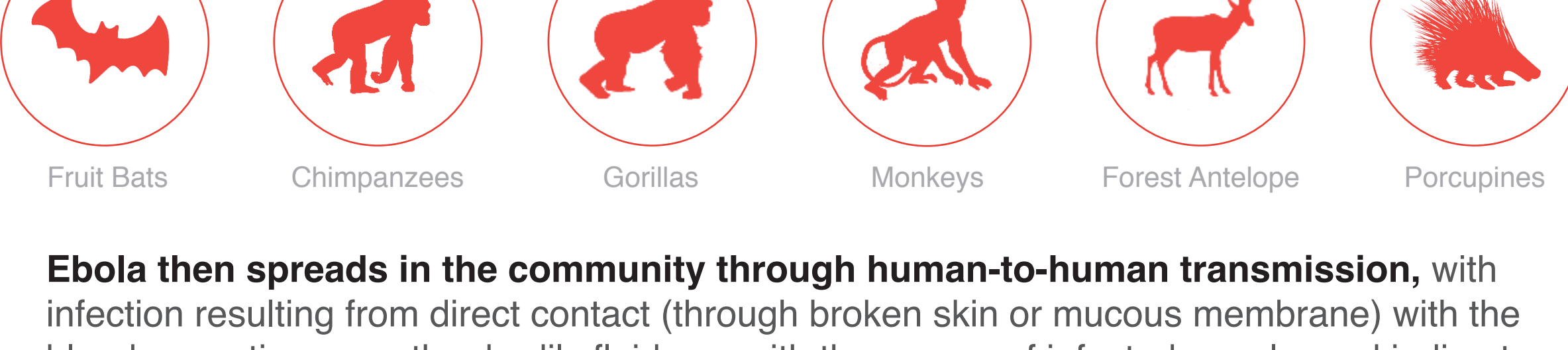


## Virus Transmission

**Ebola is introduced into the human population** through contact with an infected animal. Ebola is spread through close and direct physical contact with infected bodily fluids, the most infectious being blood, faeces and vomit. The Ebola virus has also been detected in breast milk, urine and semen.

In Africa, infection has been documented through the handling of the following infected animals found ill or dead in the rainforest: <sup>12</sup>



**Ebola then spreads in the community through human-to-human transmission**, with infection resulting from direct contact (through broken skin or mucous membrane) with the blood, secretions, or other bodily fluids, or with the organs of infected people, and indirect contact with environments contaminated with such fluids. The virus can survive in liquid or dried material for a number of days. <sup>13 14</sup>

The following are the most common methods of EVD transmission between people:

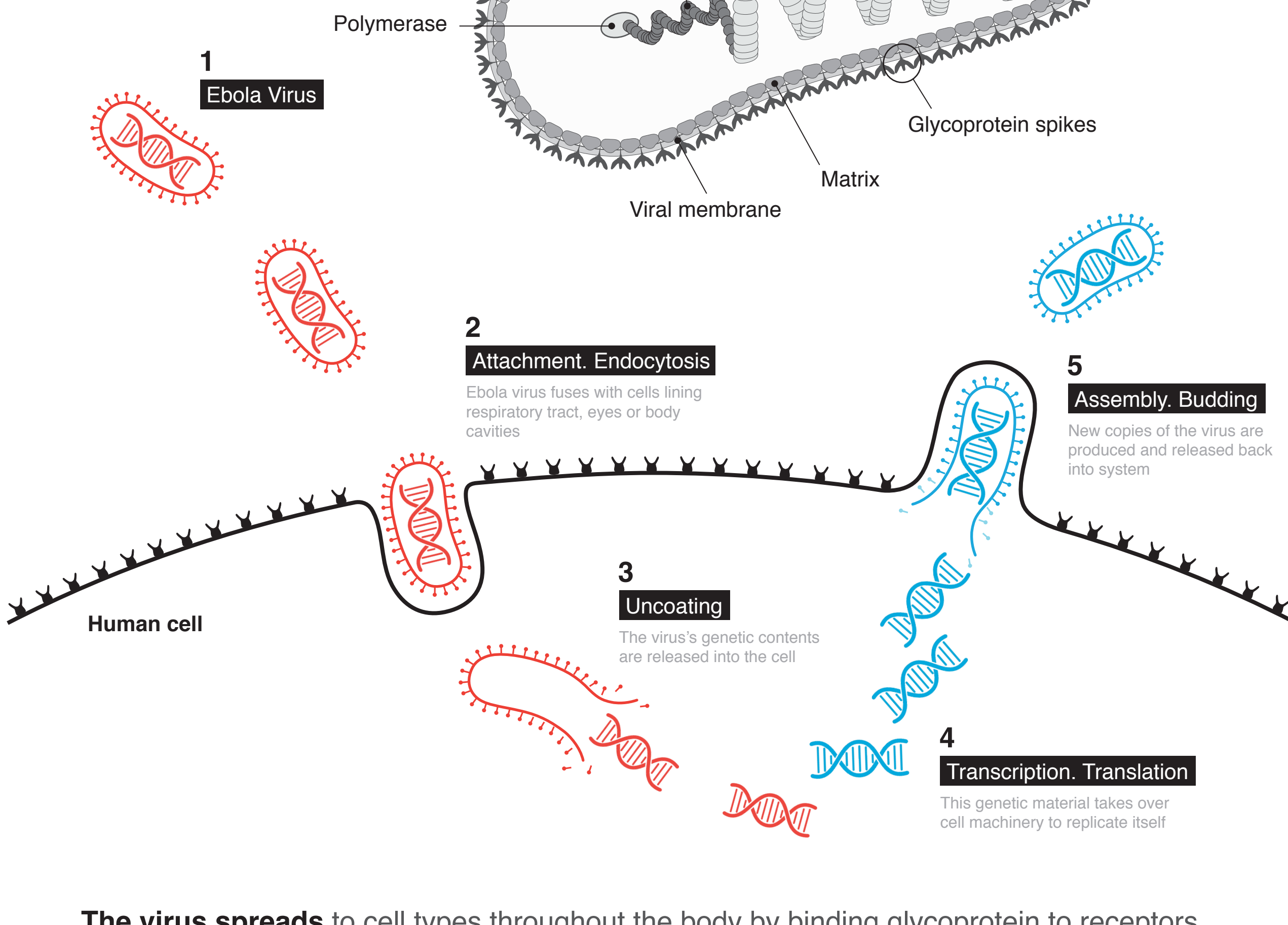


Each pattern represents 50,000 particles

Three drops (0.031 US oz / one-fifth of a teaspoon) of a confirmed patient blood carry<sup>15</sup>:

HIV particles 50,000 - 100,000  
Hepatitis C particles 5,000,000 - 20,000,000

**Ebola particles** 10,000,000,000

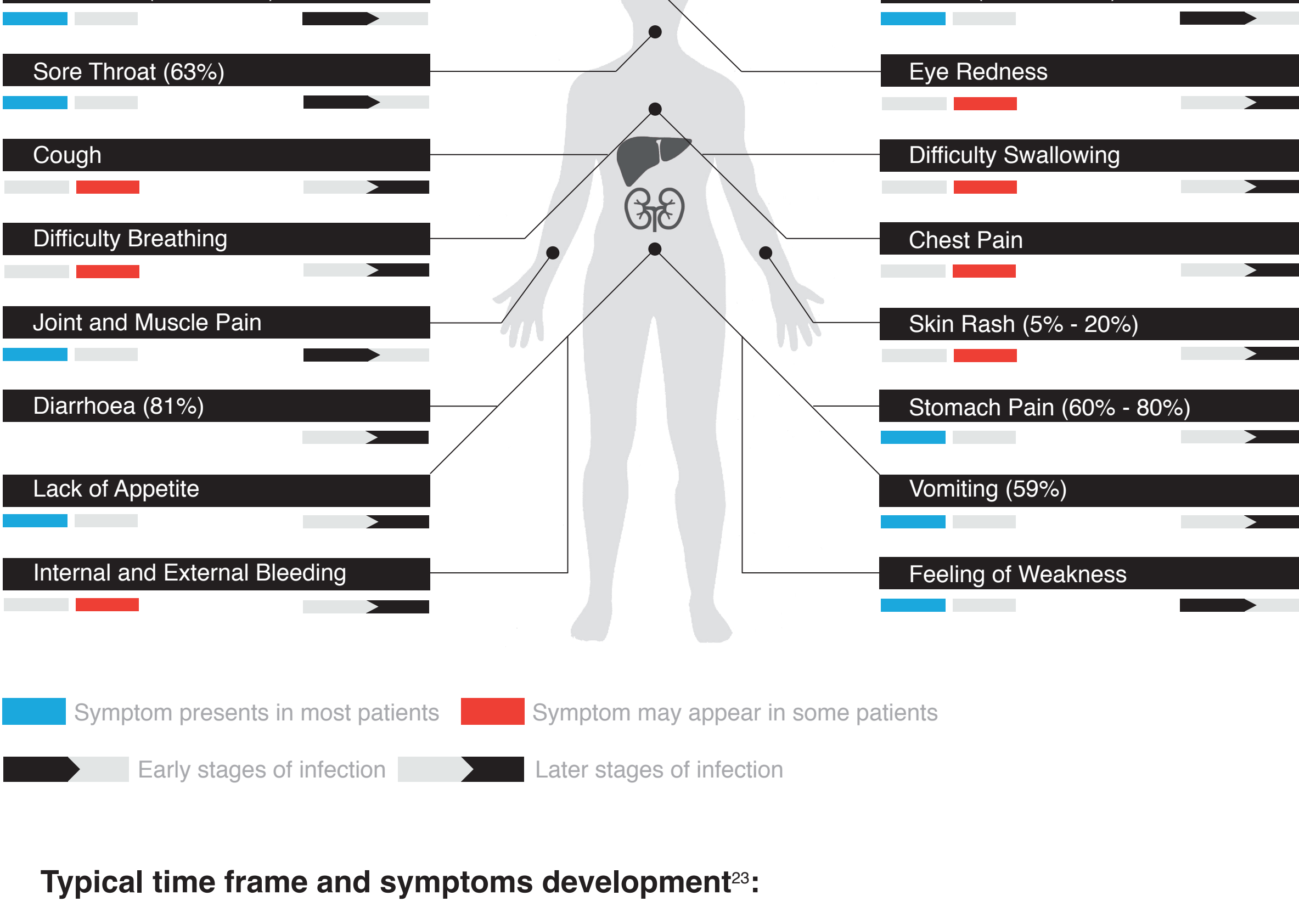


**The virus spreads** to cell types throughout the body by binding glycoprotein to receptors on cell surfaces. Infected cells detach from blood vessels, causing massive hemorrhage. Loss of blood leads to kidney and liver failure.

