

Ebola Virus Disease

What Health Professionals Need to Know

Last updated 4 December 2014

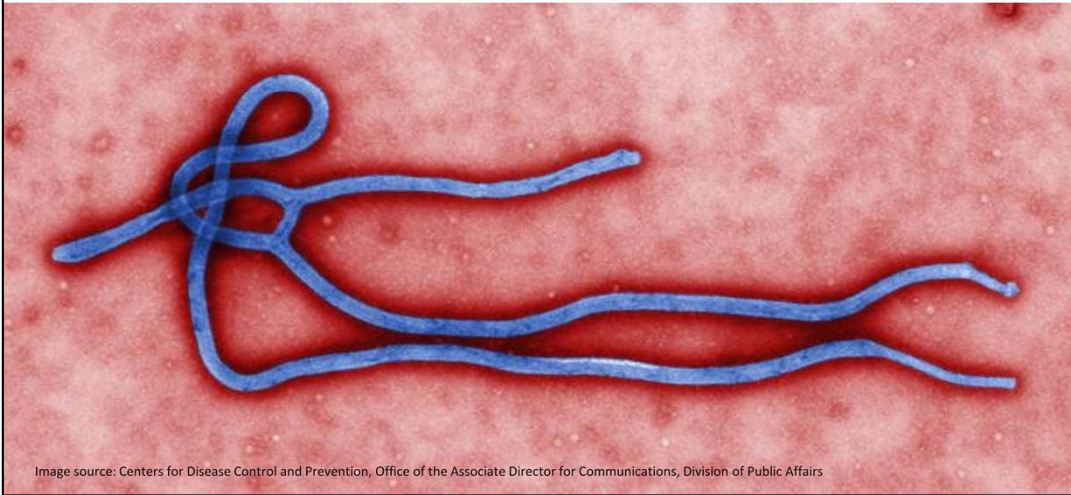


Image source: Centers for Disease Control and Prevention, Office of the Associate Director for Communications, Division of Public Affairs

- Ebola is a filovirus belonging to the virus family called Filoviridae (from the Latin, 'filum' meaning thread)
- The only other member of this virus family is Marburg virus which causes a similar illness.
- Reston is the only filovirus that does not cause severe disease in humans, though can still be fatal in monkeys.

What is Ebola?

- Viral Haemorrhagic Fever
- A severe and often fatal viral infection
- Five Ebola strains; four known to cause infection in humans



- Ebola, previously known as Ebola haemorrhagic fever, is a rare and often fatal disease caused by infection with one of the Ebola virus strains.
- Ebola can cause disease in humans and nonhuman primates.
- Ebola viruses are found in several African countries. Ebola was first discovered in 1976 near the Ebola River in what is now the Democratic Republic of the Congo, and in Sudan. Since then, outbreaks have appeared sporadically in Africa.
- Ebola is caused by infection with a virus of the family Filoviridae.
- There are five identified Ebola virus species, four of which are known to cause disease in humans:
 - Ebola virus (*Zaire ebolavirus*);
 - Sudan virus (*Sudan ebolavirus*);
 - Taï Forest virus (*Taï Forest ebolavirus*, formerly *Côte d'Ivoire ebolavirus*); and
 - Bundibugyo virus (*Bundibugyo ebolavirus*).
- The fifth, Reston virus (*Reston ebolavirus*), has caused disease in nonhuman primates, but not in humans.

