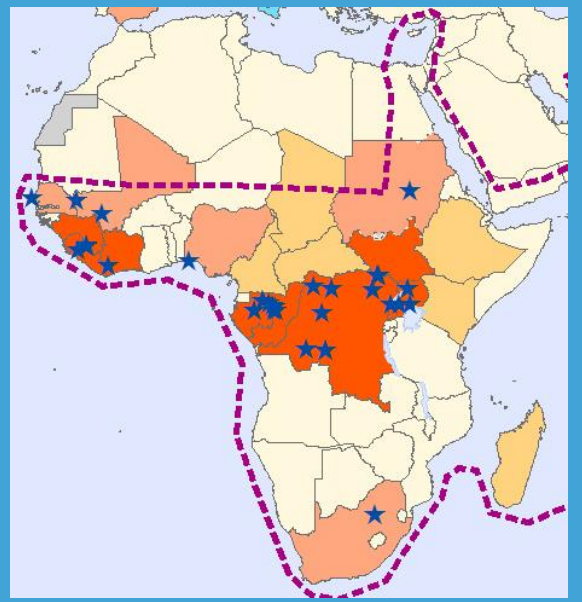
Introduction to Ebola disease

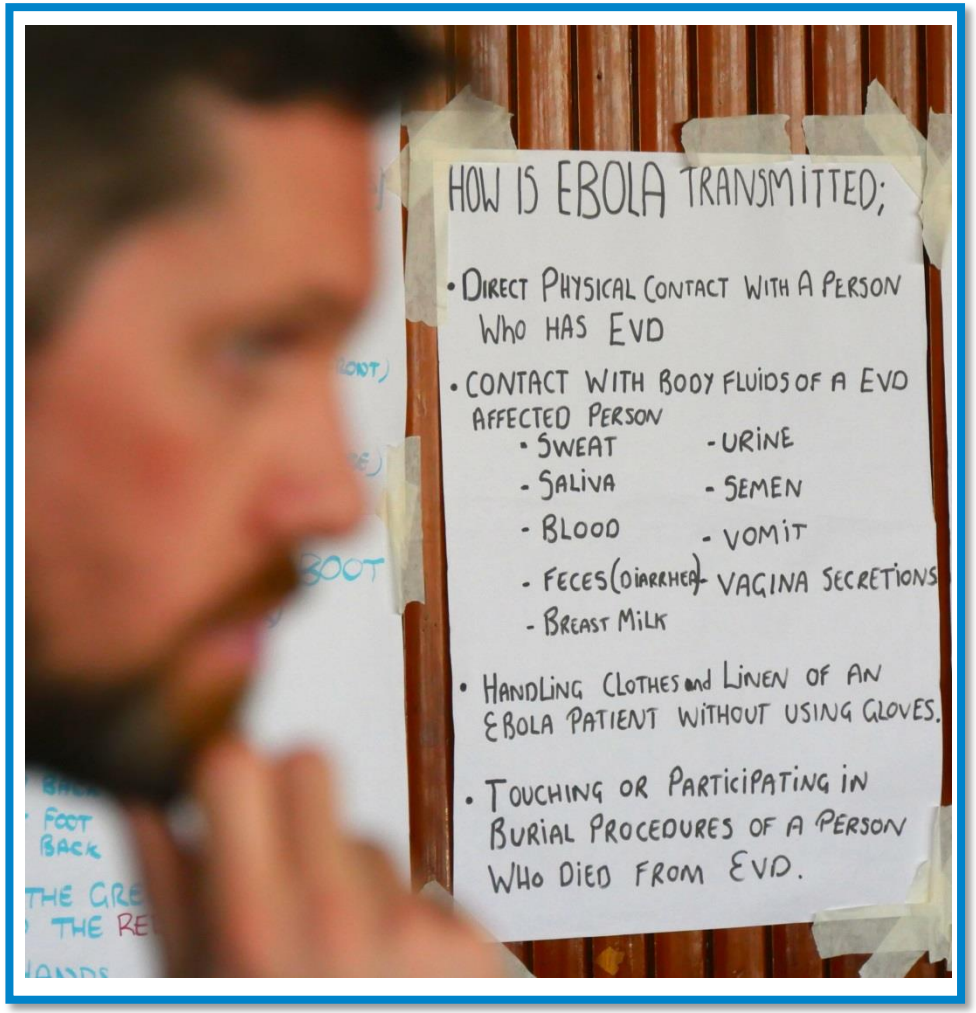
Managing infectious hazards



World Health Organization

Learning objectives

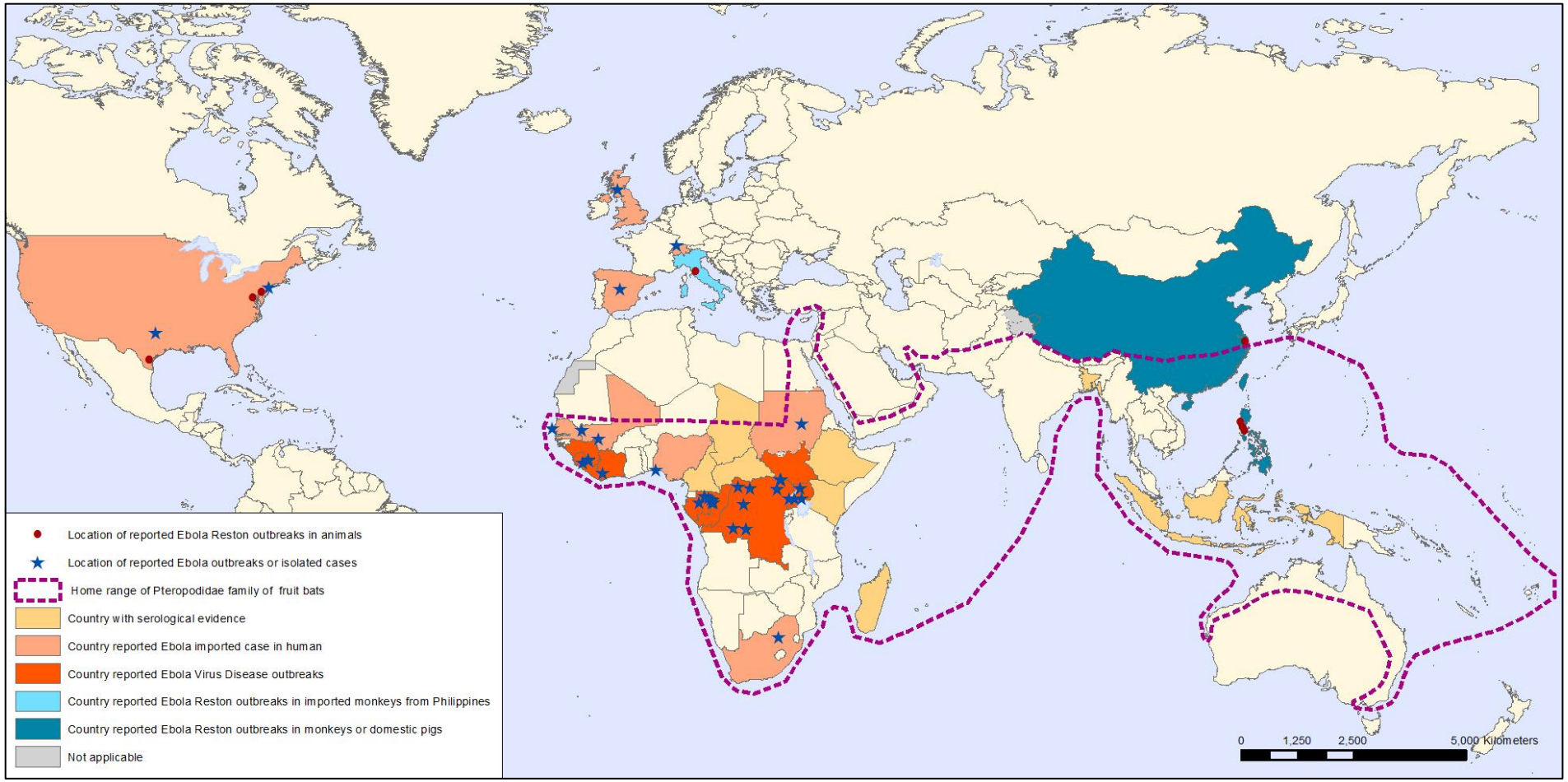
- Describe signs, symptoms, and transmission of Ebola disease
- List preventive and control measures
- Describe main public health concern during an Ebola disease outbreak



Ebola disease

- Ebola disease is a severe, often fatal illness in humans.
- The virus is transmitted to people from wild animals and then spreads in the human population through human-to-human transmission.