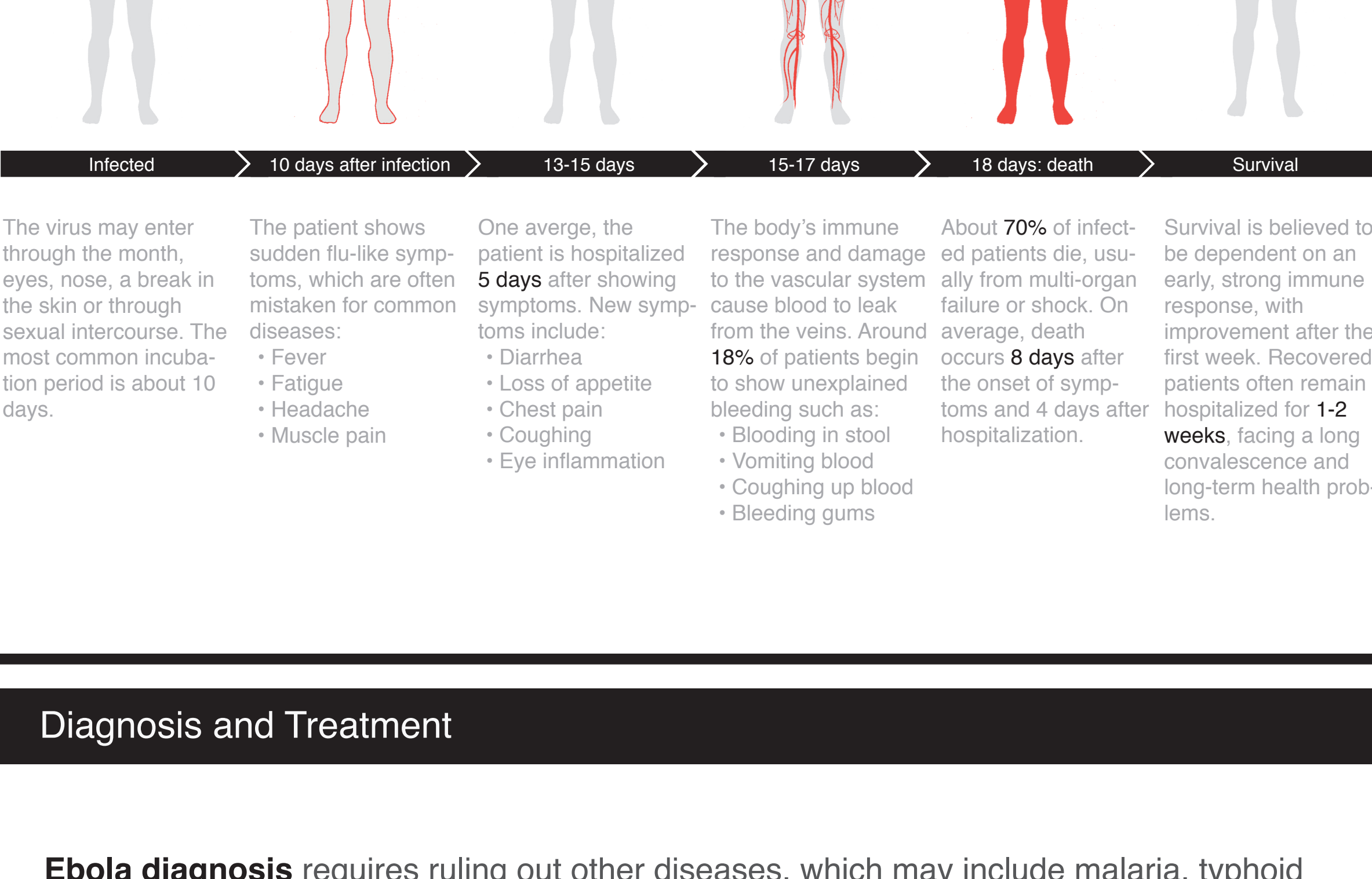
## Symptoms of Infection

**Ebola is a severe acute viral illness** often characterized by the sudden onset of fever, intense weakness, joint and muscle pain, sore throat and headache. These symptoms are then followed by more severe complications, along with decreased function of the liver and kidneys. Around this time, affected people may begin to bleed both within the body and externally. The incubation period is 2 to 21 days. Humans are not infectious until they develop symptoms. It is unclear why some patients can survive and others die from this disease, but patients who die usually have a poor immune response to the virus.

The full list of potential symptoms includes: <sup>20 21 22</sup>



## Typical time frame and symptoms development<sup>23</sup>:



## Diagnosis and Treatment

**Ebola diagnosis** requires ruling out other diseases, which may include malaria, typhoid fever, shigellosis, cholera, leptospirosis, plague, rickettsiosis, relapsing fever, meningitis, hepatitis, and other viral hemorrhagic fevers.