Ebola ecology

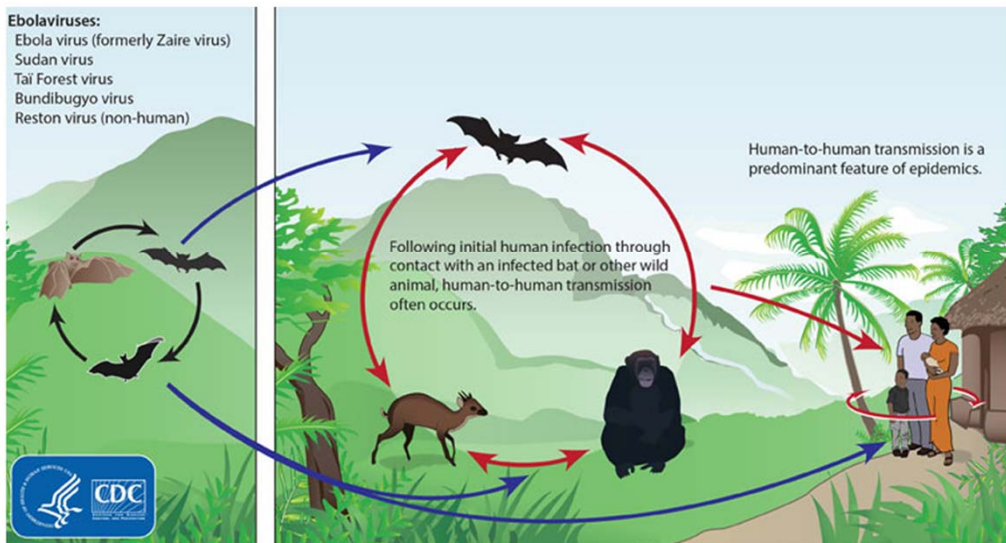


Image source: Centers for Disease Control and Prevention, Office of the Associate Director for Communications, Division of Public Affairs



Most researchers believe that the natural reservoir host of Ebola virus are African fruit bats.

- Humans, non human primates, and other mammals are susceptible to Ebola and are thus regarded as end hosts rather than reservoir species
- It is thought that the virus is usually introduced in to the human population in endemic parts of Africa via handling of an infected animal carcasses, known as bush meat.
- Human to human transmission then becomes a prominent feature of any epidemic.

Yambuku, Zaire – 1976



Image source: Centers for Disease Control and Prevention, Office of the Associate Director for Communications, Division of Public Affairs



Ebola first appeared in 1976 in two simultaneous haemorrhagic fever outbreaks in Yambuku, Zaire (in what is now the Democratic Republic of Congo) and in Nzara, Sudan. These were two unrelated outbreaks that occurred some 800km apart.

The virus was identified from a patient in the Yambuku outbreak. It was named after the Ebola river which ran near Yambuku, rather than the town itself to avoid stigmatisation.

- It was initially thought that the two outbreaks were related, but it was later established that the outbreaks were caused by two different strains of the virus.
- Both strains were named after the nations in which they were discovered (that is *Ebola zaire* and *Ebola sudan*).