- The average Ebola case fatality rate is around 50%. Early supportive care with rehydration, symptomatic treatment improves survival.
- Five species of Ebola virus have been identified. Among them, Bundibugyo ebolavirus, Zaïre ebolavirus, and Sudan ebolavirus have been associated with large outbreaks in Africa.

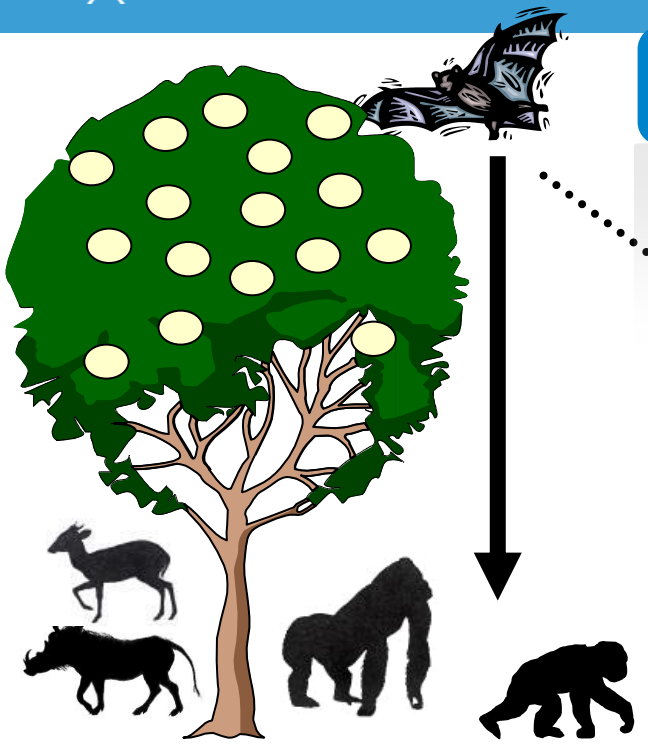
Geographic distribution of Ebola



- Ebola disease was identified in 2 simultaneous outbreaks in 1976, one in South Sudan and one in the Democratic Republic of the Congo.
- Since 1976, 25 Ebola outbreaks occurred mostly in central Africa.
- The 2014–2016 Ebola outbreak in West Africa was the largest and most complex.

