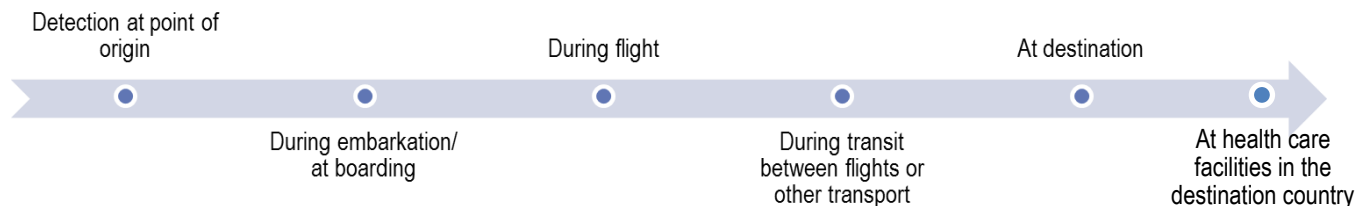
In the current context, the most likely scenario that countries in the Americas might have to face is the introduction of small number of cases. Therefore, to avoid further spread locally, it is critical that detection mechanisms be highly sensitive, so as to report to national public health authorities that an individual might be infected by the Ebola virus at the slightest suspicion, which, in their turn should immediately communicate this occurrence 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, any unusual health event possibly associated with Ebola virus infection, and any laboratory confirmed case of Ebola virus infection should be reported through the channels established under the International Health Regulations (IHR).

The identification of a case of Ebola virus infection must take into account both the clinical manifestations as well as the travel history (to a countries where the transmission of Ebola virus is being documented during the 21 days prior to the onset of symptoms) and exposure history to EVD reported by the patient as well as through epidemiological investigations.

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 indicated in the figure are properly informed and trained. They need to be kept updated on the evolution of the spread of EVD, and be trained to recognize the symptoms of EVD, inquire about travel history, and understand the protocols to inform relevant authorities.

Figure 1. Possible points of detection of EDV cases



Health staff and other relevant officials at health care facilities, airports, and other points of entry 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

Contact person is defined as any person having had contact with an EVD case during 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 bodily fluids during the illness
- Has touched his/her clothes or linens
- Has been breastfed by the patient (baby)

When an individual with clinical and epidemiology history compatible with EVD is identified, or in the case of an unexplained death in a traveler with clinical and epidemiological history compatible with EVD, even though laboratory diagnosis is pending, identification of contacts and their monitoring for 21 days after the last date of known exposure to EVD should be initiated.

If the patient with illness compatible to EVD develops symptoms while on an aircraft, contact tracing must be made according to the Risk assessment guidelines for diseases transmitted on aircraft (RAGIDA) protocol¹, which indicates contact tracing of all those passengers seated within 4 rows ahead and 4 rows behind, as well as the crew on board. If the cleaning of the aircraft is performed by unprotected personnel, they should be considered as contacts. Contacts should be assessed in a designated area within the airport according to the airport contingency plan.

When any international traveler in transit is among the identified contacts, the national authorities should determine the least disruptive and most acceptable way to secure the follow up of the contact. Continuation of international travel to the final destination should be preceded by communication to national health authorities in the relevant country.

National health authorities informed by their counterparts in other countries, directly or through PAHO/WHO, about the arrival in their jurisdiction of a contact of an EDV case, should ensure the monitoring of the individual for 21 days after the date of last exposure to EDV.

Both health personnel involved in the direct care of a patient under investigation for EVD or of a confirmed case of EVD, as well as laboratory personnel, must be considered as a contact and monitored for 21 days after the opportunity for exposure to contaminated material.

As part of contact tracing, the following information for each contact is to be collected: name, address, relationship with the patient, date of last exposure to EVD, 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

¹ 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

go to a health care facility if symptoms are present. For household visits of asymptomatic contacts, the use of personal protective equipment (PPE) by healthcare personnel performing the visit is not required.

Asymptomatic individuals identified as contacts do not require use of PPE as long as they remain asymptomatic, may continue their daily routines, and must remain available to health authorities, notifying health personnel of any change of location that may affect the health personnel's ability to carry out daily monitoring. For operational reasons, non-essential travel of contacts during the monitoring period is discouraged.

Contacts that developed symptoms compatible with EVD must be referred to the isolation ward in a designated hospital for medical assessment and further investigation. This should trigger further 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 laboratory diagnosis. The sample should be obtained 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). The 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.

In the case of death of an individual with illness clinically and epidemiologically compatible with EVD, an oral swab should be obtained. **Autopsy in these circumstances is contraindicated.**

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 samples have 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 BSL-2 laboratories managing samples of patients with illness compatible with EVD should, in addition to the use of routine PPE (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 (WHO CC). Samples must be sent to the WHO CC by the National Reference

Laboratory, as a category A infectious substance, according to International Air Transport Association's (IATA) standards and packed by personnel with international IATA certification for shipping and handling.

