



RAPID RISK ASSESSMENT

Outbreak of Ebola virus disease in Equateur province, Democratic Republic of the Congo

9 September 2014

Main conclusions

An outbreak of Ebola virus disease has been evolving in the Equateur province of the Democratic Republic of the Congo (DRC) since the beginning of August 2014. As of 4 September 2014, 72 cases had been reported, including 48 deaths. The epidemiological features of this outbreak are consistent with previous outbreaks of Ebola virus disease caused by *Zaire ebolavirus*. The viral strain isolated from this outbreak is distinctly different from the strain isolated in the ongoing West Africa outbreak. There is no epidemiological evidence linking the two events.

As the incubation period can be up to three weeks, it is likely that additional cases will be identified in the affected zone during the coming weeks. However, control measures currently being implemented with the support of international partners are expected to prevent further spread of the disease.

Given that the affected area is remote and not a tourist destination, it is unlikely that travellers from the EU will be exposed and become infected in the outbreak area. It is also unlikely that people residing in the outbreak area will travel to the EU while incubating the virus and develop the disease upon arrival.

Risk mitigation measures for this outbreak are the same as for the ongoing outbreak of Ebola virus disease in West Africa.

Source and date of request

ECDC Internal Decision, 3 September 2014.

Public health issue

The risk associated with the ongoing outbreak of Ebola virus disease in Equateur province, Democratic Republic of the Congo (DRC) to EU residents and EU citizens visiting and living in DRC.

Consulted experts

ECDC contributors: Wim Van Bortel, Thomas Mollet, Niklas Danielsson, Bertrand Sudre, Hervé Zeller.

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].

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 [4]. 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 [5]. Freezing or refrigeration does not inactivate Ebola viruses [6-8].

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% [9].

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 [10]. The principal mode of transmission in human outbreaks is person-to-person transmission through direct contact with a symptomatic or dead case. Airborne transmission has not been documented. The risk of transmission is considered low in the early phase of human disease (prodromal phase). Burial ceremonies and the handling of dead bodies play an important role in transmission [2]. Ebola virus genome has been detected in semen up to 91 days after onset of disease [11] and sexual transmission of another filovirus, Marburg virus, has been documented six weeks after onset of disease [12].

Event background information

On 26 August 2014, the Ministry of Health of DRC notified the World Health Organization (WHO) of an outbreak of Ebola virus diseases in the Equateur province. The index case was a woman from Ikanamongo village in Boende health zone (Figure 1) who is believed to have become infected when she butchered and prepared bush meat (wild game meat). She died on 11 August 2014. The index case and her contacts did not have a history of travel to the Ebola-affected countries in West Africa, nor did they have contact with visitors from the affected countries. As of 4 September 2014, 72 cases, including 48 deaths, have been reported. Among these cases, seven are healthcare workers, six of whom have died [13].