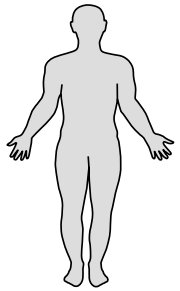
Map available at: http://www.who.int/csr/disease/ebola/global_ebolaoutbreakrisk_20150316.png?ua=1

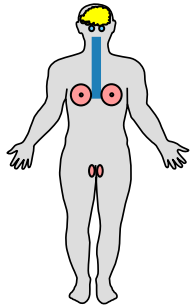
Ebola virus transmission



1. Virus reservoir: fruit bats

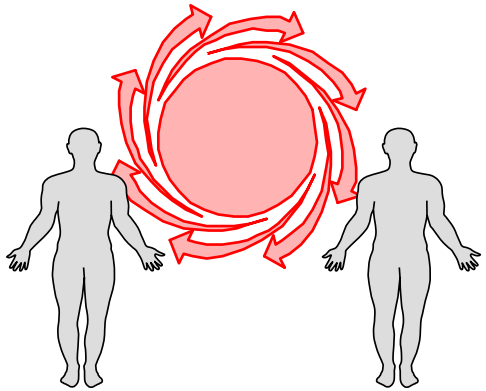
The virus maintains itself in fruit bats





5. Virus persistence

Persistence of Ebola virus in body fluids of EVD survivors represent a risk for sexual transmission.



10% Health Care Workers

2. Epizootics in animals

- Infected fruit bats enter in direct or indirect contact with other animals and pass on the infection.
- Large-scale epidemics in primates or mammals (e.g. forest antelopes) can happen.

3. Primary human transmission

Humans are infected either through:

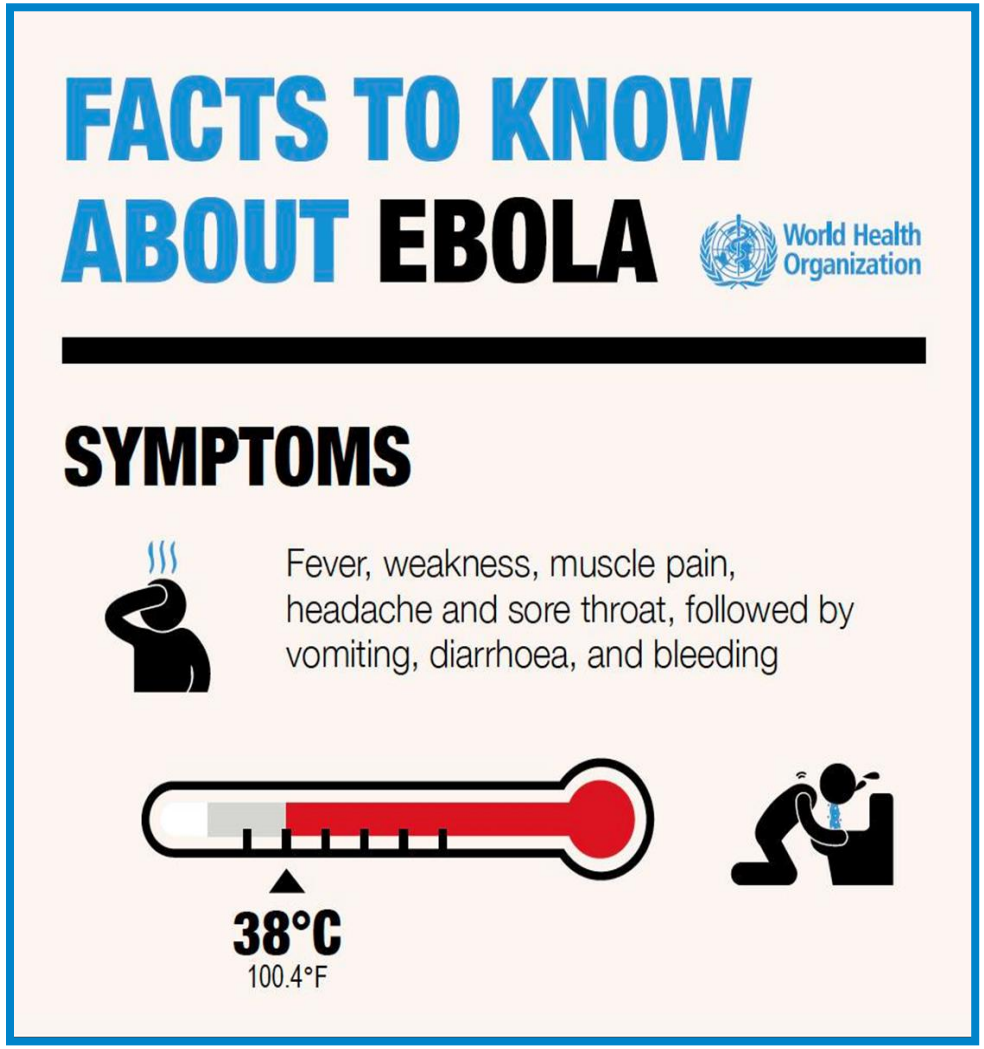
- handling infected dead or sick animals found in the forest (more frequent);
- or through direct contact with infected bats (rare event).

