Viral Haemorrhagic Fever

VHFs (with the exception of dengue) are very rare in UK travellers, they can cause a range of symptoms from a relatively mild illness, to severe, life-threatening disease

Key Messages

Viral haemorrhagic fevers (VHFs) are a group of highly contagious viral infections that have the potential to cause severe life-threatening illness.
Although they have some features in common, VHFs are a diverse group and occur in different parts of the world.
VHFs tend to occur in nature in mammals and insects, and can be passed to humans in a variety of ways when they have contact with these animals.
Person-to-person transmission can occur in some VHFs and can result in large outbreaks.
VHFs (with the exception of dengue) are very rare in travellers.
Except for yellow fever, there are no UK-licensed vaccines to prevent VHFs.

Overview

VHFs are caused by a number of highly infectious viruses that belong to one of four families: *Arenaviridae, Bunyaviridae, Filoviridae* and *Flaviviridae*. VHFs can cause a range of symptoms ranging from a relatively mild illness, to severe, life-threatening disease associated with shock (severely low blood pressure) and haemorrhage (bleeding). Although viruses causing VHF share a number of characteristics, they are a diverse group of infections and have significant differences in epidemiology, transmission and clinical features.

Examples of VHFs include: Ebola virus disease, Marburg, Lassa fever, Crimean-Congo haemorrhagic fever (CCHF) and Rift Valley fever (RVF) [1]. Although dengue and yellow fever are classified as VHFs they are not covered here in detail, as separate factsheets are available for both of these diseases.

Summary table of VHFs

Arenaviridae	*Bunyaviridae*	*Filoviridae*	*Flaviviridae*
Lassa fever	Rift Valley fever	Ebola virus disease	Yellow fever

Lujo virus			
Argentinian haemorrhagic fever	Crimean-Congo haemorrhagic fever	Marburg	Dengue
Venezuelan haemorrhagic fever	Hantavirus cardio-pulmonary syndrome		Omsk haemorrhagic fever
Bolivian haemorrhagic fever	Haemorrhagic fever with renal syndrome		Kyasanur Forest disease
Brazilian haemorrhagic fever			Alkhurma haemorrhagic fever

Risk areas

Viruses causing VHFs occur across much of the world and are endemic in some areas of Africa, Asia, and South America. The responsible viruses may only occur in certain geographical areas, but these areas may change over time, and others are widespread. See Public Health England (PHE) map of Viral haemorrhagic fevers in Africa: areas of known risk.

Disease distribution maps are available for dengue and yellow fever from WHO. A map showing the distribution of Crimean-Congo haemorrhagic fever (CCHF) published 2015 is also available from the World Health Organization (WHO). However, note that in 2016, 2 cases were also reported in Spain, and these cases are not shown on the WHO map. A field study has since confirmed the presence of CCHF virus in ticks in the regions of Extremadura, Castilla-La Mancha, Castilla and León, and Madrid in this country [1].

In general the viruses and early outbreaks are limited to the areas inhabited by their animal hosts. Human cases or outbreaks of viral haemorrhagic fever occur sporadically and irregularly, and are difficult to predict [2].

Risk for travellers

With the exception of dengue, VHFs are very rare in UK travellers. According to PHE, in the UK, as of 3 January 2017, there have been:

- Eight cases of Lassa fever since 1980.
- Two cases of Crimean-Congo haemorrhagic fever (one in 2012 and one in 2014).
- Three cases of Ebola virus disease; all in healthcare workers who were working in Sierra Leone during the largest West African outbreak to date from March 2014 to June 2016. One case was imported, and the other two were brought home in air ambulance after diagnosis.

Healthcare workers and those who work with animals in endemic areas, or areas where outbreaks

are occurring, may be at increased risk of infection depending on the exact nature of their work.

Transmission

Humans are not the natural host for VHFs. The viruses exist in nature in mammal (rodent, bat and primate) and/or insect reservoirs (tick and mosquito). Humans are at risk of infection when they encroach on areas inhabited by these animals. Following initial animal-to-person transmission, subsequent person-to-person transmission of some viruses can result in large human outbreaks [2, 3]. The exact mode of transmission varies between viruses, but humans may become infected following:

- Close contact with live infected animal hosts, animal carcasses (e.g. during slaughter) or animal excreta/saliva.
- A bite from an infected mosquito or tick (e.g. yellow fever, RVF or CCHF).
- Close contact with bodily fluids from an infected person or the body of an individual who has died from VHF.
- Sexual contact (vaginal, oral or anal) with an infected individual.

