Ebolavirus disease (Ebola) outbreaks in West Africa

*Important information for **clinicians in secondary or tertiary care***

7 November 2014

Key point

Clinicians should be alert to the possibility of Ebola in unwell travellers returning from affected areas of West Africa, and obtain a full travel and exposure history. Contact public health urgently and apply appropriate infection control measures while conducting a clinical risk assessment.

Summary

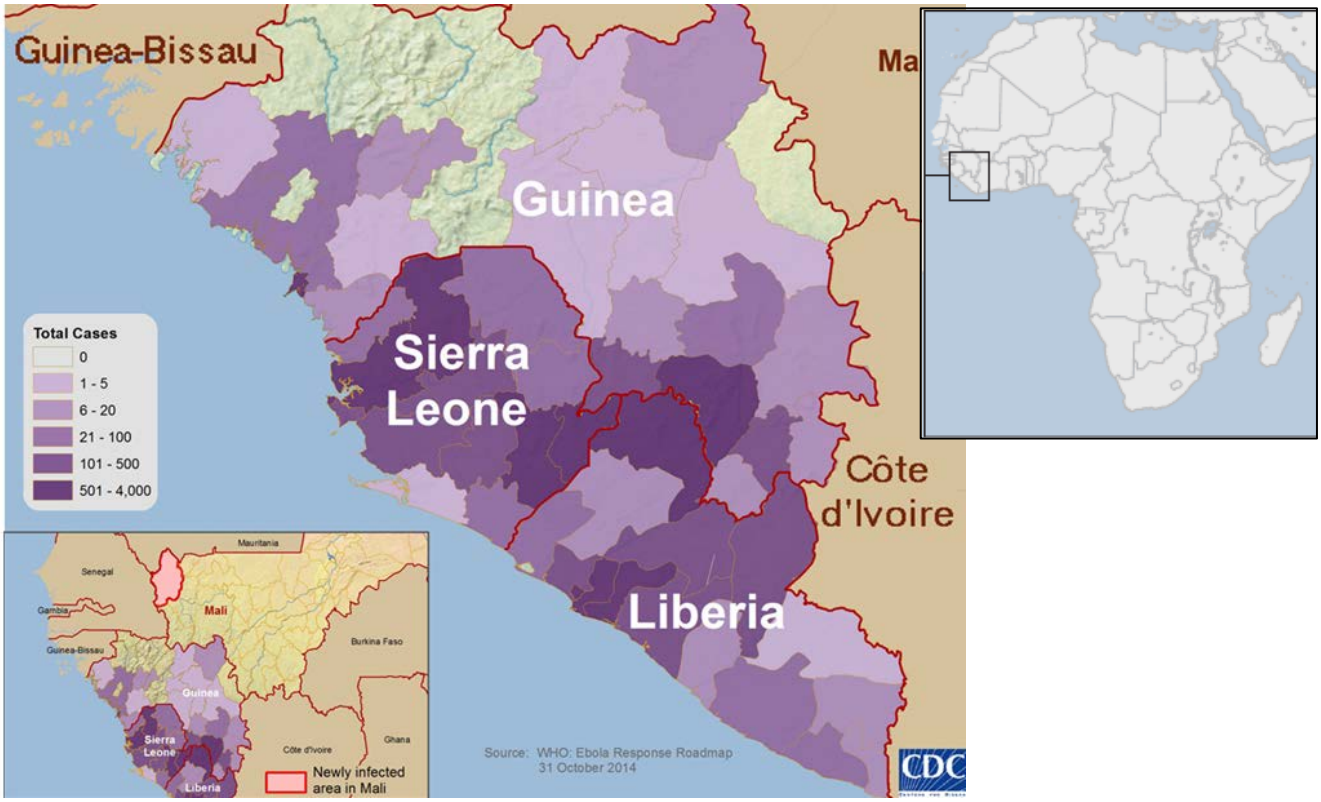
- The outbreak of Ebolavirus disease (Ebola) in West Africa is larger and more serious than any previous outbreak and has developed into a humanitarian crisis, with 13,567 clinically-compatible cases acquired in West Africa as of 29 October 2014 (25 October 2014 for Liberia.
- The risk of infection is extremely low unless there has been direct exposure to the bodily fluids of an infected person or animal (alive or dead).
- For patients with compatible clinical symptoms and exposure history as per the case definition in the section **"What are the symptoms and who do I test for Ebola?"** the following procedure should be followed:

1. Implement infection appropriate infection control:
    a. for a **patient under investigation** (with a compatible travel history in the 21 days prior to onset and fever of $\geq 38^{o}$C or a history of fever in the past 24 hours), place in a single room. Patient to remain in hospital while risk assessment conducted.
    b. For a **suspected case** (with fever of $\geq 38^{o}$C or a history of fever in the past 24 hours and high or low risk exposures to Ebola in the 21 days prior to onset as outlined in the case definition),

        - isolate in a single room with private bathroom and an anteroom, with the door closed.
        - In hospitals where such facilities are not available, interim arrangements may be required, such as use of commodes in the patient's room and unoccupied adjacent rooms for anterooms;
        - Close attention to hand hygiene;
        - Healthcare worker (HCW) to use a well-fitting P2/N95 mask, and cover all skin using a suitable combination of PPE, such as a disposable fluid resistant gown, gloves, and eye protection (e.g. goggles or face shield), leg and shoe coverings,

overalls when entering a patient care area. Double gloving might also be considered.

2. Notify the relevant state/territory public health unit/communicable diseases branch immediately of any persons under investigation, or suspected (and probable or confirmed) cases in order to discuss and coordinate testing and management of contacts.
3. Collect blood samples for Ebolavirus testing and for other investigations, but since blood is highly infectious, routine haematology and other tests should be minimised. If other tests are required for the immediate management of the patient, these should only be performed in close collaboration with specialist physicians, laboratory staff and public health authorities. Aerosol-generating procedures should be avoided.



Map: Areas of Guinea, Liberia and Sierra Leone in West Africa affected by outbreaks of Ebola as of 31 October 2014 (from the CDC website accessed 4 November 2014, BBC News 6 November 2014).

What are the symptoms and who do I test for Ebola?

The likelihood that a febrile illness in a returned traveller is due to Ebola is very low, however clinicians should be aware of the possibility of Ebola in patients who meet the case definition for a person under investigation, or a suspected case. The risk of infection is extremely low even in persons with a compatible travel history, unless there has been direct exposure to the bodily fluids

of an infected person (including unprotected sexual contact with confirmed cases up to three months after they have recovered) or animal (alive or dead).

The onset of symptoms is sudden and typically includes fever, myalgia, fatigue and headache. The next stage may include symptoms that are gastrointestinal (vomiting, diarrhoea), neurological (headaches, confusion), vascular, cutaneous (maculopapular rash), and respiratory (sore throat, cough) with prostration. Cases may develop a septic shock-like syndrome, and progress to multi-organ failure, sometimes accompanied by profuse internal and external bleeding. The case-fatality rate (CFR) for Zaire strain of Ebola cases during previous outbreaks is estimated to be between 50% and 90%, while for other species, the CFR may be lower.

Case definition

Testing should be considered for persons with epidemiological and clinical evidence as per the Communicable Diseases Network of Australia (CDNA) case definitions:

Person under investigation

Requires clinical evidence and limited epidemiological evidence.

*Note: If a risk assessment determines that a **person under investigation** should be tested for Ebolavirus, the person should be managed as a **suspected case** from that point forward regardless of clinical and epidemiological evidence.*

Suspected case

Requires clinical evidence and epidemiological evidence.

Definitions

Clinical evidence requires fever ($\geq$38^{o}C) or history of fever in the past 24 hours. Additional symptoms such as unexplained haemorrhage or bruising, severe headache, muscle pain, marked vomiting, marked diarrhoea, abdominal pain should also be considered.

Limited epidemiological evidence requires only travel to an Ebola affected area (country/region)* in the 21 days prior to onset.

Epidemiological evidence requires a lower risk exposure or higher risk exposure in the 21 days prior to onset as defined below.

Lower risk exposures:

- household contact with an Ebola case (in some circumstances this might be classified as higher risk such where the household was in a resource poor setting),
- being within approximately 1 metre of an Ebola patient or within the patient's room or care area for a prolonged period of time (e.g., healthcare workers, household members) while

not wearing recommended personal protective equipment (see "What are the recommended isolation and PPE recommendations for patients in hospital?" for details).
- having direct brief contact (e.g., shaking hands) with an Ebola patient while not wearing recommended personal protective equipment.