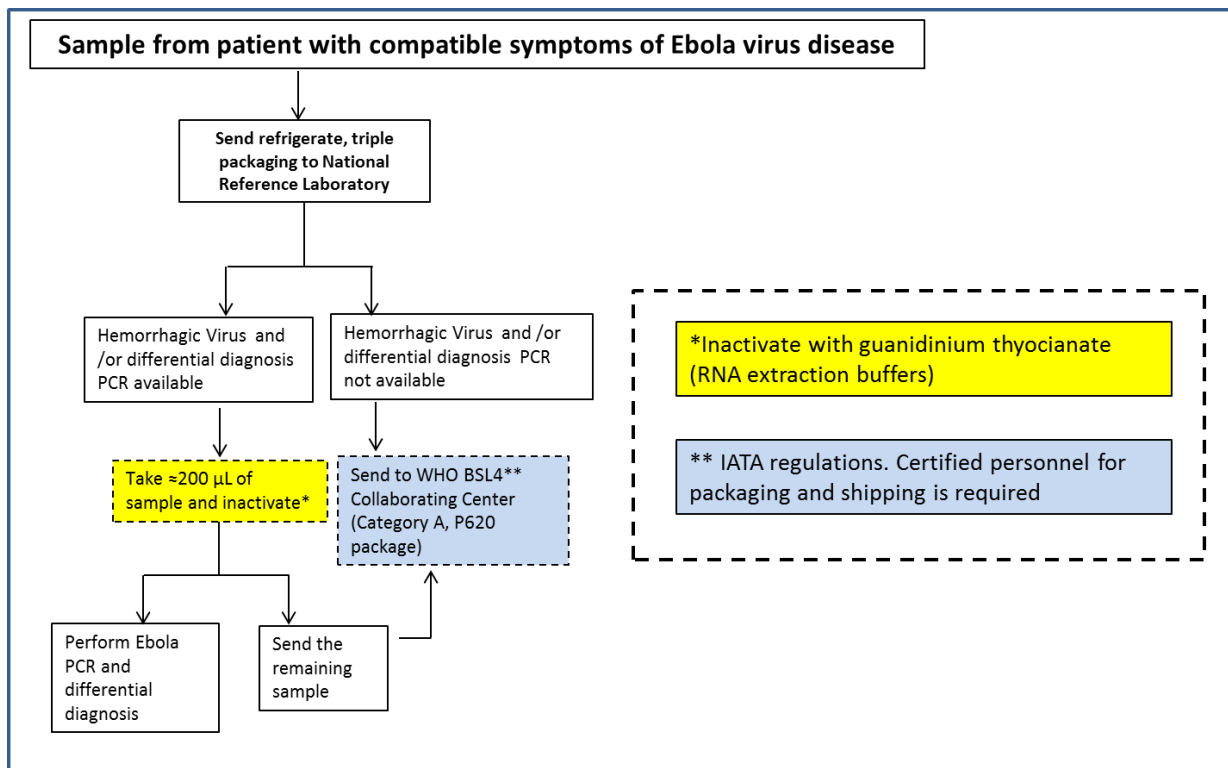
Sending samples presupposes functional delivery channels through a certified company (Courier). Competent national authorities must ensure a priori that the company is available for the shipment of the samples.

The laboratories in the Region that can receive samples for EVD confirmatory tests 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 should be empirically started pending the receipt of a definitive confirmation.

Figure 2 below presents the algorithm for the management of samples from patients with symptoms consistent with EVD.



5. Case management

5.1 Health services

Recognizing that patients with symptoms compatible EVD can be detected at different levels of the health care system or at points of entry, and that they should 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 PPE, 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 confirmed with EVD by laboratory tests 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 an individual with illness consistent with EVD is detected on an aircraft or at airport facilities, the patient should be directed to the area within the airport designated for isolation and evaluation by health personnel according to the airport contingency plan and prior to transfer to the designated hospital.

5.2 Patient referral

The referral of a patient with illness compatible with EVD to the designated isolation facility should be performed by trained health care professionals in an appropriate vehicle. The vehicle must only transport essential personnel for patient care.

PPE for the transfer:

- Personnel providing direct care to 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 PPE unless possible direct contact with the patient is anticipated.

Vehicle cleaning: After a vehicle has been used for the referral of the patient, it must be cleaned and disinfected with hypochlorite solution 0.05%. Professionals performing cleaning

should use PPE (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 bodily fluids. Transmission to health-care workers has been reported when appropriate infection control measures were not observed.

