



RAPID RISK ASSESSMENT

Outbreak of Ebola virus disease in West Africa

Fourth update, 3 September 2014

Main conclusions and options for risk reduction

Since December 2013 and as of 26 August 2014, 3 070 cases of Ebola virus disease (EVD), including 1 553 deaths have been reported by the World Health Organization (WHO) in affected countries (Guinea, Liberia, Sierra Leone and Nigeria). On 29 August, the Ministry of Health in Senegal reported a confirmed case of EVD in a 21-year-old male who recently arrived from Guinea. No local transmission of EVD is currently reported in Senegal therefore the country is not among the list of affected countries to date. The outbreak is spreading fast and accelerating. The most affected rural area during the past three weeks is the cross-border area of Gueckedou (Guinea), Lofa (Liberia) and Kenema and Kailahun (Sierra Leone). Transmission in the capital cities is of particular concern, owing to their population density and the repercussions for travel and trade.

The evolving outbreak of EVD over the last weeks increases the likelihood that residents and travellers to the EVD-affected countries will be exposed to infected or ill persons. The risk of infection for residents and visitors to the affected countries through exposure in the community is considered low if they adhere to the recommended precautions.

People visiting friends and relatives in the affected countries tend to have more and closer contacts in the community, and they are more likely than other visitors to participate in burial ceremonies – an activity known to be associated with transmission of the Ebola virus.

Residents and visitors to the affected areas run a high risk of exposure to EVD in healthcare facilities. The risk of being exposed to the Ebola virus is higher for healthcare workers, e.g. volunteers from NGOs who work in settings where appropriate infection control measures have not been implemented.

Risk of importation to the EU is linked to the number of patients presenting with symptoms and seeking medical attention in the EU.

The risk of Ebola viruses spreading from an EVD patient who arrives in the EU as result of a planned medical evacuation is considered extremely low. If a symptomatic case of EVD presents in an EU Member State, secondary transmission to caregivers in the family and in healthcare facilities cannot be ruled out. Once the possibility of EVD has been recognised and, healthcare providers have taken precautions to stop transmission, the risk of spread is reduced to a minimum.

The options for risk reduction are:

- To reduce the risk of infection by avoiding non-essential travel into the affected areas and strictly following the EVD prevention measures in communities. As there is an increased risk of infection in healthcare facilities, visitors to the EVD affected countries should identify appropriate in-country healthcare resources prior to

Erratum: the following corrections were made on 5 September 2014

Pg.2: the affiliation of the external expert Chantal Reusken was corrected.

Pg.13: links to case definitions were updated.

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travelling;

- To reduce the risk of importation of Ebola viruses from affected countries into the EU, the WHO recommendations related to the declaration of a Public Health Event of International Concern (PHEIC) should be applied. Screening at the point of departure (exit screening) in the affected countries is likely to be more effective and less costly than screening of passengers at point of entry in EU/EEA countries (entry screening). Therefore, entry screening in the EU should be considered only for direct flights originating from EVD-affected countries where there is no evidence of effective exit screening;
- To reduce the risk of transmission within the EU following importation of Ebola viruses, the following options are available: enhance information and communication to travellers departing from EVD-affected countries, raise awareness and sensitise healthcare providers in the EU about EVD, and support them with resources that will help them to identify and manage potential EVD patients.

Source and date of request

ECDC internal decision, 26 August 2014*.

Public health issue

To update the assessment of the risk of importation and transmission of Ebola viruses in the EU associated with the outbreak of Ebola virus disease in West Africa currently affecting Guinea, Liberia, Sierra Leone and Nigeria. This assessment does not cover the ongoing EVD outbreak in the Democratic Republic of Congo.

Consulted experts

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Disease background information

Infections with Ebola viruses originating from Africa cause a severe disease in humans called Ebola virus disease. There are five species of the genus *Ebolavirus* (Filoviridae family): *Zaire ebolavirus*, *Sudan ebolavirus*, *Reston ebolavirus*, *Tai Forest ebolavirus* and *Bundibugyo ebolavirus* [1-3]. The current outbreak in West Africa is caused by *Zaire ebolavirus*. A concurrent EVD outbreak was declared on 26 August 2014 in the Democratic Republic of Congo. The two outbreaks are not connected [4].

Ebola viruses are biosafety level-4 pathogens (BSL-4; risk group 4) and require special containment measures and barrier protection, particularly for healthcare workers. The viruses can survive in liquid or dried material for many days [5]. They are inactivated by gamma irradiation, heating for 60 minutes at 60°C or boiling for five minutes, and are sensitive to sodium hypochlorite (bleach) and other disinfectants [6]. Freezing or refrigeration will not inactivate Ebola viruses [7-9].

The incubation period (the period between infection and first symptoms) is usually four to ten days but can be as short as two days and as long as 21 days. The case-fatality ratio for *Zaire ebolavirus* infections is estimated to be between 44% and 90% [10].

