



Department
of Health



Management of Hazard Group 4 viral haemorrhagic fevers and similar human infectious diseases of high consequence

Advisory Committee on Dangerous Pathogens

Title: Management of Hazard Group 4 viral haemorrhagic fevers and similar human infectious diseases of high consequence

Author: Directorate/ Division/ Branch acronym / cost centre

Advisory Committee on Dangerous Pathogens

Document Purpose:

Guidance

Publication date:

NB: November 2015

Target audience:

Health care and laboratory workers coming into contact with an infected patient or samples from an infected patient.

Contact details:

ACDP Secretariat

Public Health England

61 Colindale Avenue

London

NW9 5EQ

acd@phe.gov.uk

You may re-use the text of this document (not including logos) free of charge in any format or medium, under the terms of the Open Government Licence. To view this licence, visit www.nationalarchives.gov.uk/doc/open-government-licence/

© Crown copyright

Published to gov.uk, in PDF format only.

www.gov.uk/dh

Management of Hazard Group 4 viral haemorrhagic fevers and similar human infectious diseases of high consequence

Advisory Committee on Dangerous Pathogens

This guidance was prepared by the Advisory Committee on Dangerous Pathogens (ACDP), in conjunction with the Health and Safety Executive (HSE), with special thanks to the Health and Safety Laboratory (HSL); the Department of Health (DH); the Devolved Administrations; and the National Health Service (NHS).

Contents

| | |
|--|-----|
| EXECUTIVE SUMMARY | 5 |
| SECTION 1: Introduction | 6 |
| SECTION 2: Patient risk assessment | 9 |
| SECTION 3: Management of a patient categorised as ‘low possibility of VHF’ | 13 |
| SECTION 4: Management of a patient categorised as ‘high possibility of VHF’ | 18 |
| SECTION 5: Management of a patient with confirmed VHF | 23 |
| SECTION 6: Public health actions | 25 |
| APPENDIX 1: Overview of ACDP Hazard Group 4 viral haemorrhagic fevers..... | 33 |
| APPENDIX 2: VHF testing | 39 |
| APPENDIX 3: Contact details for HLIU | 41 |
| APPENDIX 4: Principles for the isolation of patients with confirmed VHF..... | 42 |
| APPENDIX 5: Transfer of a patient..... | 51 |
| APPENDIX 6: Specimen collection | 56 |
| APPENDIX 7: Laboratory procedures..... | 59 |
| APPENDIX 8: Personal protective equipment (including respiratory protective equipment) | 63 |
| APPENDIX 9: Management of staff accidentally exposed to potentially infectious material | 69 |
| APPENDIX 10: Decontamination, including treatment of laundry | 71 |
| APPENDIX 11: Waste treatment and disposal..... | 78 |
| APPENDIX 12: After death care | 83 |
| APPENDIX 13: Relevant health and safety legislation..... | 88 |
| APPENDIX 14: Glossary | 95 |
| APPENDIX 15: Abbreviations | 100 |
| APPENDIX 16: Acknowledgements..... | 102 |

EXECUTIVE SUMMARY

This document provides guidance on the risk assessment and management of patients in the United Kingdom in whom infection with a viral haemorrhagic fever (VHF) should be considered or is confirmed. This guidance aims to eliminate or minimise the risk of transmission to healthcare workers and others coming into contact with an infected patient or their samples. This guidance replaces the previous Advisory Committee on Dangerous Pathogens' (ACDP) publication 'Management and Control of Viral Haemorrhagic Fevers,' published in 2012.

VHFs are severe and life-threatening viral diseases that have been reported in parts of Africa, South America, the Middle East and Eastern Europe. VHFs are of particular public health importance because they can spread within a hospital setting; they have a high case-fatality rate; they are difficult to recognise and detect rapidly; and there is no effective treatment. Environmental conditions in the UK do not support the natural reservoirs or vectors of any of the haemorrhagic fever viruses, and all recorded cases of VHF in the UK have been acquired abroad, with the exception of one laboratory worker who sustained a needle-stick injury.

In preparing this guidance, ACDP undertook a new assessment of the risks of transmission of VHF infection. Evidence from outbreaks strongly indicates that the main routes of transmission of VHF infection are direct contact (through broken skin or mucous membrane) with blood or body fluids, and indirect contact with environments contaminated with splashes or droplets of blood or body fluids. Experts agree that there is no circumstantial or epidemiological evidence of airborne transmission risk from VHF patients. Following the revised risk assessment, this guidance recommends control options for the isolation of VHF patients in the UK. These options include flexibility in the isolation of a patient with a VHF infection within a specialist High Level Isolation Unit (HLIU).