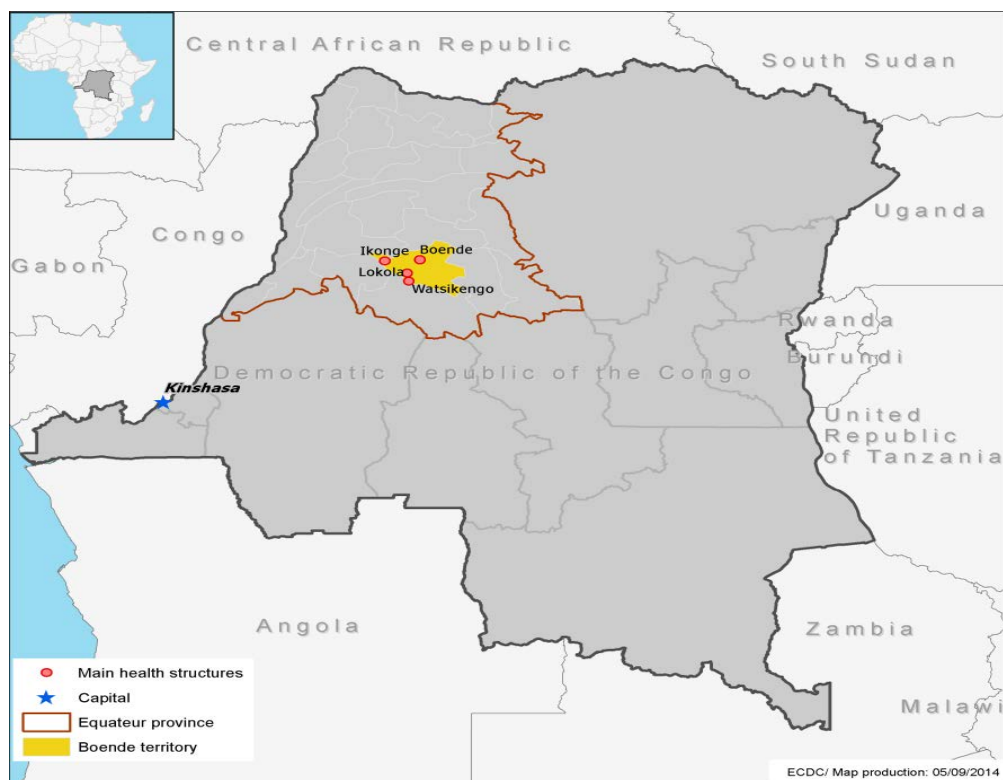
Laboratory investigations conducted at the National Institute of Biology (INRB) in Kinshasa, DRC and the Centre International de Recherches Médicales de Franceville in Gabon confirmed *Zaire ebolavirus* in 13 out of 15 samples (as of 3 September 2014). The virus is very closely related to the *Zaire ebolavirus* strain which was responsible for the outbreak in Kikwit, 500 kilometres south of the current outbreak, in Bandundu Province, DRC, in 1995. It is distinct from the *Zaire ebolavirus* currently circulating in West Africa [14]. 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.

The Boende health zone is located 1 200 kilometres from Kinshasa, and 600 kilometres south-east of Mbandaka, the capital of Equateur province, in a remote area. The city of Boende is located 68 kilometres from Lokolia which is the epicentre of the epidemic.

A team of experts from the DRC Ministry of Health, WHO, UNICEF, the US Centers for Disease Control and Prevention (CDC) and Médecins Sans Frontières (MSF) is in the Boende health zone to support the response operations. As of 1 September 2014, 285 contacts exposed to suspected, probable and confirmed cases had been identified for active follow-up out of 291 (98%).

According to the DRC Ministry of Health, Boende hospital has established an isolation ward for suspected, probable and confirmed cases with the support of MSF. According to the Ministry of Health, there are plans to set up another isolation ward in Lokolia over the next few days. Outbreak response activities, including the training of healthcare workers, awareness raising and community mobilisation are ongoing.

As of 4 September 2014, none of the other ten provinces of DRC had reported cases of Ebola virus disease.

Figure 1. Boende health zone, Equateur province, Democratic Republic of the Congo

ECDC threat assessment for the EU

In the past, DRC has experienced six outbreaks of Ebola virus disease. Five of these outbreaks were caused by the *Zaire ebolavirus*: 1976 in Yambuku, (318 cases, 88% fatal); 1977 in Tandala (1 case, fatal), Equateur province; 1995 in Bandundu province, mainly in Kikwit with additional cases in Mosango, Vanga, Fashi, Yassa Bonga, Gungu, Bulungu, Imbongo, Mukala and Idiofa (315 cases, case-fatality rate (CFR) 81%); 2007 in Kasai Oriental province, mainly in Mweka and Luebo (264 cases, CFR 71%) and 2008 in Kasai Occidental province (32 cases, CFR 44%) [2]. In 2012, an outbreak caused by *Bundibugyo ebolavirus* occurred in Orientale province in eastern DRC (57 cases, CFR 51%). Furthermore, in 1999 and 2000 there were outbreaks caused by Marburg virus in Durba-Watsa, Oriental province [15].

At least 930 cases of Ebola virus disease caused by *Zaire ebolavirus* have been reported from the Democratic Republic of the Congo since the disease was first described in 1976, and the overall case fatality rate has been 79% (736 fatal cases). The epidemiological features of this outbreak are consistent with previous outbreaks of Ebola virus disease involving *Zaire ebolavirus*. This outbreak has not yet been brought under control and, given the long incubation period of up to three weeks, it is expected that more cases will be identified through active case-finding and contact monitoring.