Signs and symptoms

The incubation period for VHF is between two days and three weeks. Clinical features vary by disease, but presenting features typically include: fever, headache, muscle aches and exhaustion. Features of severe disease include: pulmonary oedema (leakage of fluid into the lungs), shock (severely low blood pressure), coma and bleeding, for example from the intestines or gums [2, 3].

Diagnosis and treatment

VHF should be considered in individuals returning from risk areas particularly in the setting of an outbreak or recent outbreak. Confirmation of the diagnosis requires laboratory testing of a patient's blood and/or urine samples.

Polymerase chain reaction (PCR) is a technique that can be used to detect virus nucleic acids (genetic material) and may be used to diagnose individual infections. Particular care is required when handling VHF or potential VHF samples, see advice from Public Health England.

Some VHFs can transmit from person to person via close contact with infected bodily fluids. Individuals with these infections should be managed in a specialist setting with implementation of high-level infection control measures. Further advice is available from the Advisory Committee on Dangerous Pathogens (ACDP).

Preventing viral haemorrhagic fever

With the exception of yellow fever, there are no UK-licensed vaccines for use in humans to prevent

VHF. Travellers and healthcare professionals may use our outbreak surveillance database to search for current or recent outbreaks of VHF.

Ideally travellers should avoid areas where outbreaks are occurring. Methods of prevention in travellers will vary according to how the infection is transmitted. In general, travellers to risk areas should:

- Avoid contact with ill people and dead bodies.
- Avoid contact with ill or dead animals.
- Avoid contact with animals associated with transmission of VHF including rodents, bats, primates, and livestock.
- Not participate in the preparation of bush meat (wild animals hunted for food).
- Adhere to insect and tick bite avoidance measures (relevant in some forms of VHF such as yellow fever, dengue, RVF and CCHF).
- Practice safe sex using barrier contraception [4, 5].

Healthcare workers involved in the care of those with VHF should maintain strict principles of infection control at all times, including:

- Careful and frequent hand washing using soap and water (or waterless alcohol-based hand rubs when soap is not available).
- Wearing gloves and other protective equipment as necessary.
- Proper disposal of needles and other equipment, and sterilisation of non-disposable equipment.
- Proper disposal of body fluids, tissues and soiled items from patients [4].

For healthcare workers caring for known cases of certain VHF such as Ebola virus disease, additional infection control measures are essential. Further guidance is available from the Advisory Committee on Dangerous Pathogens.

Vaccine information

With the exception of yellow fever there are no UK-licensed vaccines for use in humans to prevent VHF. See yellow fever factsheet for information on the yellow fever vaccine.

Diseases in detail

Lassa fever

Lassa fever was first described in the 1950s, and the virus was identified in 1969 when 2 missionary nurses died from the disease in the town of Lassa in Nigeria. The disease is endemic in Guinea**,** Liberia, Sierra Leone,and Nigeria; evidence of infection has been found in neighbouring countries such as Mali, Senegal, the Central African Republic, Ghana and the Democratic Republic of Congo [6]. In 2009 a confirmed case from Mali was imported into the UK. Benin reported cases in

2014, and an outbreak in 2016 [6]. In 2016, two cases were also reported in healthcare workers in Togo [6].

Lassa virus is present in wild multimammate rats that are commonly found in rural areas of tropical Africa, and often live in or around homes. Transmission to humans normally occurs through contamination of broken skin or mucous membranes via direct or indirect contact with infected rodent excreta.

Transmission is also possible where rodents are caught and consumed as food. Person-to-person transmission occurs through contact with infected bodily fluids, such as blood, saliva, urine or semen. This may occur in a healthcare or laboratory setting or via close or sexual contact with an infected individual. The incubation period for the disease is usually between seven and ten days, with a maximum of 21 days. Infection is mild or asymptomatic (without symptoms) in 80 percent of cases, but can cause severe illness and is fatal in approximately one to three percent of patients [6].

Rift Valley fever (RVF)

RVF virus was identified in 1931 following an outbreak among sheep on a farm in the Rift Valley in Kenya [7]. RVF may infect humans and domesticated animals such as cattle, goats, camels and sheep. The disease tends to occur in eastern and southern Africa in areas where livestock are kept, however the virus also occurs in other parts of sub-Saharan. The first cases recorded outside the African continent occurred in Saudi Arabia and Yemen in 2000 [7]. The virus is usually transmitted to humans via contact with bodily fluids of infected animals for example through animal slaughter or veterinarian work [8]. The disease may also be transmitted through the bite of an infected mosquito (usually *Aedes*). Person-to-person transmission is not known to occur [9]. The incubation period is between two and six days. Infection is mild in most cases however some patients develop more severe disease [7].