Higher risk exposures:

- percutaneous (e.g. needle stick) or mucous membrane exposure to blood or body fluids of an Ebola patient (either suspected or confirmed)
- direct skin contact with blood or body fluids of an Ebola patient without appropriate personal protective equipment (PPE),
- laboratory processing of body fluids of suspected, probable, or confirmed Ebola cases without appropriate PPE or standard biosafety precautions,
- direct contact with a dead body without appropriate PPE in a country where an Ebola outbreak is occurring,
- direct handling of sick or dead animals from disease-endemic areas consumption of "bushmeat" in country where Ebola is known to occur.

*Areas affected by outbreaks in West Africa should currently be considered to be Guinea, Liberia, and Sierra Leone, but travel to neighbouring countries in West Africa (Mali, Cote d'Ivoire, Guinea-Bissau, Senegal) and areas of countries with an imported case or limited transmission should also be considered where there is strong clinical suspicion. There is also a separate outbreak in the Democratic Republic of the Congo. Further, filoviruses are endemic in sub-Saharan Africa.

Reporting

The treating doctor must notify a **person under investigation** or **suspected case** immediately to their state/territory communicable disease branch/centre to discuss testing and management of contacts, see **"Who do I contact if I have a suspected case?"** for contact information.

Positive laboratory tests for Ebola i.e. **confirmed** and **probable** cases, must be reported to state/territory public health authorities immediately.

State and territory authorities will notify the Commonwealth Department of Health about **suspected**, **probable** and **confirmed** cases.

How do I test for Ebola?

To organise testing of a **suspected case**, the treating clinicians should contact their jurisdictional public health reference laboratory for advice on specimen type, collection and transport. Treating clinicians should:

- notify the jurisdictional Communicable Disease Control Branch/Public health Unit (Details available below under **"Who do I contact if I have a person under investigation/suspected**

case?" as soon as possible for further advice on Ebola risk assessment, and public health management if indicated, and

- contact the Public Health Reference Laboratory for advice on appropriate specimen type, collection and transport.

Testing for Ebola in Australia is conducted at the National High Security Quarantine Laboratory (NHSQL) at VIDRL. In some jurisdictions facilities exist for the preliminary testing of samples for Ebolavirus. Where preliminary testing is to be conducted at these facilities, samples should be sent to VIDRL from the jurisdictional public health laboratory for confirmatory testing.

Telephone contact with the VIDRL on-call microbiologist is essential before any specimen referral. The VIDRL on-call microbiologist can be contacted on mobile 0438 599 437. In case of difficulty back-up is provided by the VIDRL on-call laboratory manager (0438 599 439), and the Royal Melbourne Hospital Switchboard (03 9342 7000).

The primary diagnostic method is detection of Ebolavirus by PCR in blood. PCR on a throat swab or urine may also be used and serology is also available. The essential specimen for virus detection is venous blood.

Where tests for Ebolavirus have been ordered, routine haematology and other tests should be minimised since blood is highly infectious. If other tests are required for the immediate management of the patient, these should only be performed in close collaboration with specialist physicians, laboratory staff and public health authorities at the point of care, or in laboratories designated to do this work, guided by jurisdictional viral haemorrhagic fever or laboratory plans wherever possible.

Further information is available in a separate advice to laboratories from the Public Health Laboratory Network (PHLN), available from the Department of Health website (http://www.health.gov.au/ebola).

Are health workers at risk from Ebola?

In affected African countries, caring for ill relatives is a known risk factor for infection, and healthcare workers, particularly those in resource poor settings with inadequate infection control are also at risk.

Infection control recommendations in this document for suspected, probable and confirmed cases aim to provide the highest level of protection for health care workers, given the current state of knowledge.

What are the recommended isolation and PPE recommendations for patients in hospital?

Person under investigation

A **person under investigation** should be placed in a single room. Persons under investigation must not be allowed to leave the hospital except if they are being transferred. Where there is a need to test, the person should be classified and managed as a **suspected case**.