Risk of Ebola virus importation from DRC to the EU

The risk of patients linked to this outbreak presenting with Ebola virus disease in the EU can be assessed for the following categories:

Tourists returning from DRC

The risk that a traveller visiting DRC will become infected and develop symptoms after returning to the EU is very low, even if the travel included a visit to Boende territory. Transmission of Ebola virus occurs in the context of direct contact with blood, secretions, organs or other bodily fluids of dead or living infected persons or animals, and the risk of infection for residents and visitors to the affected countries through exposure in the community is considered very low if they adhere to the recommended precautions. Visitors returning from tropical countries are routinely advised to seek immediate medical attention if they develop symptoms of infectious disease, and to inform their attending physician of recent travel.

Visiting families and friends

The risk for people who visit families and friends in DRC is low, unless they have close contact with sick or dead persons or animals infected with Ebola.

Exposed persons seeking medical attention in the EU

There is a possibility that persons who know or suspect that they have been exposed to an EVD patient in the outbreak area will travel to the EU during the incubation period in order to access medical services. This scenario includes EU citizens who work in healthcare settings in the area. It is anticipated that people who travel to the EU under such circumstances will seek immediate medical attention and disclose the potential exposure to Ebola. This would make it possible to implement effective infection control measures.

Patients presenting symptoms and seeking medical attention in the EU

There is a possibility that a person having been exposed and starting to develop symptoms could board a commercial flight to seek medical attention in the EU. Such patients are expected to either be recognised on the flight or to seek medical attention upon arrival in the EU. This would lead to their isolation and identification of contacts on the plane and after arriving in the EU.

WHO does not recommend that any travel or trade restrictions be applied to DRC.

Risk of Ebola infection for visitors and residents from the EU in DRC

The risk to EU citizens who visit or reside in Equateur province or elsewhere in DRC of becoming infected with Ebola virus is considered very low, unless they are directly exposed to the bodily fluids of dead or living Ebola-infected persons or animals (e.g. bats, rodents, monkeys, forest antelopes).

In comparison to the ongoing outbreak in West Africa, the risk of exposure to Ebola virus in healthcare settings in DRC is low because the outbreak in Equateur province is still limited in size and geographical spread, and there are indications that a proportional response to the outbreak has been launched by local health authorities and international partners. However, the risk of actual transmission is dependent on the use of appropriate infection control measures in each health facility. The information available to ECDC does not allow for an assessment of the quality of Ebola infection control measures in the affected area.

There is an increased risk of exposure to Ebola virus for EU citizens who provide healthcare in the affected area. However, if the recommended standard infection control measures are strictly adhered to, transmission can be effectively prevented.

There is a risk of transmission through unprotected sex with a person who has recently recovered from Ebola virus disease.

Preventing infection in communities*

Visitors and residents in areas affected by Ebola virus disease 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 infection with Ebola virus disease:

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

* The full list of *Options for risk reduction* is available in the fourth update of the Rapid Risk Assessment on the outbreak of Ebola virus disease in West Africa, 3 September 2014: <http://www.ecdc.europa.eu/en/publications/Publications/Ebola-virus-disease-west-africa-risk-assessment-27-08-2014.pdf>

Conclusions

An outbreak of Ebola virus disease has been evolving in the Equateur province of the Democratic Republic of the Congo (DRC) since the beginning of August 2014. As of 4 September, 72 cases had been reported, including 48 deaths. The epidemiological features of this outbreak are consistent with previous outbreaks of Ebola virus disease caused by *Zaire ebolavirus*. The viral strain isolated from this outbreak is distinctly different from the strain isolated in the ongoing West Africa outbreak, and there is no epidemiological evidence linking the two events.

As the incubation period can be up to three weeks, it is likely that additional cases will be identified in the affected zone during the coming weeks. However, control measures currently being implemented with the support of international partners are expected to prevent further spread of the disease.

Given that the affected area is remote and not a tourist destination, it is unlikely that travellers from the EU will be exposed and become infected in the outbreak area. It is also unlikely that people residing in the outbreak area will travel to the EU while incubating the virus and develop disease upon arrival.