Ebola outbreaks

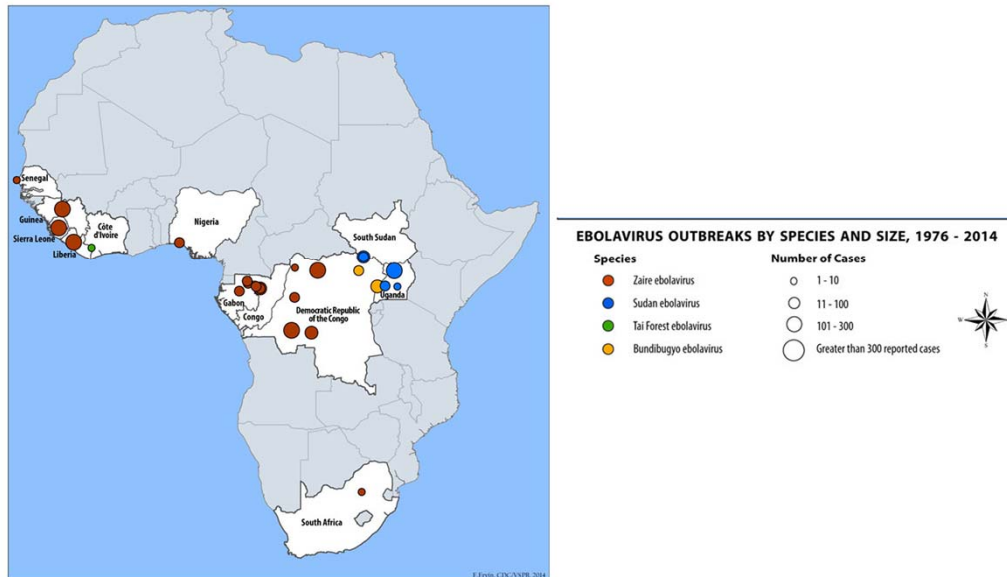
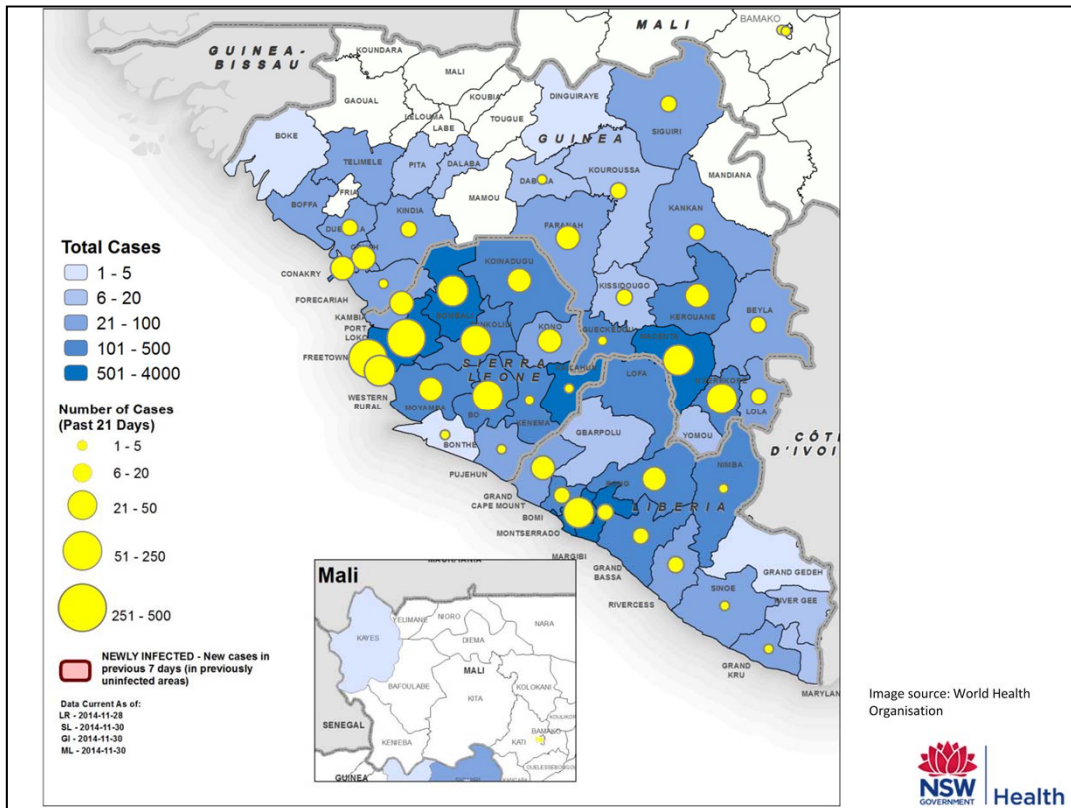