Ebola viruses are highly transmissible by direct contact with infected blood, secretions, tissues, organs and other bodily fluids from dead or living infected persons. Transmission via inanimate objects contaminated with infected bodily fluids (fomites) is possible [11]. The principal mode of transmission in human outbreaks is person-to-person transmission through direct contact with a symptomatic or dead EVD case. Airborne transmission has not been documented. The risk for transmission is considered low in the early phase of human disease (prodromal phase) [4]. Burial ceremonies and handling of dead bodies play an important role in transmission [2]. Ebola virus genome

* The current EVD outbreak was first assessed in an ECDC rapid risk assessment entitled '[Outbreak of Ebola haemorrhagic fever in Guinea](#)', dated 23 March 2014 [12]. Detailed information about the Ebola virus and the epidemiology of EVD can be found in the first update, entitled '[Outbreak of Ebola virus disease in West Africa](#)', published on 8 April 2014 [13]. A [second update](#) was published on 9 June 2014 [14], and a [third update](#) was published on 1 August 2014.

has been detected in semen up to 91 days after onset of disease [12], and sexual transmission of another filovirus, Marburg virus, has been documented six weeks after onset of disease [13].

Table 1. Levels of risk of transmission of Ebola viruses according to type of contact with an infected patient

Type of contact	Type of contact
Low risk	Casual contact with a feverish but ambulant and self-caring patient, e.g. sharing a sitting area or public transportation; receptionist tasks.
High risk	<ul style="list-style-type: none"> • Close face-to-face contact (e.g. within one meter) without appropriate personal protective equipment (including eye protection) with a probable or confirmed case who is coughing, vomiting, bleeding, or who has diarrhoea; or has had unprotected sexual contact with a case up to three months after recovery; • direct contact with any material soiled by body fluids from a probable or confirmed case; • percutaneous injury (e.g. with needle) or mucosal exposure to bodily fluids, tissues or laboratory specimens of a probable or confirmed case; • participation in funeral rites with direct exposure to human remains in or from affected area without appropriate personal protective equipment; • direct contact with bush meat or bats, rodents, primates, living or dead in/from affected areas,

Event background information

On 22 March 2014, the Guinea Ministry of Health notified WHO about a rapidly evolving outbreak of EVD [14]. Investigations indicated that the first cases occurred in December 2013. Institut Pasteur in Lyon, France confirmed a clade of *Zaire ebolavirus* that is related but distinct from the viruses that have been isolated from previous outbreaks in central Africa, and clearly distinct from the *Tai Forest ebolavirus* that was isolated in Côte d'Ivoire from 1994–1995 [2,15,16].

The first cases were reported from south-eastern Guinea and the capital Conakry. By May, the first cases were reported from Sierra Leone and Liberia [17,18] to where the disease is assumed to have spread through the movement of infected people over land borders. At the end of July 2014, a symptomatic case travelled by air to Lagos, Nigeria where he infected a number of healthcare workers and airport contacts before his condition was recognised to be EVD. This cluster in Nigeria, initiated by air travel of an infectious person, has now resulted in tertiary cases in Nigeria and recently a new cluster in Port Harcourt, Rivers State with three confirmed cases [19] [20]. Therefore, Rivers State is now considered as an affected area.

On 29 August, the Ministry of Health in Senegal reported a confirmed case of EVD in a 21-year-old male native of Guinea. He arrived in Dakar, by road, on 20 August and was hospitalised on 26 August after having initially been treated for malaria. On 27 August 2014, the Ministry of Health was informed that the patient was a contact of a known Ebola patient in Guinea and the patient was immediately isolated [21]. However, no local transmission of EVD is currently reported in Senegal therefore the country is not among the list of affected countries.

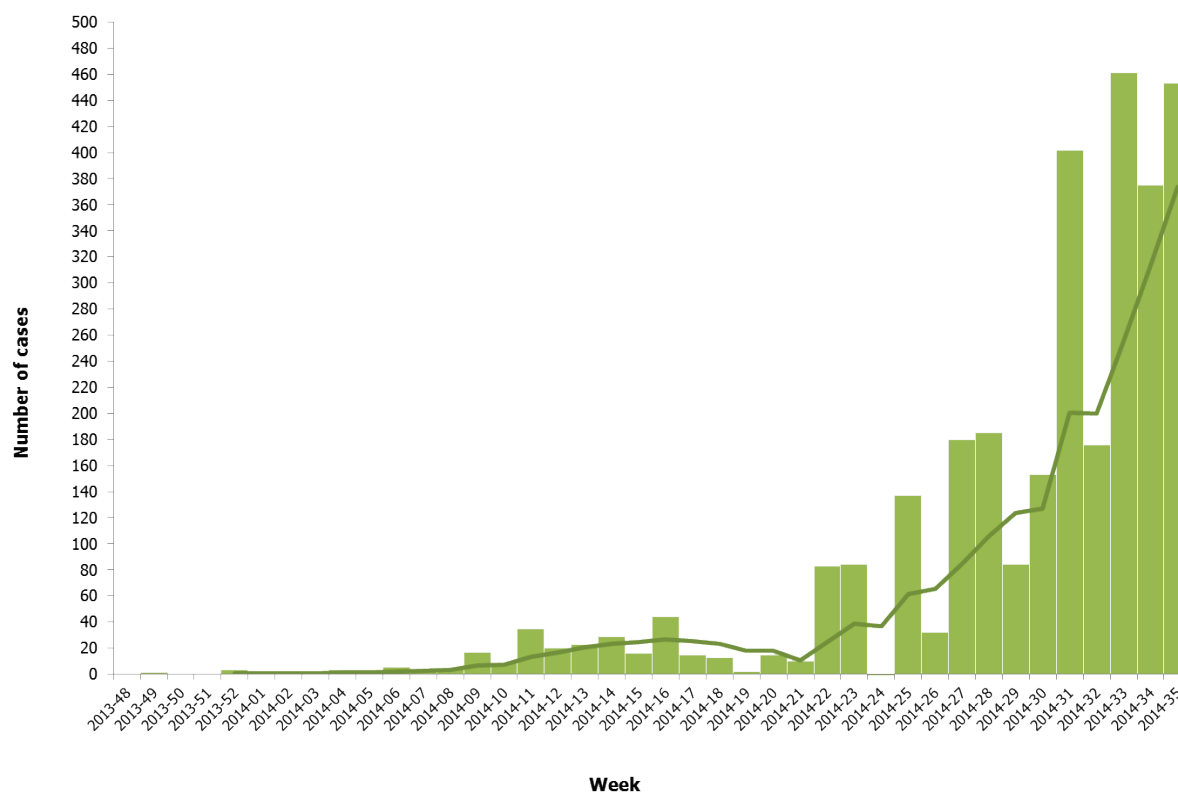
This is the first outbreak of EVD in West Africa and the 25th outbreak globally since the disease was discovered in 1976 in Zaire. It is unprecedented in size, in geographical distribution, and in affecting densely populated urban areas. The outbreak has not yet reached its peak and it is currently in a phase of rapid spread. WHO declared the outbreak a Public Health Event of International Concern (PHEIC) on 8 August 2014 [22]. Officially reported figures are generally believed to be gross under-estimations of the real magnitude of this outbreak. The health system and epidemiological surveillance are struggling to keep-up with developments and hundreds of healthcare workers have become infected and died [23].