Risk mitigation measures for this outbreak are the same as for the ongoing outbreak of Ebola virus disease in West Africa. The intense media attention and professional communications to healthcare providers regarding the West African outbreak mean that awareness of the possibility of patients presenting with Ebola virus disease in Europe is already high in the EU public health community and health services.

ECDC will continue to monitor the development of this outbreak closely.

References

1. European Centre for Disease Prevention and Control. ECDC fact sheet: Ebola and Marburg fever [internet]. ECDC; 2014 [cited 20 March 2014]. Available from: http://www.ecdc.europa.eu/en/healthtopics/ebola_marburg_fever/pages/index.aspx.
2. World Health Organization. Ebola haemorrhagic fever - Fact sheet [internet]. WHO Media centre; 2012 [cited 20 March 2014]. Available from: <http://www.who.int/mediacentre/factsheets/fs103/en/>.
3. Li YH, Chen SP. Evolutionary history of Ebola virus. *Epidemiology and Infection*. 2014 Jun;142(6):1138-45.
4. Piercy TJ, Smither SJ, Steward JA, Eastaugh L, Lever MS. The survival of filoviruses in liquids, on solid substrates and in a dynamic aerosol. *Journal of Applied Microbiology*. 2010 Nov;109(5):1531-9.
5. Public Health Agency of Canada. Ebola virus. Pathogen Safety Data Sheet - Infectious substances [internet]. Public Health Agency of Canada.; 2010 [cited 31 March 2014]. Available from: <http://www.phac-aspc.gc.ca/lab-bio/res/psds-ftss/ebola-eng.php>.
6. Chepurinov AA, Chuev Iu P, P'Iankov OV, Efimova IV. [The effect of some physical and chemical factors on inactivation of the Ebola virus]. *Voprosy virusologii*. 1995 Mar-Apr;40(2):74-6.
7. European Centre for Disease Prevention and Control. Risk assessment guidelines for diseases transmitted on aircraft (Part 2). Stockholm: ECDC; 2010.
8. World Health Organization. A Guide for Shippers of Infectious Substances, 2013 [22 March 2014]. Available from: http://www.who.int/ihr/infectious_substances/en/.
9. Bannister B. Viral haemorrhagic fevers imported into non-endemic countries: risk assessment and management. *British Medical Bulletin*. 2010;95:193-225.
10. Colebunders R, Borchert M. Ebola haemorrhagic fever- a review. *The Journal of Infection*. 2000 Jan;40(1):16-20.
11. Rowe AK, Bertolli J, Khan AS, Mukunu R, Muyembe-Tamfum JJ, Bressler D, et al. Clinical, virological and immunological follow-up of convalescent Ebola hemorrhagic fever patients and their household contacts, Kikwit, Democratic Republic of the Congo. *Commission de Lutte contre les Epidemies a Kikwit. The Journal of Infectious Diseases*. 1999 Feb;179 Suppl 1:S28-35.
12. Martini GA, Schmidt HA. [Spermatogenic transmission of the "Marburg virus". (Causes of "Marburg simian disease")]. *Klinische Wochenschrift*. 1968 Apr 1;46(7):398-400.
13. World Health Organization Regional Office for Africa. WHO Response to the Ebola Virus Disease (EVD) Outbreak. Update by the WHO Regional Director for Africa as of 31 August 2014: [cited 4 September 2014]. Available from: http://www.afro.who.int/pt/downloads/doc_download/9431-who-response-to-the-ebola-virus-disease-evd-outbreak-update-by-the-who-regional-director-for-afric.html.
14. Office for the Coordination of Humanitarian Affairs Democratic Republic of the Congo. Point d'information sur la maladie a virus Ebola en RDC. [cited 1 September 2014]. Available from: <http://www.rdc-humanitaire.net/attachments/article/4924/EBOLA%20-%20Update%20du%2030%20ao%C3%BBt%202014%20-%20No.%205.pdf>.
15. Colebunders R, Tshomba A, Van Kerkhove MD, Bausch DG, Campbell P, Libande M, et al. Marburg hemorrhagic fever in Durba and Watsa, Democratic Republic of the Congo: Clinical documentation, features of illness, and treatment. *Journal of Infectious Diseases*. 2007 Nov 15;196:S148-S53.