Image source: Centers for Disease Control and Prevention



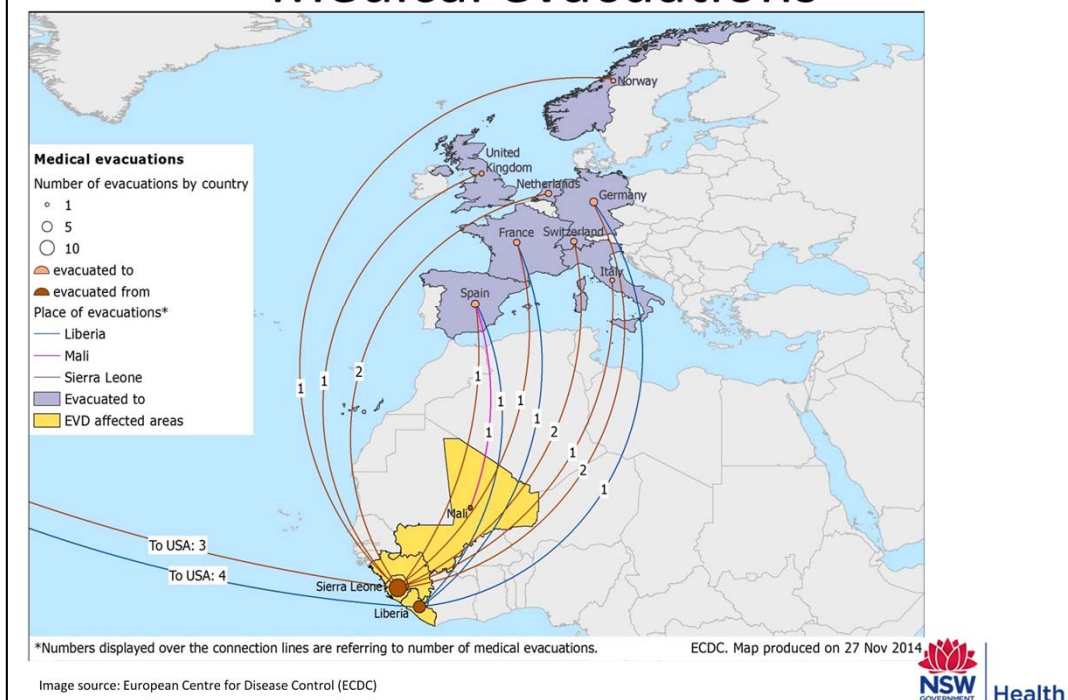
- In terms of the history, following the first appearance of Ebola in 1976, there were two other outbreaks in the late 1970s.
- This was preceded by an absence of Ebola, with no recorded outbreaks between 1980 and 1993.
- Ebola re-emerged in 1994, and since then there have been several independent foci of transmission recorded.
- Most have been caused by the Zaire and Sudan species of the virus, but some were caused by species that were discovered more recently.
- For example, the Tai forest Ebola virus strain emerged in 1994, when there was a large outbreak amongst chimpanzees in the Tai National Park in Côte d'Ivoire. Only one person was infected after performing an autopsy on a chimpanzee, and there were no human fatalities. Tai forest has not appeared since.
- Bundibugyo Ebola virus first appeared in 2007 in Uganda and has only appeared again once, in 2012.
- There have also been a number of incidents involving the *Ebola reston* strain in animals, but never a symptomatic human case.
- All outbreaks in humans have originated in central Africa, except for the most recent outbreak in West Africa, and the single case of Tai forest in Côte d'Ivoire.
- Case fatalities have ranged from around 25% up to 90%. Variation in fatality rates may be attributable to a range of factors including access to health care, variations in strain and host factors.



As of 3 Dec 2014, there have been over 17,000 cases reported with over 6,000 deaths.

- **Countries with widespread and intense transmission: Guinea, Liberia and Sierra Leone**
- **Countries with initial cases or localised transmission**
 - **US – four cases including one death**
 - **Mali – seven cases, six deaths**
 - **Spain – one case, no deaths (Ebola free 03/10/14) – 42 days since last case**
 - **Nigeria – 20 cases and eight deaths (Ebola free 19/10/14)**
 - **Senegal – one case (Ebola free 17/10/14)**

Medical evacuations



- As of 27 November, there have been 11 medical evacuations of confirmed EVD-infected patients to Europe (three to Germany, three to Spain, two to France, one to the UK, one to Norway and one to Italy).
- The most recent case is an Italian doctor who was medically evacuated from Sierra Leone on 24 November. According to the [Italian Ministry of Health](#), he was working in the Medical Centre of the NGO Emergency in Sierra Leone when he was diagnosed with EVD. The patient, a 50-year-old Sicilian man, was transported to the National Institute for Infectious Diseases (INMI) Lazzaro Spallanzani in Rome and was hospitalised in a high isolation unit to receive the appropriate treatment.

How is Ebola transmitted?

- Ebola is spread through **direct contact**
- This means contact through broken skin or mucous membranes (e.g. eyes, nose, or mouth) with:
 - blood or body fluids (including urine, saliva, sweat, faeces, vomit, breast milk, and semen) of an Ebola patient
 - objects (like needles and syringes) that have been contaminated with the virus
 - infected fruit bats or primates (apes and monkeys)
- Ebola is not spread through the air or by water



- When an infection occurs in humans the virus can be spread in many ways.
- It is spread mainly through direct contact (through broken skin or mucous membranes) with:
 - Infected animals
 - An infected person's blood or body fluid
 - Objects contaminated with infected body fluids (bed linen, needles etc)
 - Body of a deceased person infected with Ebola
- Ebola has a low infectious dose, but is only considered moderately contagious.
- This means that exposure to even a tiny amount of the virus can cause illness.
- Laboratory experiments on nonhuman primates have suggested that even a single virus may be enough to trigger a fatal infection.
- However, because the virus is not known to be airborne, Ebola virus is only considered to be moderately contagious, so it is not as contagious as measles or influenza which are airborne.
- Patients are only infectious so long as they are symptomatic and can not transmit the infection during the incubation period.