Epidemiological update

The outbreak is spreading fast and accelerating.

Since December 2013 and as of 26 August 2014, 3 071 cases of EVD, including 1 553 deaths have been reported by WHO (Figure 1). The breakdown by affected countries is presented in Table 2 and Figure 2.

Figure 1. Distribution of reported cases of EVD by week, in Guinea, Sierra Leone, Liberia, Nigeria and Senegal, week 48/2013 to 35/2014 (as of 26 August 2014*)

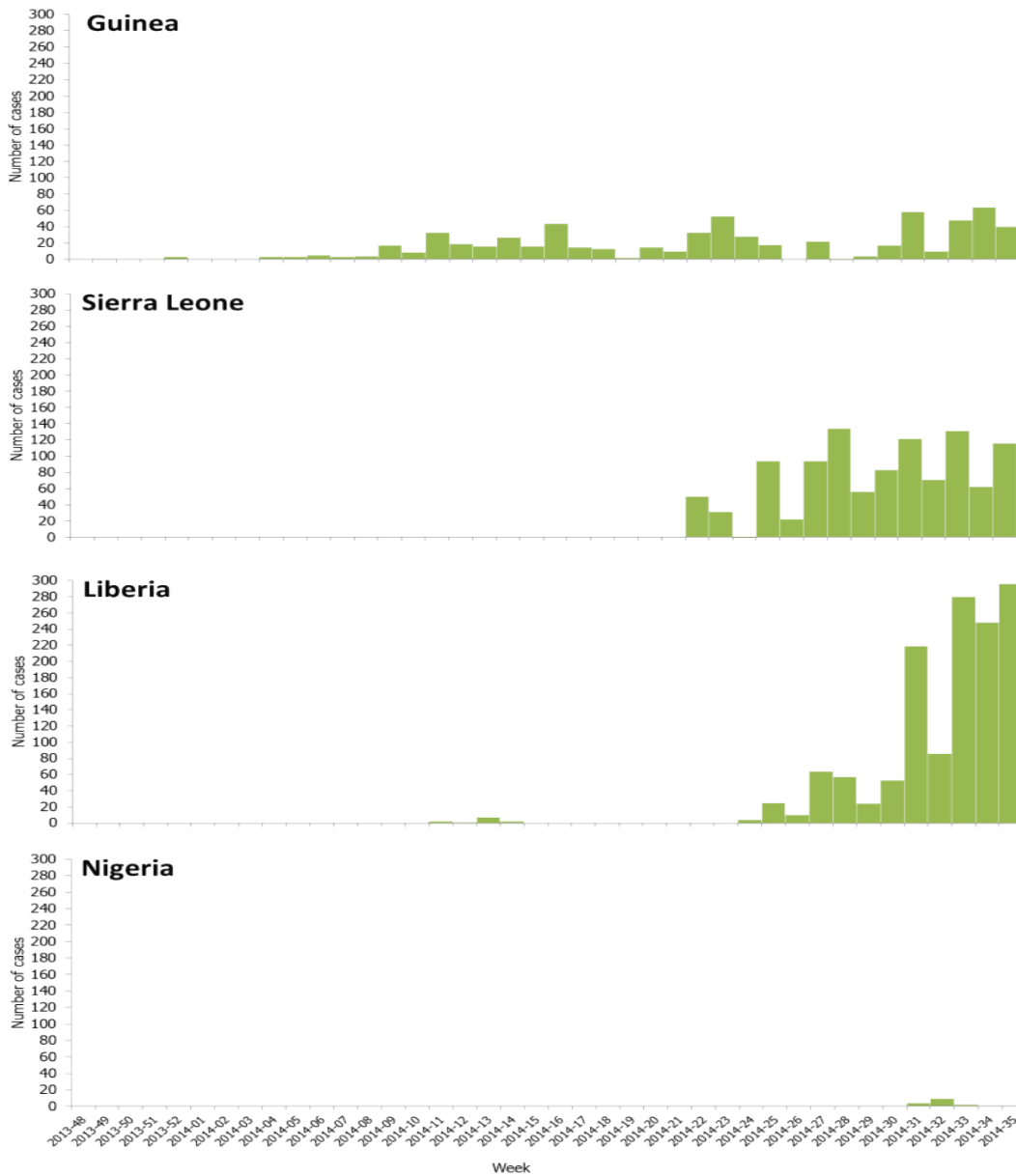


*The bar for week 35/2014 does not represent a complete week. The solid green line represents the outbreak trends based on a five week moving average plotted on the fifth week of the moving average window.