Suspected, probable and confirmed cases

In summary, these should include – at a minimum:

- Placement of the patient in a single room with private bathroom and an anteroom, with the door closed. In hospitals where such facilities are not available, interim arrangements may be required, such as use of commodes in the patient's room and unoccupied adjacent rooms for anterooms;
- Healthcare worker (HCW) to use a P2/N95 mask, and cover all skin using a suitable combination of PPE, such as a disposable fluid resistant gown, gloves, and eye protection (e.g. goggles or face shield), leg and shoe coverings, overalls when entering a patient care area. Double gloving might also be considered.
- Close attention to hand hygiene.

Use of PPE, especially additional PPE, requires adequate training and supervision – see below: **Staff training on the use of PPE**. The use of a "buddy" system, where staff members observe each other in the safe removal of PPE after patient contact, is recommended. A knowledgeable and experienced staff member should be assigned to oversee the safe use of PPE in the patient care area.

Aerosol generating procedures (AGP) should be avoided in an Ebola patient. If an AGP is essential, the PPE should include – at a minimum as stated above – a P2/N95 mask, and cover all skin, using a suitable combination of PPE, such as a disposable fluid resistant gown, gloves, and eye protection (e.g. goggles or face shield), leg and shoe coverings, overalls when entering a patient care area. Double gloving might also be considered. Limit the use of needles and other sharps as much as possible.

Visitors should be restricted to a limited number of immediate family members; and only adults who are well. Visitors who come into contact with suspected case, probable and confirmed cases must be protected according to recommended infection control guidelines. Direct contact with the patient should not be allowed. A log should be kept of any visitors, including contact details.

Where a suspected case initially tests negative for Ebola, but there is no alternative diagnosis and a high index of suspicion remains, consideration should be given to continued isolation and use of the

recommended infection control precautions, pending further testing (see Laboratory testing section) and re-assessment.

Individual organisations may develop institute facility-specific infection control recommendations that exceed the national minimum standard specified here. Training in the use of PPE is particularly important when using any additional measures (beyond usual transmission-based precautions), because without sufficient training, additional PPE can be unsafe.

For hospitals managing the ongoing care of probable or confirmed Ebola cases, the United States Centers for Disease Control (CDC) ***Guidance on Personal Protective Equipment to be use by healthcare workers during management of patients with Ebola Virus Disease in U.S. Hospitals, including procedures for putting on (donning) and removing (doffing)*** (http://www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html) are recommended.

The CDC guidance includes recommended administrative and environmental controls for healthcare facilities, principles of PPE, training on correct use of PPE, use of a trained observer, designating areas for PPE donning and doffing, selection of PPE for healthcare workers during management of Ebola patients, recommended personal protective equipment for HCW and for observers and preparation for doffing.

Staff training on the use of PPE

Staff should be thoroughly trained in detailed procedures regarding how to put on and especially to take off PPE, including the correct order to avoid cross contamination and where used, to check that the respirator (P2/N95 mask) with which they are provided fits properly. They must also receive clear instructions on when PPE is to be used and how it is to be disposed of or, as appropriate, decontaminated, maintained and stored. This training should be held regularly.

It is important that training be extended to all staff who may come into contact with suspected, probable and confirmed cases.

General guidance on donning and removing PPE is available from the NHMRC website (http://www.nhmrc.gov.au/book/australian-guidelines-prevention-and-control-infection-healthcare-2010/b1-2-7-sequence-putting-).

The CDC guidance (http://www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html) is recommended for donning and doffing for PPE used in ongoing care of probable or confirmed Ebola cases, including instructions on use of Powered Air Purifying Respirators (PAPR) or surgical hoods.

Without detailed and thorough training, the use of PPE beyond that which healthcare workers regularly use may endanger staff. Without training, additional PPE may be ineffective.

Information about environmental cleaning is available in the CDNA Series of National Guidelines (SoNG) for public health units on Ebola, the Ebola SoNG (section 10 and appendix 12).

Advice for contacts of cases

The state/territory communicable disease branch or public health units will undertake the public health management of contacts of suspected, probable and confirmed cases. Contacts of cases should be directed to your state/territory communicable disease branch/centre for management.

Who do I contact if I have a person under investigation or suspected case?

Contact your state/territory communicable disease branch/centre.