4. Secondary human transmission

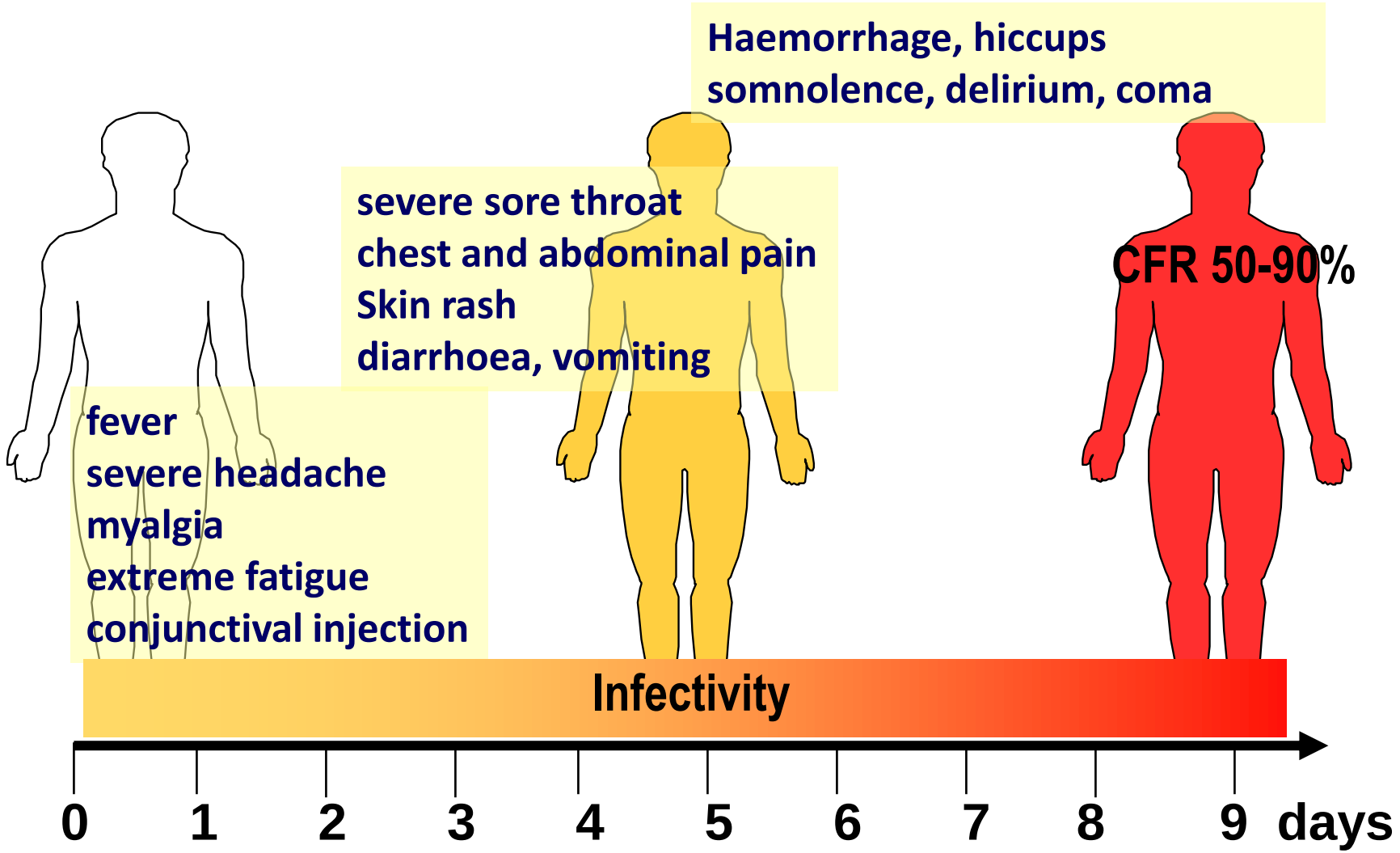
- Secondary human-to-human transmission occurs through direct contact with the blood, secretions, organs or other body fluids of infected persons.
- High transmission risk when providing direct patient care or handling dead bodies (funerals).

Clinical features of Ebola disease

- The incubation period is 2 - 21 days.
- Human are not infectious until they develop symptoms.
- Initial symptoms are sudden onset of fever and fatigue, muscle pain, headache and sore throat.
- Usually followed by: vomiting, diarrhoea, rash, impaired kidney and liver function, spontaneous bleeding internally and externally (in some cases).



EVD: clinical symptoms



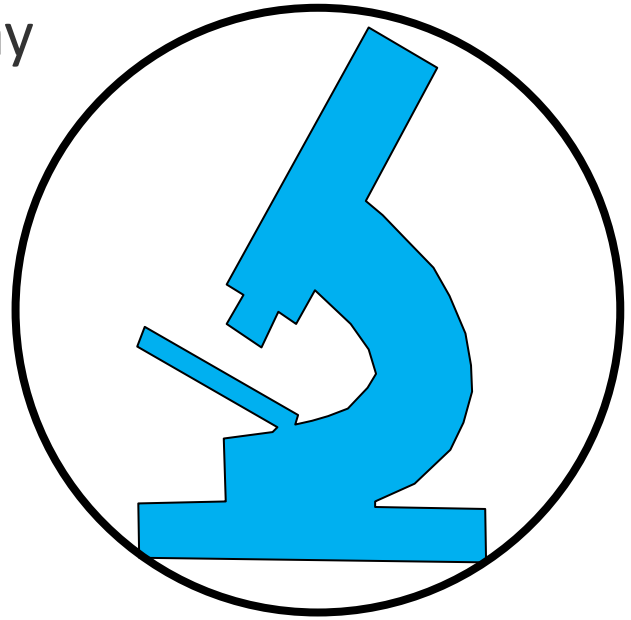
Ebola disease diagnosis

- Symptoms are non-specific; clinical diagnosis may be difficult.
- Differential diagnosis includes other viral haemorrhagic fevers, yellow fever, malaria, typhoid fever, shigellosis, and other viral and bacterial diseases.
- Patient history is essential and should include:
  - Contact with a dead or sick animal;
  - Contact with a suspected, probable or confirmed Ebola patient

Ebola disease laboratory diagnosis

Definitive diagnosis requires testing:

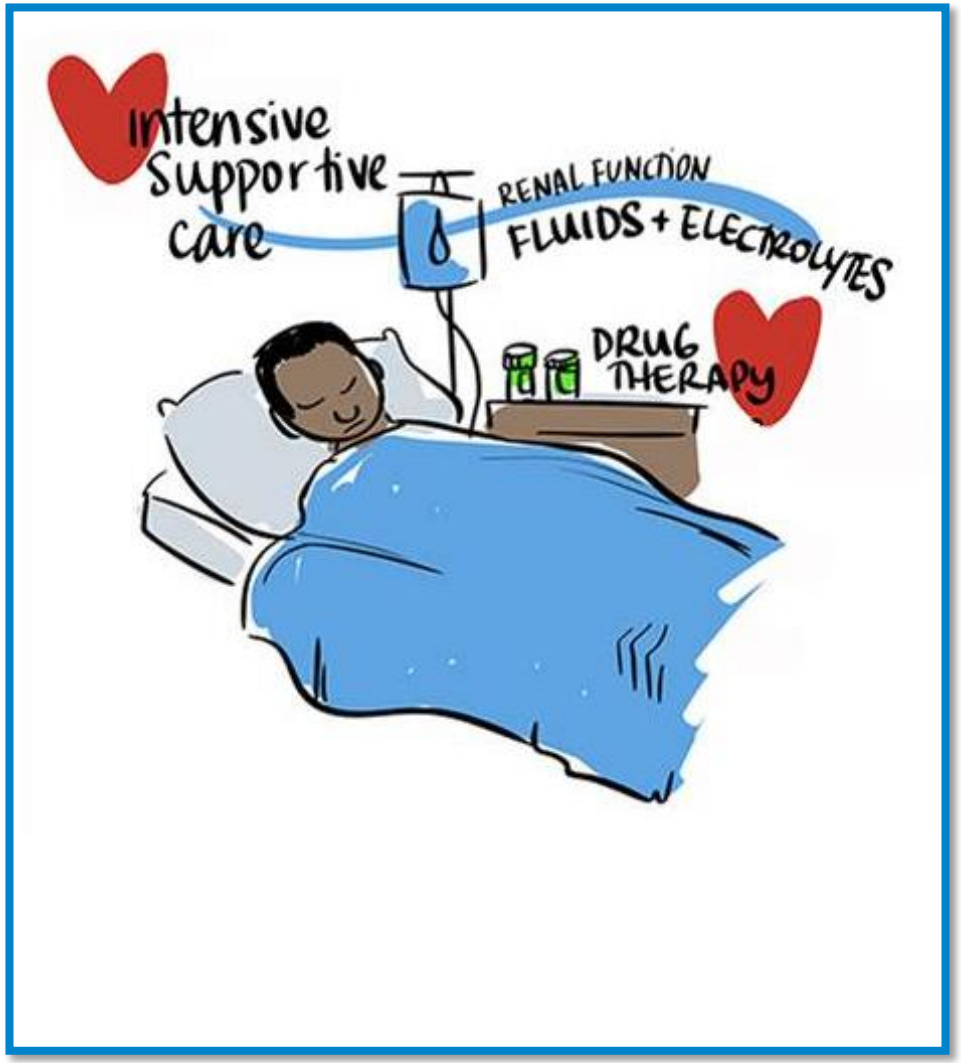
- reverse transcriptase polymerase chain reaction (RT-PCR) assay
- IgG and IgM antibodies with enzyme-linked immunosorbent assay (ELISA)
- antigen detection tests
- virus isolation by cell culture



The list of diagnostics approved for Emergency Use Assessment and Listing procedure (EUAL) by WHO is available here: http://www.who.int/medicines/ebola-treatment/emp_ebola_diagnostics/en/

Handling and processing specimen requires **suitably equipped laboratories under maximum biological containment conditions** and staff collecting samples should be **trained**

Ebola disease treatment



- Early, aggressive, intensive care support: Monitor fluid and electrolyte balance and renal function, blood pressure, oxygenation, careful rehydration.
- Supportive drug therapy including : painkillers, antiemetic for vomiting, anxiolytic for agitation, +/-antibiotics and/or antimalarial drugs
- Psycho-social support and services

Key components for Ebola disease control

General strategy to control EVD outbreaks

- Conduct social and cultural assessments
- Engage with key influencers: women and /or youth associations, traditional healers, local authorities, religious & opinion leaders
- Formal and informal communication
- Address community concerns

Behavioural and social interventions

Psycho-social support

Clinical case management

- Triage in/out
- Barrier nursing
- Infection control
- Organize funerals
- Clinical trials
- Ethics committee

Medias

Coordination

Ethical aspects

Expanded access Ebola Vaccine Implementation Team

- Security, police
- Lodging, food
- Social and epidemiological mobile teams
- Finances, salaries
- Transport vehicles