Table 2. Cases, deaths and case-fatality ratios in West African EVD-affected countries, as of 26 August 2014

Country	Cases as of week 2014–35	Deaths as of week 2014–35	Case-fatality ratio
Guinea	648	430	66.4%
Sierra Leone	1 026	422	41.1%
Liberia	1 378	694	50.4%
Nigeria	19	7	36.8%
Total	3 071	1 553	50.6%

Figure 2. Distribution of cases of EVD by week of reporting in Guinea, Sierra Leone, Liberia, and Nigeria (as of 26 August 2014*)



* The bar for week 35/2014 does not represent a complete calendar week.

According to WHO [24], close to 40% of the cases have occurred within the past three weeks. Of these, 34% are concentrated in the cross-border area of Gueckedou (Guinea), Lofa (Liberia) and Kenema and Kailahun (Sierra Leone) as presented in Figure 3. Transmission in the capital cities are of particular concern, owing to their population density and the repercussions for travel and trade.

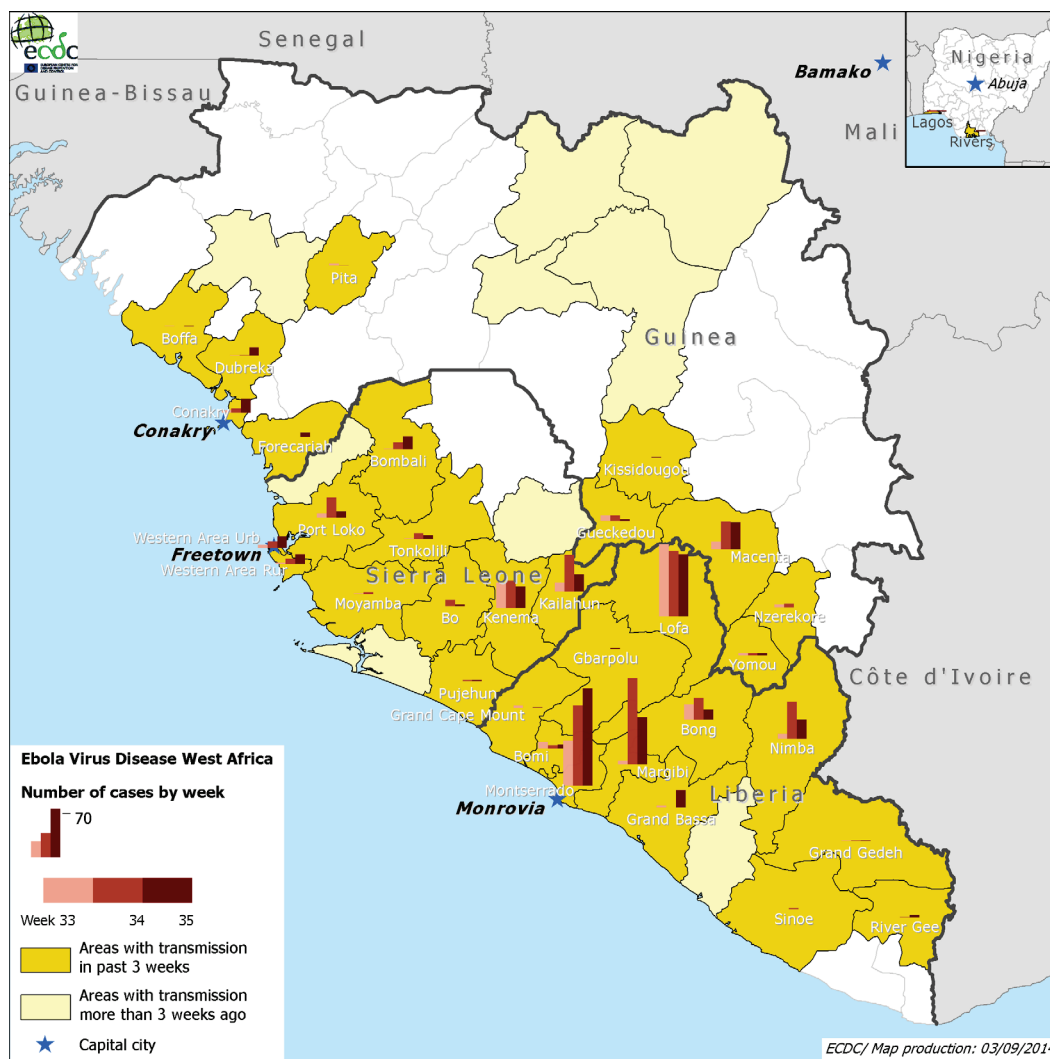
During weeks 33 to 35, Liberia presented with the highest transmission, with 53% of the cases reported from the counties of Monserrado where the capital Monrovia is located (20.6% of cases), Margibi county (19.3%) and Lofa county (13%). During the same period in Sierra Leone, Kenema and Kailahun districts reported 7.2% and 6.0% of the cases in the past three weeks. In Guinea, the prefecture of Macenta is the most affected location countrywide (6.0%).