State / territory	Public health unit contact details
ACT	02 6205 2155
NSW	1300 066 055 Contact details for the public health offices in NSW Local Health Districts (http://www.health.nsw.gov.au/Infectious/Pages/phus.aspx)
NT	08 8922 8044 Monday-to Friday daytime and 08 8922 8888 ask for CDC doctor on call –for after hours
QLD	13 432 584 Contact details for the public health offices in QLD Area (www.health.qld.gov.au/cdcg/contacts.asp)
SA	1300 232 272
TAS	1800 671 738 (from within Tasmania), 03 6166 0712 (from mainland states) After hours, follow the prompt “to report an infectious disease”
VIC	1300 651 160
WA	08 9388 4801 After hours 08 9328 0553 Contact details for the public health offices in WA (www.public.health.wa.gov.au/3/280/2/contact_details_for_regional_population__public_he.pm)

Background information

Ebolaviruses

Ebolaviruses are part of the family *Filoviridae,* which also includes Marburg virus. Fruit bats of the *Pteropodidae* family are considered to be a likely natural host of the Ebolavirus, with outbreaks amongst other species such as chimpanzees, gorillas, monkeys and forest antelope from time to time. Five species of Ebolavirus have been identified, namely Zaire, Sudan, Reston, Tai Forest and

Bundibugyo, but Reston and Tai Forest species are not known to have caused outbreaks amongst humans.

Transmission

Ebolavirus is introduced into the human population through direct contact (through mucous membranes or broken skin) with the blood, secretions, or other bodily fluids of infected animals (often therefore through hunting or preparation of "bushmeat"). In Africa, infection has been documented through the handling of infected chimpanzees, gorillas, fruit bats, monkeys, forest antelope and porcupines found ill or dead or in the rainforest.

Ebolavirus then spreads through person-to-person transmission via direct contact (through mucous membranes or broken skin) with:

- the blood or bodily fluids (including but not limited to urine, saliva, feces, vomit, and semen) of people with Ebola, and the bodies of people who have died of Ebola.
- objects (e.g. needles, syringes) contaminated with blood or bodily fluids of people with Ebola.

Transmission through sexual contact may be possible for up to three months after clinical recovery. Participating in traditional burial ceremonies in affected areas of Africa is a known high risk activity for transmission.

The risk of transmission in healthcare settings can be significantly reduced through the use of appropriate infection control precautions and environmental cleaning.

Airborne transmission to humans, as occurs for tuberculosis or measles, has never been documented.

Incubation period

From 2 to 21 days; most commonly 8 to 10 days.

Treatment

There are no specific prophylactic (vaccine) or therapeutic (antiviral drugs) options available to treat human infections, and care is largely supportive.

Quarantinable disease

Ebola is a quarantinable disease in Australia, and as such can be controlled and eradicated through a range of quarantine measures, including enforcing appropriate quarantine measures if suspected cases of disease are identified.