Logistics

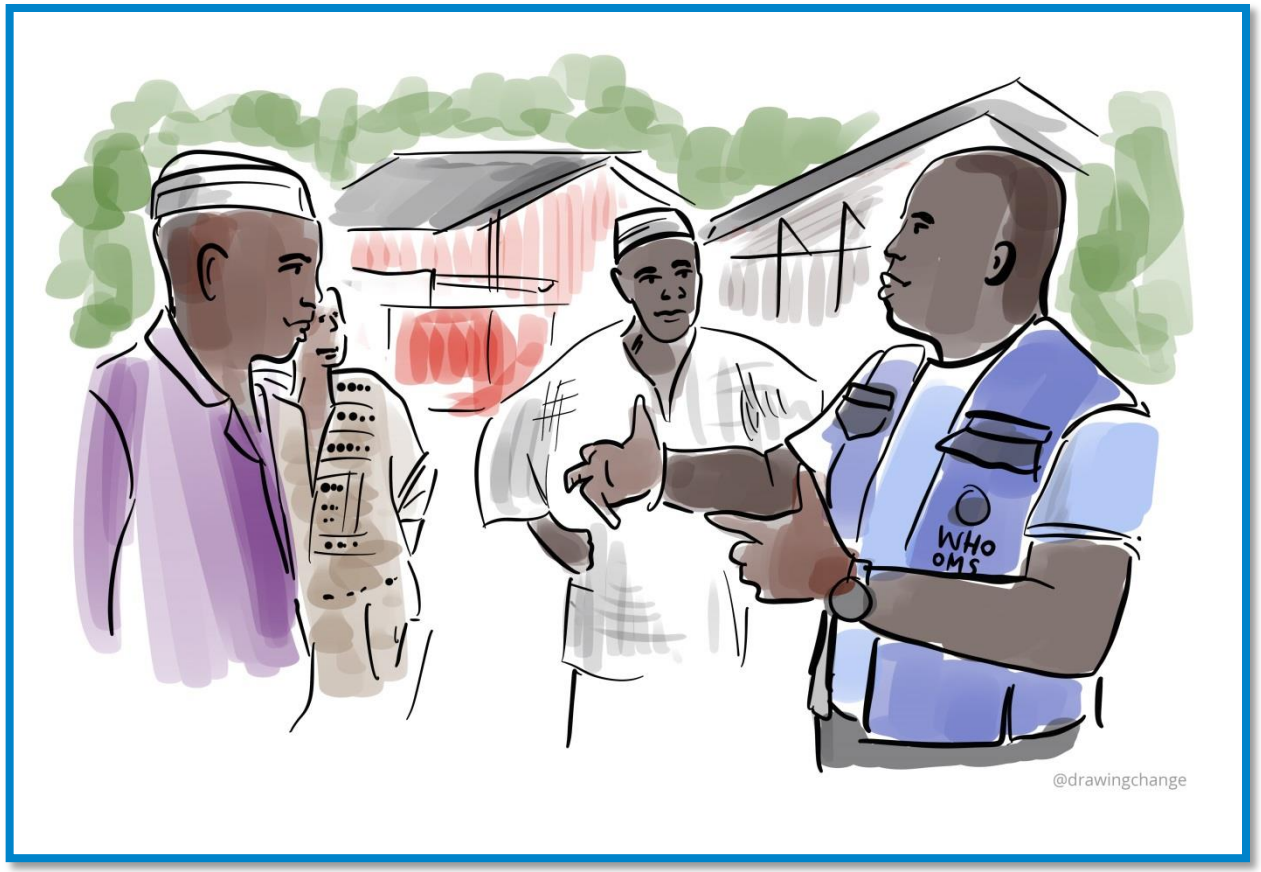
Control of vectors and reservoirs in nature

Epidemiological investigation, surveillance and laboratory

- Active case-finding
- Follow-up of contacts
- Specimens
- Laboratory testing
- Database analysis
- Search for the source

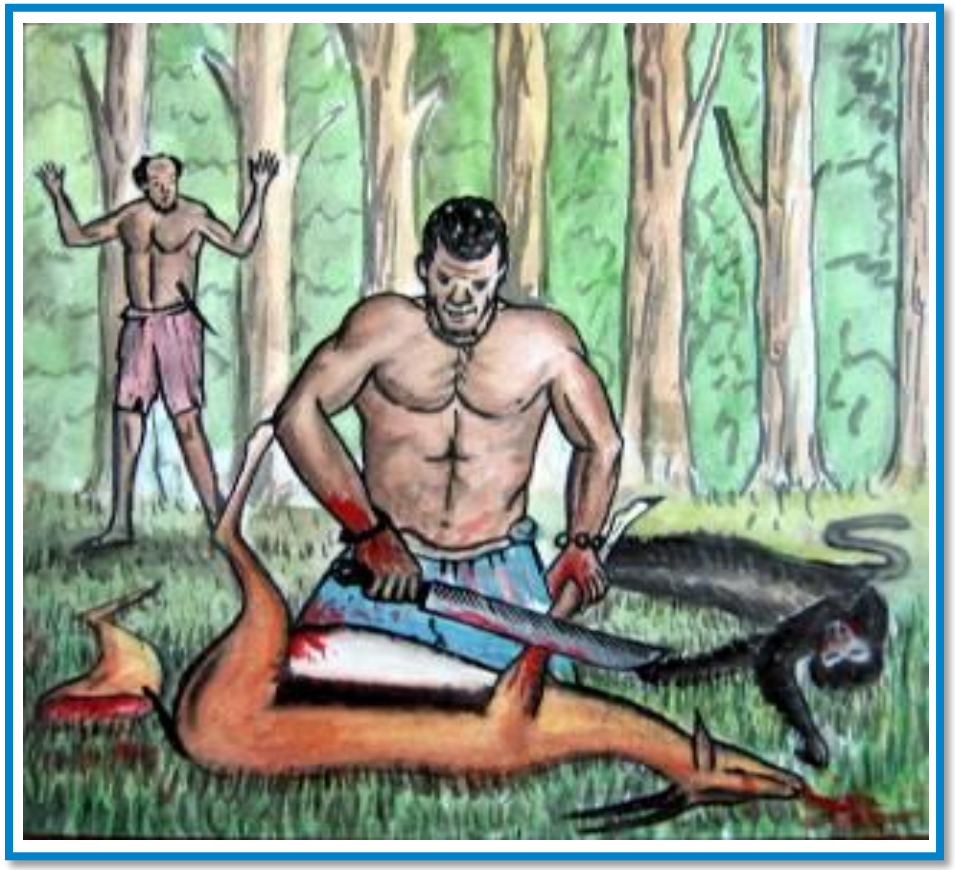
Community engagement and awareness

- Engage with communities to promote desired health practices and behaviours, particularly on caring for sick and/or deceased persons.
- Provide accurate and timely health advice and information on the disease.