Table 2. Number of cases by affected district/county/prefecture in Guinea, Liberia and Sierra Leone during the week 33 to 35*

Affected district/county/prefecture	Country	Number of case during the past three weeks (33 to 35)	Percentage of total
Montserrado	Liberia	321	20.4
Lofa	Liberia	287	18.2
Margibi	Liberia	197	12.5
Kenema	Sierra Leone	106	6.7
Kailahun	Sierra Leone	91	5.8
Macenta	Guinea	90	5.7
Others	Guinea/Sierra Leone/Liberia	485	30.8
Total		1 577	100.0

Data source: adapted from WHO and Ministry Health reports. * Last data update: Guinea, 29 Aug 2014, Liberia, 29 Aug 2014, Sierra Leone, 29 Aug 2014 and Nigeria, 28 Aug 2014

Figure 3. Distribution of EVD cases by week of reporting in Guinea, Liberia, Sierra Leone and Nigeria (as of 29 August 2014*)



Data source: adapted from WHO and Ministry Health reports. * Last data update: Guinea, 29 Aug 2014, Liberia, 29 Aug 2014, Sierra Leone, 29 Aug 2014 and Nigeria, 28 Aug 2014.

An EVD genomic surveillance study conducted in Sierra Leone from end of May to mid-June 2014 on 99 Ebola virus genomes from 78 patients showed that the virus is changing relatively quickly with intra-host and inter-host genetic variations. It appears that the observed substitution rate is roughly twice as high within the 2014 outbreaks as between all other outbreaks. Data from the study in Sierra Leone showed that the present outbreak appears to be linked to one single introduction from wildlife [15,25].

Consensus sequences from patients with multiple specimens analysed were identical but some were reported from other patients with a unique specimen analysed. These discrepancies might affect the sensitivity and specificity of each PCR assay. A continuous information sharing and monitoring of targeted genome sequences is needed to ensure that the selected primers for RT-PCR fit with the circulating strains [25].

Concurrent Ebola virus disease outbreak in the Democratic Republic of Congo

On 26 August 2014, the Ministry of Health of the Democratic Republic of the Congo (DRC) notified WHO of an outbreak of EVD in the Equateur province [26]. The index case was a pregnant woman who died from unidentified haemorrhagic fever in a local hospital. She had butchered an animal hunted by her husband who later died. Between 28 July and 29 August 2014, the index case generated 53 suspected and confirmed cases of haemorrhagic fever, including 13 deaths. Five of the fatalities were healthcare personnel. None of the cases had history of travel to the EVD-affected countries in West Africa or history of contact with individuals from the affected areas. The species causing the outbreak has been identified as *Zaire ebolavirus*. The strain was found to be 99% homologous to Kikwit 1995 strain and therefore different from the *Zaire ebolavirus* strain circulating in West Africa [27]. This viral species has caused six previous outbreaks in DRC since 1976. The case-history of preparing bush meat suggests a direct zoonotic introduction in a remote area of the Equateur province providing additional evidence that this outbreak is not connected to the West African outbreak.

Outbreak response in the EVD-affected countries

The goal of Ebola outbreak response is to interrupt all chains of human-to-human transmission. The principle strategies for achieving this are:

1. To instruct community leaders about the disease, ways of transmission and how to protect against infection, and to engage them in communicating this information to community members;
2. To quickly identify and isolate suspected EVD cases for laboratory diagnosis confirmation and supportive treatment;
3. To identify all contacts of each EVD case, actively monitor their health for the maximum incubation period of 21 days, and isolate, diagnose and treat all contacts who develop symptoms;
4. To minimise the risk of transmission in healthcare settings through the consistent and appropriate use of personal protective equipment (PPE) and handling of hospital waste;
5. To ensure safe removals and burials of deceased EVD cases;
6. To raise public awareness and promote adherence to protective behaviour [2,28].

Successful implementation of these strategies depends on building and maintaining public trust in government response measures and ensuring cooperation from the affected families and their communities.

The implemented measures have so far been unsuccessful in controlling the outbreak. The biggest challenges have been encountered in Sierra Leone and Liberia, the two countries where the spread is currently accelerating the fastest.

Prevention of transmission to healthcare workers

Healthcare workers are at high risk of exposure to Ebola viruses during an outbreak. The risk of the exposure resulting in infection depends on the availability and consistent use of PPE. There are frequent reports about shortages of PPE, particularly from Liberia and Sierra Leone, despite the substantial financial support that has been pledged by the international community.

Transmission to healthcare workers has occurred after close contact with EVD patients. This includes settings where infection control precautions were in place but not strictly adhered to [29]. Healthcare workers are potentially exposed not only through direct contact with cases but also through contaminated hospital materials, medical waste and diagnostic samples. However, the risk of healthcare-associated Ebola virus infections can be controlled by consistent and appropriate use of infection control precautions and strict barrier nursing procedures [30].