6.1 Standard Precautions

It is not always possible to identify patients with EVD early in the course of their illness because initial symptoms may be non-specific. For this reason, it is important that health-care workers at all levels 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 PPE according to the risk assessment
- Safe cleaning and disinfection of spills, environment, and reusable equipment

6.2 Contact precautions:

- Restriction of the number of staff dedicated to patient care
- Limited number of visits
- Keeping log books to register staff caring for the patient as well as visitors
- Use of PPE by both health care personnel and visitors
- Washing hands
- Use of surgical masks, goggles – preferably with anti-fog visor, waterproof apron, gloves and closed shoes before entering the patient's room.
- Safe removal of PPE before leaving the isolation area. Special care should be taken when removing PPE to prevent contact with eyes and mucous membranes.
- Designation of dedicated staff for monitoring the correct use of PPE in both health personnel and visitors
- Use of disposable PPE is generally recommended. When disposable PPE can not be obtained or is not available, the following items can be re-used following appropriate disinfection:
 - Goggles or eyewear must be first washed with water and soap and then disinfected with 70% alcohol

- Impermeable gowns or aprons that cannot be sent to the hospital laundry facilities must be disinfected with hypochlorite solution 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 household 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 bodily 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 bodily fluids.

In the hospital: Both the bedding and clothing of the patient should be placed in an appropriate 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 under investigation for EVD or to a confirmed EVD case must be incinerated.

6.5 Infection control in aircraft

Should an individual with illness compatible with EBV be identified on board, the crew will have to adhere to relevant IATA's recommendations for infection control and proceed with the notification according to the procedures of the International Civil Aviation Organization (ICAO).² The cabin crew should be using the Universal Precaution Kit as recommended by IATA.

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

² 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](#)

While the most probable scenario for the introduction of the Ebola virus in the Region is likely to be by air travel, there is a high volume of commercial ships and cruise ships in the Americas. Prevention and control measures onboard ships are available in English.³

6.6 Safe disposal of dead bodies

The handling of bodies of individuals who died from EVD should be limited and their integrity maintained.

While recognizing the existence of deep-seated funeral rituals and burial practices in different cultural and religious contexts, ensuring safe disposal of dead bodies is crucial to limit the spread of EVD. Bodies must not be embalmed. Bodies should be disinfected with hypochlorite solution 0.5%, placed in leak proof body bags, which must be properly closed and placed in a closed casket before burial.

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

7. Clinical Management

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

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.

Invasive procedures in patients under investigation for EVD or confirmed EVD cases should be limited.

Criteria for terminating patient isolation

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

Special Considerations

- **Breastfeeding:** Because the virus is transmitted by breast milk, it is recommended that women under investigation for EVD or with confirmed Ebola virus infection not breastfeed.

³ [WHO Aviation Guide which includes information on sanitizing of aircraft](#)

- Since the Ebola virus can still be transmitted through semen up to seven weeks after recovery from the illness, men should be advised to avoid sexual intercourse for at least seven weeks after recovery or to have protected intercourses.

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 EVD in the Region is through international air travel, the following is recommended:

- To establish close coordination mechanisms with civil aviation authorities, airports authorities and airlines operating in the country in order to facilitate and coordinate case detection among travelers; manage contacts; and access information critical to enable the contact tracing of travelers. Therefore it is essential to involve, at all times, governmental authorities responsible for the transport sector as well as immigration authorities.
- To coordinate with the aforementioned authorities to:
 - Accurately determine the country from which travelers under investigation for EVD are possibly proceeding (e.g. information about the nationality through passport information available to immigration authorities; information about the complete itinerary through the airlines).
 - Facilitate the location of contacts both in and outside the country: through immigration authorities for those who are in the country; through the airlines as for the flights' manifests, the determination of the final destination in order to inform relevant national authorities accordingly.
 - Activate the component of the airport contingency plan required to guide the response to a public health event.

- 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 relevant operators in the tourism sector (hotels, cruise lines, travel agencies, etc.) about the outbreak evolution, the international recommendations and of the government's preparation efforts.
 - Through the Ministry of Foreign Affairs, Ministry of Defense, and other relevant Ministries, reach out to the private sector national institutions, non-profit organizations that have personnel or operations (commercial, military, scientific, humanitarian, cooperation or other) in the countries where the transmission of EVD is being 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 about the detection cases compatible with EVD 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 by the community of public health measures to control EVD, should there be one or more individuals under investigation for EVD and/or EVD confirmed cases.

8.4 Informing travelers

Given the evolution of the outbreak and considering the international recommendations published, national authorities should inform and advise travelers who intend to travel to countries with documented transmission of EVD, about the characteristics of the disease, its modes of transmission, the timing of the travel, and about personal protective measures.

This information should be disseminated through travel clinics, travel agencies and/or web pages dedicated to this purpose.

8.5 Informing expat communities (from countries where EVD transmission is being documented)

National health authorities are invited to engage with relevant national and local authorities to reach out to expat community leaders to ensure open dialogue with the communities, to

facilitate potential health monitoring operations, and facilitate access to the health care services.

8.6 Media

National health authorities are invited to engage with the media to inform them about characteristics of the disease, its modes of transmission, 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 country.

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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