- The exception being, that in men the virus can remain detectable in semen for up to 7 weeks post recovery, so transmission is a risk during this time

Early symptoms

Ebola can only be spread to others after symptoms begin.

Symptoms usually appear after 8-10 days; rarely up to 21 days

- Fever
- Severe headache
- Muscle pain
- Lethargy
- Anorexia
- Diarrhea
- Vomiting
- Abdominal pain
- Unexplained bleeding or bruising *



Ebola can only be spread to others after symptoms begin.

Usually there is an abrupt onset of symptoms 8 to 10 day after contact; rarely up to 21 days. Symptoms in the early stages of the disease are non specific, which can make diagnosis difficult.

- Symptoms are characterised by the sudden onset of fever, intense weakness, muscle pain, headache and sore throat.
- This is followed by vomiting, diarrhoea, rash, and impaired kidney and liver function.
- Cases may develop a septic shock-like syndrome, and progress to multi-organ failure, sometimes accompanied by profuse internal and external bleeding.

Treatment



Image source: Centers for Disease Control and Prevention, Office of the Associate Director for Communications, Division of Public Affairs



- There is no specific vaccine or treatment that has been proven to be effective against Ebola.
- Although experimental treatments do exist and have been shown to be effective in animal studies – there is continued debate about how and where these should be utilised with respect to the current epidemic.
- In the absence of treatment, symptoms are managed as they appear and care is largely supportive,
- Basic interventions significantly increase survival rate. These include:
 - Provision of IV fluids and balancing electrolytes
 - Maintaining oxygen status and blood pressure
 - Treating other infections as they occur
- Timely treatment is important but challenging as the infection is difficult to diagnose in the early stages. Because early symptoms are fever and headache, which are non-specific to Ebola virus, the infection may be misdiagnosed.
- Access to treatment and medical support is a challenge in resource poor settings, and probably one of the reasons why the current epidemic has proved so difficult to control.

Ebola Preparedness in NSW



Image source: Western Sydney LHD. Available at: <http://www.wslhd.health.nsw.gov.au/News-room/Westmead-Hospital-conducts-ebola-training-sessions>



Prevention of Ebola

- No vaccine available yet but in rapid development by WHO
- Advice for Travellers
- Detailed advice for healthcare workers developed regarding
 - High-level PPE and infection control
 - Patient isolation
 - Laboratory infection control
 - Safe linen and waste disposal
 - Safe management of the deceased
- Contact identification and management

Border measures

- Exit screening in Ebola affected countries
- Enhanced border screening in place in Australia – contact public health if any concern
- 1 800 number on all incoming passenger cards



Australian Government
Department of Health

Please keep this information for 21 days after arrival

**PROTECT YOURSELF
PROTECT OTHERS**

EBOLA

Information Card
KEEP THIS CARD FOR 21 DAYS

Arrival Date

Your personal information is protected by law, including the Privacy Act 1988, and is being collected by the Australian Government Department of Agriculture to protect the Australian public by minimising the entry of quarantinable diseases and diseases with pandemic potential.

If you do not provide the health information requested penalties authorised under the Quarantine Act 1958 may apply.

You can get more information about the way in which your personal information will be managed at www.health.gov.au/quarantine

**PROTECT YOURSELF
PROTECT OTHERS**

An outbreak of Ebola has originated in West Africa. Ebola is a severe, often fatal disease.

SYMPTOMS INCLUDE

Fever
Headache

Muscle
Aches

Vomiting
or Diarrhoea

If you visited a country affected by the outbreak and develop any symptoms within 21 days, call **1800 196 815** for help 24 hours a day.