Isolation of patients, barrier nursing and other Ebola viruses control measures are burdensome for healthcare staff, particularly in hot and humid climates, and it can be difficult to ensure compliance over time.

The increase of patients who need to be cared for over the past two months has meant that more healthcare workers are exposed to Ebola viruses in their daily work.

The number of infected healthcare workers and the proportion of healthcare workers among EVD cases are not being systematically reported. However, WHO reports that more than 240 health care workers have developed EVD in Guinea, Liberia, Nigeria, and Sierra Leone, and more than 120 have died, and that this is an unprecedented high proportion of deaths in healthcare workers [23]. Of particular concern is that healthcare workers seem to continue to become infected long into the outbreak, at a time when standard procedures for prevention of healthcare associated transmission could be expected to be in place.

Medical evacuations from EVD-affected countries

A small number of Ebola virus infected people have been evacuated from the EVD-affected countries.

Table 3. Medical evacuation from EVD affected countries up to 1 September 2014.

Date of evacuation	Evacuated from (country)	City (Country) of evacuation	Profession	Outcome	Citizenship
2 August 2014	Liberia	Atlanta (USA)	Healthcare worker	Discharged	US
5 August 2014	Liberia	Atlanta (USA)	Healthcare worker	Discharged	US
6 August 2014	Monrovia, Liberia	Madrid (Spain)	Healthcare worker	Death	Spanish
24 August 2014	Sierra Leone	London (United Kingdom)	Healthcare worker	Stable	British
27 August 2014	Sierra Leone	Hamburg (Germany)	Epidemiologist	Stable	Senegalese

There are increasingly frequent reports about expatriate healthcare workers being repatriated from the EVD-affected countries for monitoring following exposure to Ebola viruses. Such repatriations should be executed early after the potential exposure, while the risk of transmission is minimal, should the exposed person turn-out to be infected.

The possibility of timely medical evacuation is likely to be an important factor in the decision when international staff consider going on mission to an EVD-affected country. This applies particularly for personnel who are asked to engage in contact tracing, patient care and other outbreak control activities that increase exposure to infected people. It is anticipated that medical evacuation needs will increase over the coming months as the outbreak escalates and the number of expatriate healthcare workers engaged in outbreak control in the field increases.

International transport to the EVD-affected countries

An increasing number of countries have issued temporary travel advice against non-essential travel to the EVD-affected countries. A number of international airlines have reduced or stopped operations to the EVD-affected countries, and these restrictions in international transport have already resulted in delays in the shipment of medical-related supplies to the affected population, including personal protection equipment. In addition, due to these measures, the affected countries are starting to suffer shortages of fuel, food and basic supplies.

ECDC threat assessment

The outbreak control measures implemented so far have failed to control the outbreak, in particular in Liberia and Sierra Leone where the outbreak is now accelerating rapidly. There is no reason to believe that the failure to control the outbreak is the result of increased pathogenicity of the outbreak strain. As in previous EVD outbreaks, transmission seems to be primarily driven by direct contact with EVD cases and dead bodies, and the wide geographical spread is the result of ineffective contact tracing and monitoring which has allowed infected people to travel during the incubation period.

The risk of Ebola virus arriving in the EU will not be eliminated until transmission stops in affected countries and there is an urgent need for substantial international support to bring this outbreak under control.

The epidemiological data coming out from the EVD-affected countries has improved over recent months but it is still far from reliable. It is expected that the rate of new cases will continue to rise in Sierra Leone and Liberia in the coming weeks and possibly months. The complexity of the outbreak, the weak public health systems in the affected countries and the magnitude of this outbreak make it difficult to predict when the spread is likely to peak and start to decelerate. According to WHO's recently published roadmap, the actual number of cases may be two to four fold higher than currently reported, and it is estimated that the aggregate count could exceed 20 000 EVD cases over the course of the outbreak [31].

As reported on 26 August in Dakar, Senegal, it is possible that the outbreak will spread over land to neighbouring countries, in particular to Ivory Coast as there is increasing transmission in the neighbouring south-east region of Liberia. It is also likely that there will be more long distance exportations of EVD cases by air, particularly if people with the means to travel abroad experience deteriorating prospects of receiving proper care in their home countries. The rate of spread in the region will depend on the effectiveness of the control measures and preparedness in surrounding countries in West Africa.

There is no evidence that the recommended infection control measures are insufficient to ensure an appropriate level of protection when applied appropriately.

Risk of exposure to EU residents and travellers in affected countries

Risk of exposure in the community

The upsurge in the number of new EVD cases over the last weeks, the existence of urban transmission, and the fact that not all chains of transmission are known, increase the likelihood that residents and travellers to the EVD-affected countries will be exposed to infected or ill persons. The risk of infection for residents and visitors to the affected countries through exposure in the community is considered low if they adhere to the recommended precautions. However, infection cannot be ruled out if mucosa or skin abrasions of people come in contact with Ebola virus contaminated surfaces and items, or directly or indirectly through contaminated hands.

People visiting friends and relatives in the affected countries tend to have more and closer contacts in the community and they are more likely than other visitors to participate in burial ceremonies – an activity known to be associated with transmission of the Ebola viruses.

Risk of exposure in healthcare settings

Residents and visitors to the affected areas run a high risk of exposure to EVD in healthcare facilities. The level of this risk is related to how well the infection control measures are being implemented in these settings and the nature of the care required. While the risk is very low for a consultation requiring non-invasive tests and prescription of oral drugs, it may be increased if invasive procedures are required.