Crimean-Congo haemorrhagic fever (CCHF)

This tick-borne virus was identified in Russia (as Crimean fever) in 1945 and in the Belgian Congo (now Democratic Republic of Congo) in 1956 [10]. It is the most widely distributed VHF, dependent on the spread of the tick vector. Outbreaks have been reported in parts of Eastern Europe, Africa, the Middle East and Asia [11]. In September 2016, two cases were reported in Spain.

The virus exists in nature in a number of domestic and wild animals including horses, donkeys, goats, cattle, sheep, and pigs. The virus is usually transmitted to humans through the bite of an infected tick, or by direct contact with infected animal/human body fluids. Exposure to the virus is also possible from contact with blood from crushing an infected tick. Those at increased risk of infection in endemic countries include farmers, veterinarians, abattoir workers and healthcare workers [12]. Camping and hiking are risk factors for exposure to tick bites [10]. The incubation period is between 1 and 13 days. Mortality is approximately 30 percent [11].

Ebola virus disease

Ebola virus was initially described in 1976 as the cause of two separate outbreaks, one in southern Sudan and the other in the Democratic Republic of Congo in a village near to the Ebola River [13]. Ebola outbreaks in humans have only been reported in countries of sub-Saharan Africa. Prior to 2014 recorded case numbers and deaths from Ebola were relatively low with only around 2,300 cases and 1,500 deaths between 1976 and 2012 [14].

In March 2014, the World Health Organization reported an outbreak of Ebola virus disease in Guinea. This developed into the largest Ebola outbreak in recorded history, with over 28,000 cases and 11,000 deaths [15]. The outbreak was focussed around the three West African countries of Sierra Leone, Guinea and Liberia, although a number of cases and small clusters of infections also occurred in neighbouring countries of Nigeria, Mali and Senegal. Imported cases occurred in Italy, Spain, the United Kingdom and USA [15]. By June 2016, the three West African countries were free of Ebola Virus Disease. However, the risk of additional outbreaks originating from exposure to infected survivor body fluids remained [16].

The natural animal host for Ebola is thought to be fruit bats. Humans may become infected with Ebola when they have close contact with bodily fluids of infected animals (e.g. bats and primates). Person-to-person transmission may then occur through direct contact of broken skin, eyes, nose, mouth or during sexual contact (vaginal, oral or anal), or contact with:

- Blood or bodily fluids of an infected individual or the body of an individual who has died from Ebola virus disease.
- Instruments contaminated with infected bodily fluids for example needles in a healthcare setting [17].

The incubation period of Ebola virus disease is between two to 21 days. Mortality rates vary between 40 and 90 percent depending on the virus species, patients' age and many other factors [18].

Marburg

Marburg virus causes a disease that is very similar to Ebola virus disease. It was first recognised in 1967 when an outbreak occurred in laboratory staff from Germany (Marburg and Frankfurt) and former Yugoslavia (Belgrade). The laboratory workers all had contact with the blood, organs or cell-cultures from a batch of imported African green monkeys from Uganda. Recorded cases or outbreaks of the disease are rare but have been reported in Angola, the Democratic Republic of Congo, Kenya, Uganda and South Africa (in a person who had recently travelled to Zimbabwe). Two travel related cases occurred during 2008 following visits to the "python cave" in the Maramagambo Forest in western Uganda; this cave is home to a large colony of Egyptian fruit bats. Both people became ill after return to their home country; one in the Netherlands and one in the USA [19]. The most recent outbreak was in 2012 in south-western Uganda [19].

It is thought that fruit bats are the main natural host for the disease. See Ebola and Marburg haemorrhagic fevers: outbreaks and case locations. Transmission to humans may occur through exposure to infected bats for example in caves or mines. The virus may then be transmitted from person-to-person via close contact with an infected patient. Blood or other bodily fluids (faeces, vomit, urine, saliva and respiratory secretions) contain a high concentration of virus. Sexual transmission of the virus may occur. Close contact with the body or bodily fluids of a person who has died of Marburg, during preparation for burial, is a recognised source of infection. The incubation period of Marburg haemorrhagic fever is three to ten days. Estimates of mortality rates range from 23 to 88 percent [20].

Resources

- Public Health England: Viral haemorrhagic fevers: origins, reservoirs, transmission and guidelines
- Public Health England: Ebola virus disease information for humanitarian aid workers
- US Centers for Disease Control and Prevention - Special pathogens branch: Viral haemorrhagic fevers
- World Health Organization: Viral haemorrhagic fevers

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