They will help you and help protect others

All information in this publication is correct as at November 2014

KEEP INFORMED
check www.health.gov.au/ebola
for regular updates

Image Sources: Australian Department of Health (top) and Australian Customs and Border Protection Service (bottom)



- Border measures are in place to check people coming from affected countries as they arrive in Australia.
- All people entering Australia from affected countries are provided with information about Ebola and what to do if symptoms develop. The health of all travellers returning from countries in West Africa is being checked.
- Returning aid workers cannot return to patient care duties for 21 days after leaving West Africa, and they remain under public health surveillance during that period.
- NSW Health is notified immediately if a person is unwell, or has had contact with person infected with Ebola.

Surveillance

National (CDNA) Public Health Guidelines

- Active public health monitoring for:
 - Returning HCWs and
 - Humanitarians arrivals from affected countries
- Immediate notification of any suspect cases under investigation to PHUs by Ambulance, GPs and hospitals
- Notification from HealthDirect



Image Source: Australian Department of Health

Public Health Laboratory Guidelines

- Collection, transport & testing of specimens



- National Public Health Guidelines for PHU staff re: investigation and management of any cases and their contacts
- In NSW PHUs are conducting active public health follow up of:
 - Returning HCWs
 - Humanitarian arrivals
- NSW Health has trained surveillance officers in public health units across the state who are skilled and experienced in public health follow up of any persons under investigation for disease
- If a case of Ebola is found in NSW, surveillance officers will identify all those they have had contact with, provide information about Ebola symptoms, and monitor them during the 21-day period to prevent any spread of infection.
- Public Health Laboratory Network released guidelines describing detail on how to collect, process, transport and test specimens for Ebola testing
 - ICPMR designated lab for diagnostic services for Ebola across NSW

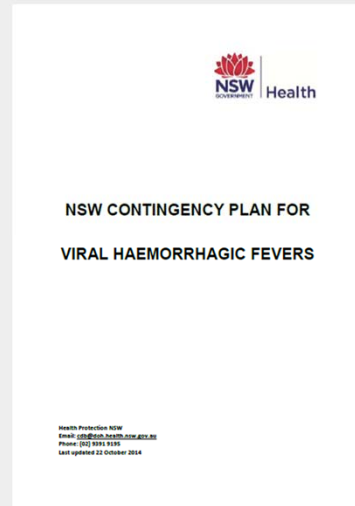
Response planning – Health Services

- **Viral Hemorrhagic Fever Contingency Plan**

- How to conduct a risk assessment
- Infection control measures
- Diagnostic procedures and tests
- Management of low, high probability and confirmed cases

- Designated hospitals

- Designated laboratories



- The objective of the NSW Contingency Plan for Viral Haemorrhagic Fevers is to provide a guide for a coordinated response within NSW to the importation of suspected and confirmed cases of viral haemorrhagic fever (VHF), and to suggest appropriate management of cases and their contacts.
- Contingency planning for VHFs (including Ebola) aims to diagnose cases early, provide patients with appropriate clinical care in a safe environment and prevent transmission to other people
- NB: Any cases of Ebola in NSW will be cared for in special facilities at Westmead Hospital or Westmead Children's Hospital.
- The Institute for Clinical Pathology and Medical Research (ICPMR) at Westmead has a high containment laboratory and a test for Ebola that takes about four hours.

Response planning – Hospitals/EDs

EBOLA VIRUS DISEASE (EVD) PATIENT RISK ASSESSMENT

Advice for NSW in the event that patient presents to Emergency Departments

1. Does the patient:
Report having a fever or history of fever in the past 24 hours? **AND**

- Report returning from a country where there is a current EVD outbreak within 21 days of illness onset (see EVD Outbreak Country List →)
- OR** Report having had contact with a known or highly suspected case of EVD within 21 days of illness onset

NO

EVD highly unlikely
Manage locally

YES

- NO STAFF MEMBER TO HAVE CONTACT WITH PATIENT UNLESS WEARING FULL PPE (see PPE Box →)
- PROVIDE PATIENT WITH A SURGICAL MASK (Provide a vomit bag if vomiting)
- ESCORT TO FACILITY'S DESIGNATED ISOLATION ROOM FOR ASSESSMENT (single room with door closed, with own bathroom and negative pressure if available)
- URGENT DISCUSSION WITH LOCAL ID PHYSICIAN (OR WESTMEAD HOSPITAL ID PHYSICIAN) AND PHU