The high number of infected healthcare workers indicates that infection control measures have not been successfully implemented. The infection risk is not limited to hospitals that provide care to known EVD cases because infectious cases may initially seek medical attention at any healthcare provider. Furthermore, the risk of exposure in healthcare settings also exists in areas that have not yet reported cases because it is suspected that not all cases of EVD are being detected and reported.

The risk of being exposed to Ebola viruses is higher for healthcare workers, e.g. volunteers from NGOs which provide assistance in settings where no infection control measures have been implemented. The risk is particularly high for healthcare workers who carry out invasive medical procedures or provide care to EVD patients.

Risk of importation to the EU

People infected with EVD may arrive in the EU by direct or indirect flights from affected countries or on board freighter or passenger ships. A remote possibility is a chain of transmission along the route used by undocumented migrants who end up on the southern shore of the Mediterranean and attempt to reach Europe by sea. Although the probability of this event is very small, the consequences could be devastating in detention centres and on board ships at sea. EVD cases may travel while incubating the disease and therefore not present with symptoms at the time of arrival, or may arrive sick because they developed symptoms while travelling. Ebola virus disease can develop quickly, and cases are not always aware that they have been exposed to Ebola virus. Incubating cases do not show symptoms and cannot be detected through screening at points of exit or entry. They may be unaware of exposure or deny it, and when presenting to an EU healthcare facility, clinicians may not suspect EVD.

Patients presenting with symptoms and seeking medical attention in the EU

There is a possibility that persons who were exposed to Ebola virus and developed symptoms board a commercial flight to seek medical attention in the EU. It is highly likely that such patients would report to a healthcare facility upon arrival in the EU and then be isolated to prevent further transmission.

Travel and transport risk assessment

A traveller on-board an airplane may be already ill or become ill during the flight, showing symptoms compatible with EVD. In this situation, the possibility of transmission to co-passengers and crew should be assessed using the ECDC RAGIDA guidelines [8].

If an investigation concludes that the passenger has symptoms compatible with EVD and was exposed to EVD in the past 21 days, all passengers and crew who report direct contact, as well as all passengers seated one seat away from the sick person, should be monitored for 21 days. In addition, all passengers, crew members and cleaning staff who had direct contact with the suspected case's bodily fluids or potentially contaminated fomites such as contaminated clothing, towels, or utensils should be investigated and monitored.

Any person who was exposed to Ebola viruses and develops symptoms while on board a freighter/passenger ship sailing to the EU should be declared in a Maritime Declaration of Health form and in accordance with article 37 of the 2005 International Health Regulations [32]. Affected crew members or passengers should be taken care of appropriately in order to prevent any further spread of the disease.

Risk related to biosafety

There is a theoretical risk that a biological sample is sent to an EU laboratory for further testing, without proper indication of a possible connection to Ebola virus. Strict compliance with sample shipment regulations and universal precautions in the receiving laboratory should mitigate this risk [33].

Risk of transmission through substances of human origin

According to the EU Blood Directive [34], current geographic deferrals for malaria also exclude residents and travellers from EVD-affected countries from donating blood.

Risk of spread of Ebola virus in the EU following importation

The risk of Ebola virus spreading from an EVD patient who arrives in the EU as result of a planned medical evacuation is considered extremely low. The risk of spread is minimal when the recommended infection control measures are followed, and the staff organising evacuations and the institutions receiving the evacuated EVD patient are expected to be well trained.

If a symptomatic case of EVD presents in an EU Member State, secondary transmission to caregivers in the family and in healthcare facilities cannot be ruled-out, particularly if presenting with symptoms exposing bodily fluids (bleeding, diarrhoea) before an Ebola virus infection is suspected and infection control measures implemented. Once the possibility of EVD has been recognised and the healthcare providers have taken precautions to stop transmission, the risk of spread should be reduced to a minimum.

Options for risk reduction

The focus of this document is on individual protection and the options for mitigating the risk of importation and spread in the EU.

Reduction of the risk of infection

Avoiding travel to affected areas

The most obvious option to decrease the risk of importation from affected areas is to advise travellers to defer their travel to these affected countries until the outbreak is controlled there. Twenty-four EU/EEA countries have recommended this option for their citizens, 20 recommending avoiding or postponing non-essential travel and four advising against all travel in the affected areas. WHO does not recommend any travel or trade restrictions to countries involved in this outbreak [35].

Preventing infection in communities

Visitors and residents in EVD-affected areas face a low risk of becoming infected in the community if the following precautions are strictly followed:

- avoid contact with symptomatic patients and their bodily fluids
- avoid contact with corpses and/or bodily fluids from deceased patients
- avoid contact with wild animals (including primates, monkeys, forest antelopes, rodents and bats), both alive and dead, and consumption of 'bush meat'
- wash hands regularly, using soap or antiseptics.

Generic precautions for travelling in West African countries also apply to the prevention of EVD infection:

- washing and peeling fruit and vegetables before consumption
- practice 'safe sex'
- avoid habitats which might be populated by bats, such as caves, isolated shelters, or mining sites.

Preventing infection in healthcare settings

There is an increased risk of exposure and infection in healthcare facilities. Options for prevention and control of this risk include:

- avoid non-essential travel to EVD-affected areas and countries
- identify appropriate in-country healthcare resources in the EVD-affected countries prior to travelling there
- ensure that your travel insurance covers medical evacuation in the event of any illness or accident in order to limit exposure to local health facilities.