Once these have been ruled out, Ebola virus infections can be diagnosed definitively in a laboratory through several types of tests: <sup>24</sup>

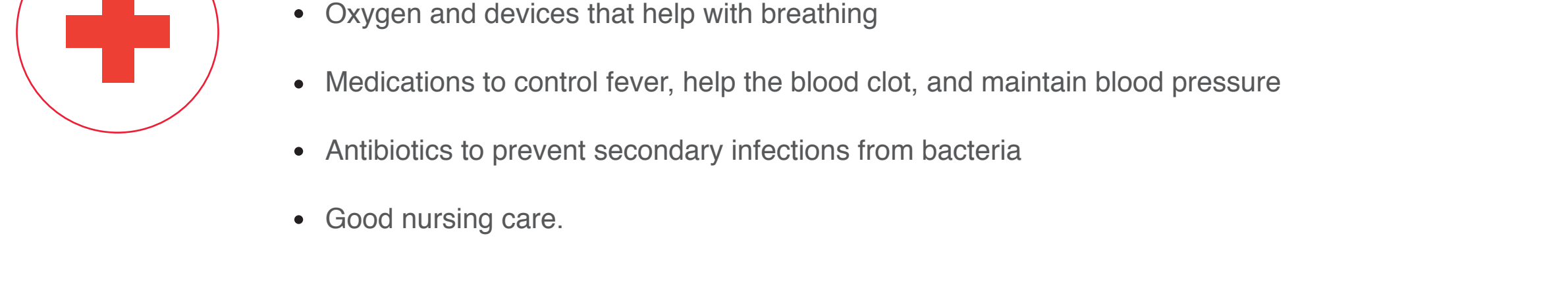
**To confirm the diagnosis**, blood test samples are tested for viral antibodies, viral RNA, or the virus itself.

**There is no licensed vaccine or specific treatment available for Ebola.** A range of potential treatments including blood products, immune therapies, and drug therapies are currently being tested, but none are available for clinical use. **Tests of new Ebola drugs could take place as early as November 2014.** <sup>25</sup>

The lack of vaccines or specific treatments is part of what makes the mortality rate so high. The **death rate from Ebola ranging from 25% to 90%**, depending on the strain, but the **current outbreak has a mortality rate of about 70%** (as of 23 September 2014). <sup>26</sup>

**The course of treatment for infected patients** involves **supportive care**: providing relief of symptoms while the body fights the infection. Intravenous fluids, antibiotics, and oxygen are usually employed. Treatment may also include the use of medications to control fever, help the blood clot, and maintain blood pressure. Even with such supportive care, death occurs in 50 to 90 percent of cases.

**Current bed capacity for patients in countries with active cases as of 8 Oct 2014** <sup>27</sup>



**ZMapp**, a monoclonal antibody vaccine. The limited supply of the drug has been used to treat a small number of individuals infected with the Ebola virus. Although some of these have recovered the outcome is not considered statistically significant. ZMapp has proved highly effective in a trial involving rhesus macaque monkeys.

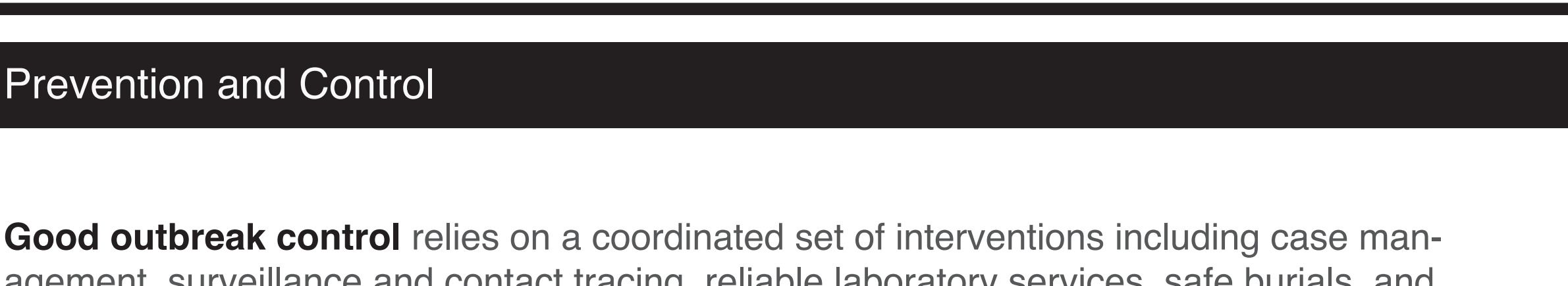
**TKM-Ebola**, an RNA interference drug.