Situation update

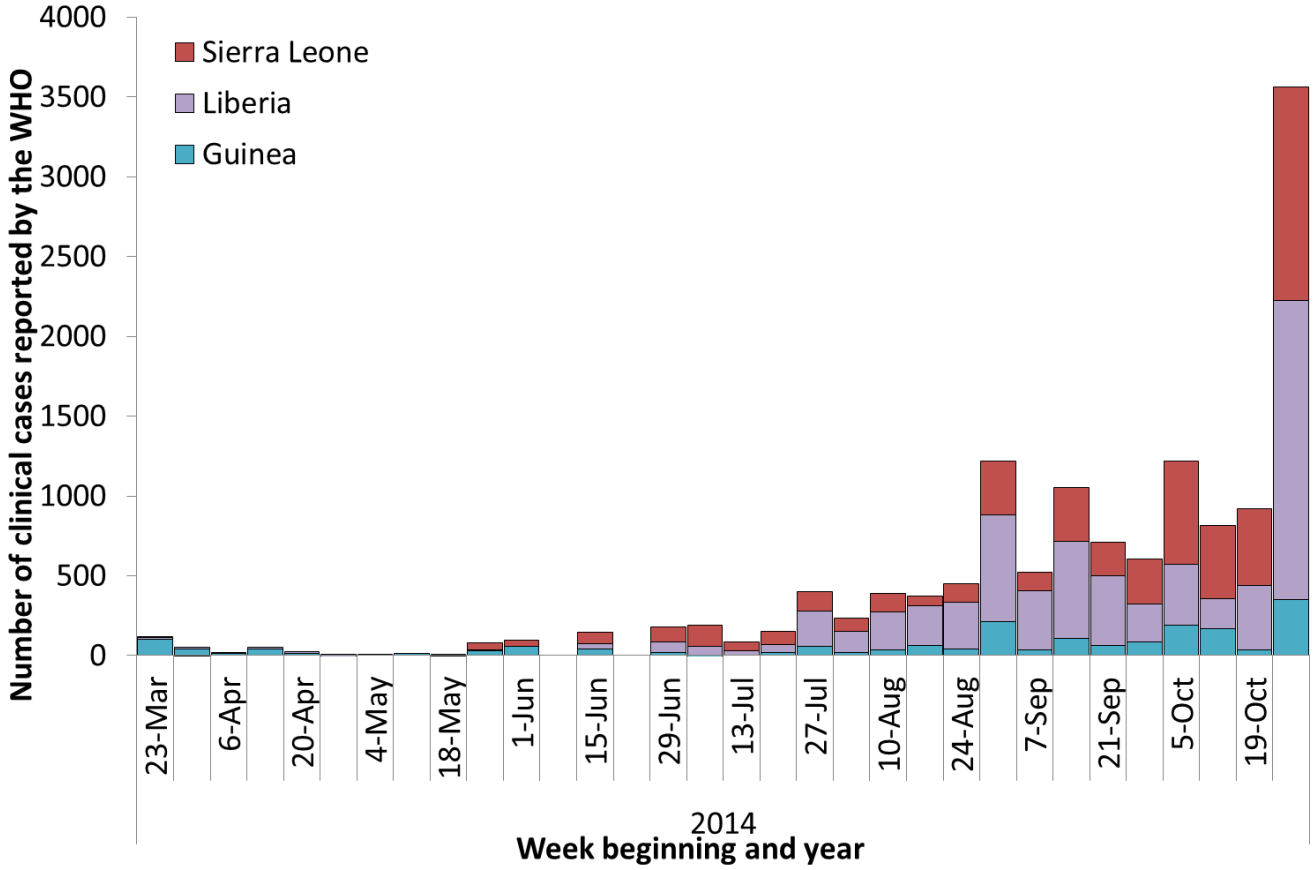
The following information is about the outbreak in West Africa at the time of writing, and does not necessarily reflect the areas of risk to be considered in a clinical risk assessment.

Table 1. Number of clinical, confirmed and fatal cases of Ebolavirus disease acquired in West Africa as of 1 October 2014 (data for Liberia as at 30 September 2014), by country. *WHO Roadmap situation update 8 October 2014, data as of 3 October 2014 (data as of 8 October for Spain and as of 10 October for United States of America)*

Country	Clinical cases	Confirmed cases	Deaths	Notes
Countries with widespread and intense transmission				
Guinea	1298	1044	768	
Liberia	3924	941	2210	
Sierra Leone	2789	2455	879	
Countries with imported cases or limited transmission				
Nigeria	20	19	8	Last case 5 Sept 2014
Senegal	1	1	0	Last case 28 Aug 2014
Spain	1	1	0	Reported 6 Oct 2014
United States of America	1	1	1	Reported 30 Sept 2014
Total	8034	4462	3865	

A separate outbreak was first reported on 26 August 2014 in the Democratic Republic of the Congo, with 66 clinical cases, of which 38 have been laboratory confirmed and 49 have died. The last case tested negative for the second time on 10 October 2014.

Figure: Clinical cases of Ebolavirus disease in Guinea, Liberia and Sierra Leone, by week reported by the World Health Organization. WHO updates 23 March to 29 October 2014 (25 October for Liberia).



See the WHO website (http://www.who.int/csr/don/en/) for the latest information

Further advice

CDNA Series of National Guidelines (SoNG) for public health units on Ebola, available from available from the Department of Health website (www.health.gov.au/ebola)

WHO situation updates and resources for health professionals are available from the WHO website (http://www.who.int/csr/disease/ebola/en/)

Surveillance case definition for confirmed and probable cases, available from the Department of Health website (http://www.health.gov.au/internet/main/publishing.nsf/Content/cda-surveil-nndss-casedefs-cd_vhf.htm)