2. Has the patient:

- Come into contact with body fluids (blood, urine, faeces, tissues, laboratory specimens) from an individual or animal known or strongly suspected to have EVD?
- Participated in a funeral which involved direct contact with the deceased body?
- Presented with vomiting OR diarrhoea OR bruising OR bleeding?
- Been assessed by ID Physician and/or PHU as having increased possibility of EVD

NO

LOW POSSIBILITY OF EVD
Discuss with local laboratory

URGENT MALARIA SCREEN
AND other local investigations as appropriate

Malaria Positive → EVD unlikely → Patient Improving

Malaria Negative → Alternative diagnosis? → YES → Patient deteriorating → EVD unlikely → Patient Improving

NO → REVIEW EVD RISK ASSESSMENT

- Discuss with ID Physician + PHU + Local Laboratory
- Consider re-categorising as Increased Possibility of EVD

YES TO ANY

INCREASED POSSIBILITY OF EVD

- URGENT DISCUSSION WITH LOCAL LAB, WH/CHW (ID + ICU) AND CIDMLS-ICPMR Lab
- REVIEW diagnosis, clinical status and need for transfer to WH or CHW for management and EVD testing
- Collect specimens for testing based on advice received
- Liaise with NSW Ambulance and WH or CHW for transfer

COMMENCE PUBLIC HEALTH ACTION

- Work with the PHU to identify close contacts
- Further actions depend upon results of EVD testing

Last updated: 21 October 2014. Health Protection NSW, NSW HEALTH H14/7029
*Where a surgical hood is not available, a balaclava is an acceptable alternative

NSW Public Health Units (PHU) 1300 066 055 (24 hours)
Westmead Hospital (WH) (02) 9845 6609; ask for ID physician
Children's Hospital Westmead (CHW) (02) 9845 0000; ask for ID physician
CIDMLS-ICPMR Laboratory (02) 9845 6255; AH: Call WH - Ask for Clinical Micro on-call

WESTMEAD HOSPITAL (WH) and the
CHILDREN'S HOSPITAL WESTMEAD (CHW)
are the designated hospitals for the
management of EVD Patients

Alertez le personnel immédiatement si...

vous avez de la
fièvre et vous
avez voyagé en
Afrique de l'Ouest
le mois dernier

www.health.nsw.gov.au

- Risk assessment algorithm is designed to ensure safe, timely and effective assessment of people presenting to healthcare services with a travel history to Ebola affected countries and/or symptoms
- ED posters are designed to encourage people attending EDs declare a history of travel to west Africa
- Preparedness checklist - to ensure hospitals and EDs have the necessary resources, personnel, training and equipment to respond to a case of Ebola under investigation
- PICTURE is our own

Response planning - GPs

- GPs to remain alert to possibility of Ebola in unwell travelers returning from West Africa
- Engagement with AMA, RACGP and Medicare Locals
- GP fact sheet
- GP algorithm

- General Practitioners (GPs) should remain alert to the possibility of Ebola in sick travellers returning from West Africa.
- If a GP is concerned that a patient may have Ebola they should isolate them in a room and contact the local public health unit and/or infectious diseases doctor immediately.
- Advice for GPs – factsheet to ensure GPs remain alert to the possibility of Ebola in sick travellers returning from West Africa.
- NSW Health has been engaging with AMA and RACGP to ensure GPs are alert and prepared for any people presenting with Ebola-like symptoms
- PICTURE is our own

Resources – Infection Control

- Isolation room posters
- PPE videos
- Cleaning videos
- Role of PPE buddy video

EVD INFECTION CONTROL / PPE

ENSURE THAT STAFF ARE:

- Rigorously and repeatedly trained
- Donning & doffing PPE in designated area outside of the patient's room
- Not exposing any skin when wearing PPE
- Monitored by a trained PPE observer for donning & doffing compliance; observer must not touch PPE.