**Favipiravir**, a drug approved in Japan for stockpiling against influenza pandemics. The drug appears to be useful in a mouse model of the disease and Japan has offered to supply the drug if requested by the WHO.

In September, an experimental vaccine, currently known as the **NIAID/GSK** vaccine, commenced simultaneous Phase 1 trials in Oxford and Bethesda. The vaccine was developed jointly by GlaxoSmithKline and the NIH. If this phase is completed successfully, the vaccine will be fast tracked for use in West Africa. In preparation for this, GSK is preparing a stockpile of 10,000 doses. <sup>28</sup>

## Prevention and Control

**Good outbreak control** relies on a coordinated set of interventions including case management, surveillance and contact tracing, reliable laboratory services, safe burials, and social mobilization. **Community engagement** is key to successfully controlling outbreaks. Raising awareness of risk factors for Ebola is important and protective measures that individuals can take is an effective way to reduce human transmission. Risk reduction messaging should focus on several factors:



**Contact tracing** involves finding everyone who comes in direct contact with a sick Ebola patient. Contacts are watched for signs of illness for 21 days from the last day they came in contact with the Ebola patient. If the contact develops a fever or other Ebola symptoms, he or she is immediately isolated, tested, treated, and the cycle starts again—all of the new patient's contacts are found and watched for 21 days, and so on.

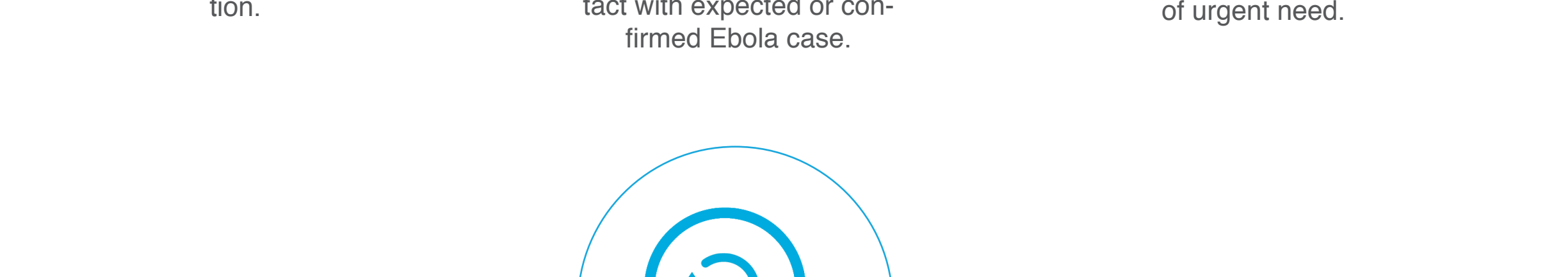
## Potential of Spreading Internationally

**There are major concerns that the EVD outbreak could spread**, particularly to Europe and the United States. The main concern centres around air travel, which is thought to be the primary potential route for the virus to spread across international and continental borders.

**Air traffic connections from West Africa to the rest of the world.** While Guinea, Liberia and Sierra Leone don't have many flights outside the region, Nigeria is well-connected to Europe and the U.S. <sup>29</sup>



Below are the final destinations of airline travelers departing from Guinea, Liberia and Sierra Leone in the month of August 2014 (source: WHO): <sup>30</sup>



**The figures show that travel from Sierra Leone, Guinea, and Liberia within the continent of Africa is much more prevalent than travel elsewhere.**

This data, coupled with the fact that outbreaks persist in countries with poor sanitation and a shortage of resources to contain them (rather than resource-rich places like the US and the UK), **leaves public health officials relatively unconcerned about Ebola becoming a big problem in the developed world.**

**Far more concerning is the potential for the disease spreading within Africa**, which is what public health officials are really worried about.