However, recent events in the affected countries have demonstrated that it may not always be possible to comply with the above precautions and this is the rationale behind many countries' advice against non-essential travel to Liberia and Sierra Leone.

Reduction of the risk of importation to the EU

Option in affected countries

Reducing the risk for importation to the EU even further, on 8 August 2014, WHO declared the Ebola virus disease outbreak in West Africa a Public Health Emergency of International Concern (PHEIC) in accordance with the International Health Regulations. As a consequence, WHO is recommending the following measures for affected Member States, following the declaration of the PHEIC:

- Affected countries are requested to conduct exit screening of all persons at international airports, seaports and major land crossings for unexplained febrile illness consistent with potential Ebola infection. There are indications that exit screening has been implemented in Conakry and prevented 47 feverish travellers from boarding an airline [36].
- There should be no international travel of Ebola cases or contacts of cases, unless the travel is part of an appropriate medical evacuation. To be fully effective, this measure should restrict asymptomatic contacts of EVD cases from leaving the EVD-affected country on an international flight until the 21-day incubation period has passed. As the ratio of contacts to cases is high, this measure represents a significant logistic challenge. It may also prevent expatriate professionals engaged in outbreak control from leaving the EVD-affected country in case they are exposed to Ebola viruses.

The implementation of this measure could indicate:

- the screening of all air passengers departing EVD-affected countries for history of contact with EVD cases
- retrieving passports from contacts who develop symptoms and from suspected and confirmed EVD cases.

The measures listed above can only be implemented in the EVD-affected countries and there is no evidence that they are effective. Screening of passengers with thermal scanners aims at allowing the detection of febrile travellers. The likelihood of a febrile passenger to be an infectious case of EVD would however be very low given the relatively low incidence of EVD in the general population of the affected countries, and the much higher incidence of other febrile illnesses (such as malaria). It could potentially prevent a febrile EVD case from boarding a flight but it would not detect an incubating passenger who has not yet developed fever.

Further exit screening information in the affected countries will remain of interest in order to monitor the risk of importation of potential EVD cases to non-affected countries.

Options for EU countries

Screening at the point of departure (exit screening) in affected countries is likely to be more effective and less costly than performing screening at point of entry in EU/EEA countries (entry screening). Therefore, entry screening in the EU appears not to be cost-effective and should only be considered for direct flights originating from affected countries where there is no evidence of effective exit screening.

Reduction of the risk of transmission within the EU following an importation

The risk of EVD transmission is dependent on the early detection of EVD suspected case imported into the EU. The time window of potential transmission is restricted between the onset of first symptoms and detection by healthcare professionals. Once appropriate Ebola infection control measures are implemented, the risk of transmission becomes very low. Interventions for reducing the risk of spread from an imported case in the EU should therefore aim to narrow this window.

Information and communication

Interventions with potential to reduce the number of contacts and shorten the interval between onset of symptoms and implementation of appropriate infection control include:

- informing travellers departing from EVD-affected countries and travellers arriving in the EU on direct flights from EVD-affected countries about:
 - the possibility of exposure to Ebola while in the affected countries
 - the clinical presentation of the disease and the need to seek immediate medical care if symptoms develop
 - the need to immediately disclose their travel history when seeking medical care, and to preferably do so before arriving at a healthcare facility;
 - the need to indicate possible contact with sick individuals or wild animals while in the EVD-affected country
 - how to contact public health authorities for support if infection is suspected and include leaflets and phone numbers (hotline).
- Informing and sensitising healthcare providers in the EU about:
 - the possibility of EVD among returning travellers from affected areas
 - the clinical presentation of the disease and the need to inquire about travel history and contacts with family and friends visiting from the EVD-affected countries
 - the availability of protocols for the ascertainment of possible cases and procedures for referral to healthcare facilities
 - the need for strict implementation of barrier management, use of personal protective equipment and disinfection procedures, in accordance with specific guidelines and WHO infection control recommendations [38,39] when providing care to suspected EVD cases.
- Supporting health providers in the EU with resources that will help them to identify and manage potential EVD patients:
 - Case definitions for Ebola patients in the EU:
http://ecdc.europa.eu/en/healthtopics/ebola_marburg_fevers/EVDcasedefinition/Pages/default.aspx
 - Case identification and case management algorithms:
http://ecdc.europa.eu/en/healthtopics/ebola_marburg_fevers/algorithm-evd-diagnosis/Pages/default.aspx and http://ecdc.europa.eu/en/healthtopics/ebola_marburg_fevers/algorithm-evd-case-assessment/Pages/default.aspx

Investigation of possible cases

The early detection of potential EVD cases corresponding to the criteria of patient under investigation (http://ecdc.europa.eu/en/healthtopics/ebola_marburg_fevers/EVDcasedefinition/Pages/default.aspx) should be conducted. In parallel, additional investigations of common aetiologies of febrile illness upon return from tropical areas should be performed with priority to malaria diagnosis. However, malaria positivity does not exclude an EVD infection. It is expected that a significant number of people will be investigated for EVD in the EU/EEA but that the likelihood of identifying a confirmed EVD case will be very low (low positive predictive value). This is because most people who meet the criteria for patient under investigation for EVD will have other infections explaining their symptoms.

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