- PPE recommendations – based on US CDC guidance
- Proficiency in use is key
- PPE videos and posters

- These pictures are our own

Education and training – Infection Control & PPE

Infection Control Practitioner (ICP) Train the Trainer Program

- Donning/doffing PPE
- Role of trained observer
- Environmental cleaning
- Competency assessment and credentialing
- Regular auditing every week during preparedness phase

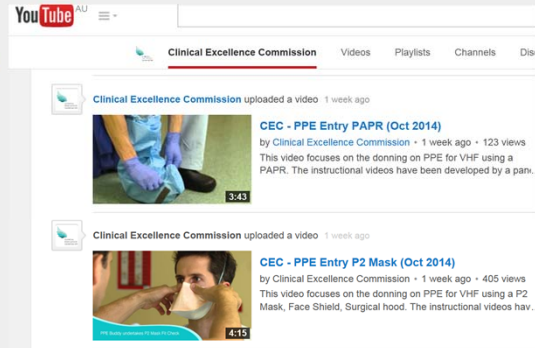


Image Source: Clinical Excellence Commission private YouTube Channel

Exercises

- Public Health Units
- Designated Hospitals re: Westmead Adults and Children's Hospitals
- Ambulance Service NSW re: patient transfer
- Border screening – SES LHD, Police and Air Services



- These images are ours

Communication

- Hospitals/ EDs
- Primary Care
- Refugee Health Service
- Laboratories
- Ambulance
- HealthDirect
- Emergency responders
- Cross-govt agencies
- Other states & territories, Commonwealth



Image Source: HealthLink, Mid North Coast LHD



- Refugee Health Service – supporting any humanitarian arrivals with appropriate health services
- NSW Health Pathology – ensuring our private and public labs have capability and capacity to respond
- HETI & CEC – ensuring healthcare staff have adequate training and resources
- ASNSW – transfer of patients
- Emergency responders and committees – HSFACs and HEMU
- Ensuring we engage with cross-govt agencies
 - NSW Taxi Council, Dept. of Education and Communities, HealthDirect etc
- Picture from: <http://yourhealthlink.health.nsw.gov.au/>

Communications

Public information

- Regularly update NSW Health Ebola webpage
- Ebola factsheets
- FAQs

The screenshot shows the NSW Health website page for Ebola virus disease. At the top, there is a search bar and a navigation menu with links for PUBLIC, PROFESSIONALS, HEALTHY LIVING, ABOUT, MEDIA, PUBLICATIONS, CAREERS, and MINISTERS. Below the navigation is a header image of a healthcare worker in a lab coat. The main content area is titled 'Ebola virus disease' and includes a breadcrumb trail: Home > Infectious Disease > Alerts > Ebola virus disease. The page is divided into four columns of information:

- Global situation update:** The largest outbreak of Ebola virus disease (EVD) ever reported is continuing in **Guinea, Liberia and Sierra Leone** in West Africa. Total EVD cases reported (as of 27 October) **13,763** with **4,922** deaths. EVD outbreaks are over in **Senegal and Nigeria**. Contacts of Ebola cases are being monitored in Spain, the United States and Mali. WHO Ebola situation reports [↗](#)
- NSW situation update:** NSW Health is well-prepared to identify and respond to any suspected cases of Ebola and prevent transmission should a case occur. **There are currently no cases of Ebola in Australia**. NSW Health has developed a Contingency Plan to ensure potential cases can be treated and outbreaks prevented. Systems are in place to ensure NSW Health is notified immediately if anyone entering Australia from affected countries shows symptoms of Ebola.
- Info for the Community and Travellers:** Ebola virus disease is a serious infection that is spread through direct contact with people who are sick with the infection, or with their blood or other body fluids, or with infected animals. At present there is no Ebola in Australia, so there is no risk of catching the infection here. People who travel in affected countries in West Africa need to minimise their risk of exposure to the Ebola virus.
- Ebola Resources:** Ebola Factsheet, Ebola Patient Risk Assessment Algorithm, VHF Contingency Plan, Hospital EVD Preparedness Checklist, Ebola PHU Control Guidelines, Ebola PPE and infection control training resources (from the Clinical Excellence Commission)

More information



- We are regularly updating the NSW Health website

Summary of preparedness

- Risk is low, but consequences are serious
- Comprehensive planning at National, State and Local levels
- Key measures:
 - Early case finding and isolation
 - Protection of staff: PPE
 - Clear management protocols
 - Exercises
 - Communication