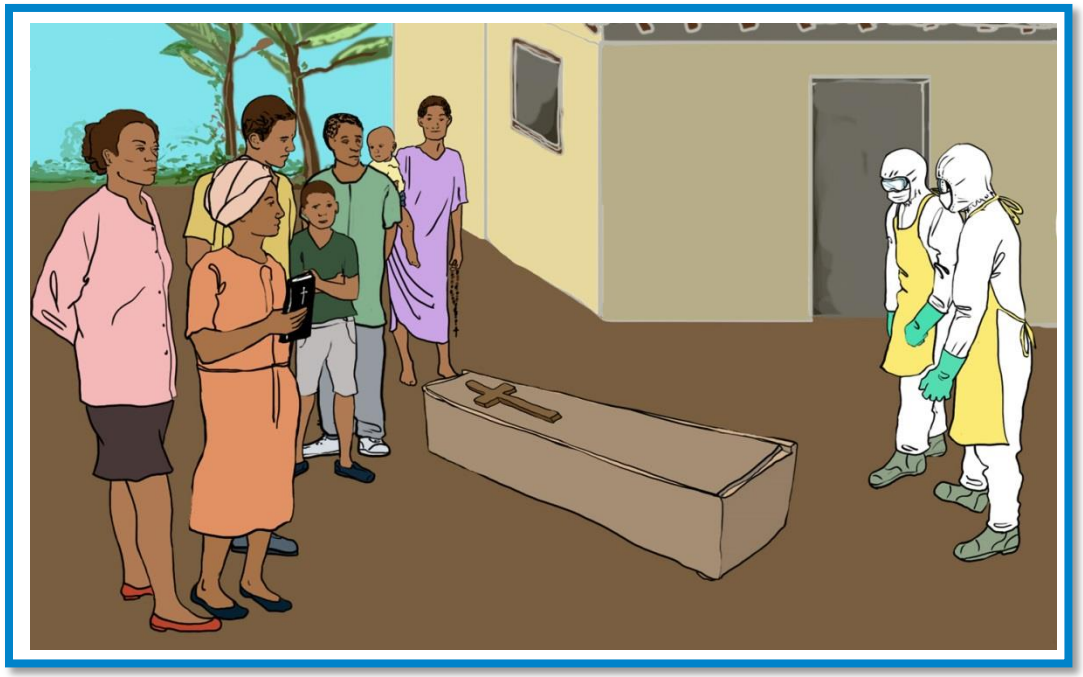
Reducing wildlife-to-human transmission

- **Reducing the risk of wildlife-to-human transmission** from contact with infected fruit bats or monkeys/apes and the consumption of their raw meat.
  - Animals should be handled with gloves and other appropriate protective clothing.
  - Animal products (blood and meat) should be thoroughly cooked before consumption.



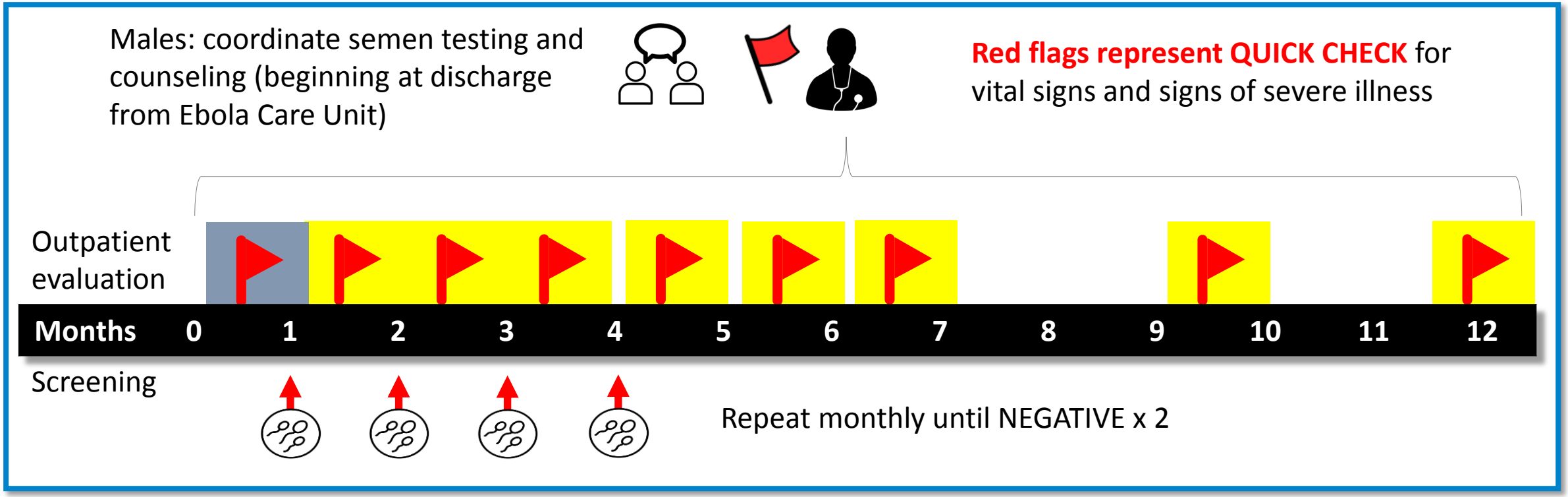
Reducing human-to-human transmission

- **Reducing the risk of human-to-human transmission** from direct or close contact with people with Ebola symptoms, particularly with their bodily fluids.
  - Gloves and appropriate personal protective equipment should be worn when taking care of ill patients at home.
  - Regular hand washing is required after visiting patients in hospital, as well as after taking care of patients at home.
  - Organize safe and dignified burials for people who may have died of Ebola Virus Disease



Reducing possible sexual transmission

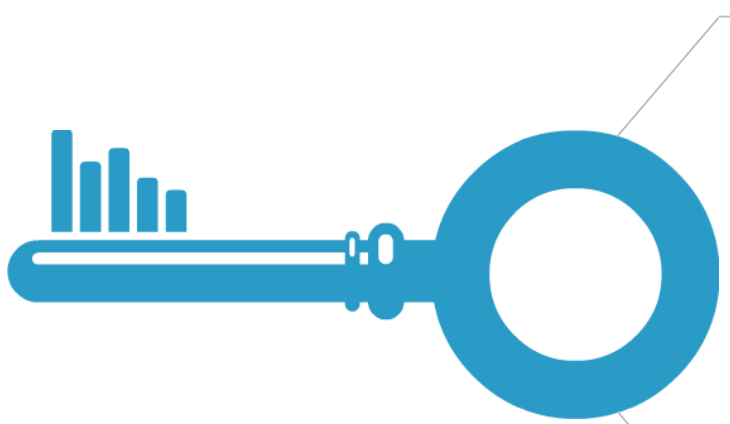
- **Reducing the risk of possible sexual transmission**, WHO recommends that male survivors of Ebola virus disease practice safer sex and hygiene for 12 months from onset of symptoms or until their semen tests negative twice for Ebola virus.



Controlling infection in health-care settings

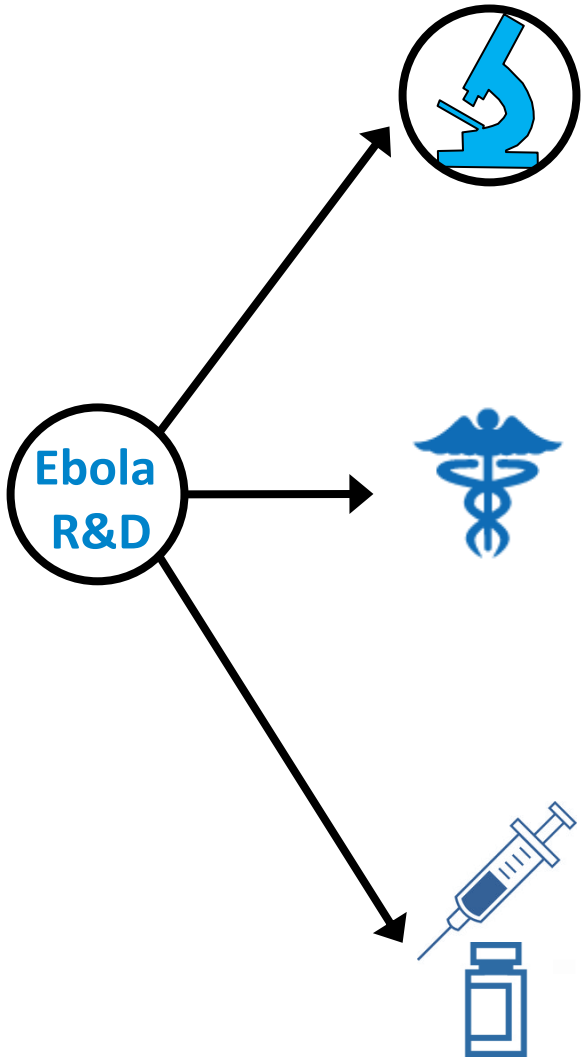
- Implement Standard Precautions with all patients – regardless of their diagnosis – in all work practices at all times including safe injection practices. http://www.who.int/csr/resources/publications/standardprecautions/en/index.html
- Health care workers treating patient with Ebola Virus Disease should apply extra infection control measures to prevent contact with the patient's blood and body fluids and contaminated surfaces or materials such as clothing and bedding.
  http://www.who.int/csr/resources/publications/ebola/filovirus_infection_control/en/?ua=1
- Laboratory workers are also at risk. Samples taken from suspected Ebola Virus Disease cases for diagnosis should be handled by trained staff and processed in suitably equipped laboratories.

Key Challenges for Ebola Virus Disease



- **Difficult to diagnose patients based on clinical presentation**
- **Stopping all chains of transmission**
- **Engaging timely with communities**

Ebola Research and Development



Rapid Antigen Test (3) Nucleic Acid Test (6)

US-FDA and WHO approved for Emergency Use

Therapeutics trials medicines and blood products

ZMapp Randomized Control Trial, estimated effect of appeared to be beneficial

Favipiravir decreases CFR in patients with a low to moderate viral load (200 patients)

GS-5734 Gilead, phase I, used for 3 compassionate treatments

Vaccines trials implemented in Guinea, Liberia and Sierra Leone

Expanded access proposed during Likati outbreak, DRC 2017

WHO information on Ebola Virus Disease

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http://www.who.int/ebola/en/

- Technical information
- Fact Sheet
- Disease outbreak news
- Infographics
- Maps
- Related links

Key contact

- Dr Pierre Formenty

Infectious Hazard Management
Health Emergency Programme
WHO Geneva
formentyp@who.int