SECTION 1: INTRODUCTION

Overview

1. This document provides guidance on the risk assessment and management of patients in the United Kingdom (UK) in whom infection with a viral haemorrhagic fever (VHF) should be considered or is confirmed.
2. The guidance aims to eliminate or minimise the risk of transmission to health care workers and others coming into contact with an infected patient. In this guidance, contact is defined as exposure to an infected person or their blood and body fluids, excretions or tissues following the onset of their fever.
3. VHFs are severe and life-threatening viral diseases that are endemic in parts of Africa, South America, the Middle East and Eastern Europe. Environmental conditions in the UK do not support the natural reservoirs or vectors of any of the haemorrhagic fever viruses. **All recorded cases of VHF in the UK have been acquired abroad, with one exception of a laboratory worker who sustained a needle-stick injury.** There have been no cases of person-to-person transmission of VHF in the UK to date of publication of this guidance.
4. VHFs are of particular public health importance because:
 - They can spread readily within a hospital setting;
 - They have a high case-fatality rate;
 - They are difficult to recognise and detect rapidly;
 - There is no effective treatment.
5. In preparing this guidance, ACDP undertook an assessment of the risks of transmission of VHF infection. Evidence from outbreaks strongly indicates that the main routes of transmission of VHF infection are **direct**

contact (through broken skin or mucous membrane) with blood or body fluids, **and indirect contact** with environments contaminated with splashes or droplets of blood or body fluids. Experts agree that there is no circumstantial or epidemiological evidence of an airborne transmission risk from VHF patients.

6. Following the revised risk assessment, this guidance recommends control options for the isolation of VHF patients in the UK. These options include flexibility in the isolation of a patient with a VHF infection within a specialist High Level Isolation Unit (HLIU).
7. This guidance only covers those VHFs that are caused by pathogens classified as ACDP Hazard Group 4. Further information about the range of ACDP Hazard Group 4 viruses that cause viral haemorrhagic fever is included in [Appendix 1](#).
8. The guidance also applies to cases of similar infectious diseases, including new or emerging infections, which have a significant health impact and may present a serious risk to public health in the UK.

The ACDP Hazard Group 4 viral haemorrhagic fever viruses

ARENAVIRIDAE

Old World arenaviruses

Lassa

Lujo

New World arenaviruses

Chapare

Guanarito

Junín

Machupo

Sabiá

BUNYAVIRIDAE

Nairoviruses

Crimean Congo haemorrhagic
fever

FLAVIVIRIDAE

Kyasanur forest disease

Alkhurma haemorrhagic fever*

Omsk haemorrhagic fever

FILOVIRIDAE

Ebola

Marburg

*Hazard Group 3 agent, but included in this guidance as “similar human infectious disease of high consequence”

Intended users of this guidance

9. This guidance is for:

- **Healthcare staff** in emergency departments, infectious disease departments, infection control, microbiology/virology, acute medical units;
- **Ambulance staff**, who may be required to transport a patient in whom VHF is suspected or confirmed;
- **Those working in laboratories** dealing with specimens from patients in whom VHF is suspected or confirmed;
- **Public health professionals**, including those in Port Health Authorities, who may be required to carry out public health actions associated with a VHF case;
- **Mortuary and funeral personnel**, who may need to deal with a VHF case.

SECTION 2: PATIENT RISK ASSESSMENT

Risk assessment

- Risk assessment is a legal obligation;
- Know who is your lead for risk assessment and be familiar with local risk assessment arrangements;
- Use the risk assessment algorithm on page 13 to determine whether a febrile patient with a travel or exposure history within 21 days may have a VHF infection;
- The patient's risk assessment determines the level of staff protection and the management of the patient;
- The risk to staff may change over time, depending on the patient's symptoms, the results of diagnostic tests and/or information from other sources. Patients with VHF can deteriorate rapidly.

Why is a risk assessment necessary?

1. The Control of Substances Hazardous to Health (CoSHH) Regulations requires employers to assess risk to their employees in the workplace. This includes making an assessment of the risk of acquiring a VHF infection in a healthcare setting or other workplace. The purpose of risk assessment is to enable decisions to be made about the actions needed to control the risk and prevent spread of infection. Risk assessment therefore embraces both assessment of the patient for the possibility of VHF and assessment of associated risks to staff. Measures to control any risks include implementation of practical infection control measures, information provision, training and health surveillance where the assessment shows that these are required.

2. In the UK, only persons who have; (i) travelled to an area where VHFs occur; and/or (ii) been exposed to a patient or animal infected with VHF (including their blood, body fluids or tissues); or (iii) worked in a laboratory with the infectious agents of VHFs; are at risk of infection from VHFs.

How to conduct the patient risk assessment

3. The patient risk assessment should be led by a senior member of the medical team responsible for the acute care of patients, for example the emergency care physician, emergency department consultant or admitting team consultant. The consultant microbiologist/virologist may also need to be involved.
4. For any patient who has had a fever [$\geq 37.5^{\circ}\text{C}$] or history of fever in the previous 24 hours and a travel history or epidemiological exposure within 21 days, follow the major steps in the pathway from identification to diagnosis in the patient risk assessment algorithm (page 13). This will establish the patient's VHF risk category, which determines the subsequent management of the patient and the level of protection for staff. Further information is provided in the subsequent sections of this guidance.
5. Initiating the patient risk assessment algorithm should become normal practice in emergency departments or Acute Medical Units for any patient who has a fever [$\geq 37.5^{\circ}\text{C}$] or history of fever in the previous 24 hours and a relevant travel history or epidemiological exposure within 21 days.
6. The algorithm deals with the management of the patient, diagnostic testing and the level of staff protection, all of which are dependent on the possibility of VHF infection and the patient's symptoms.

7. Standard precautions and good infection control are paramount to ensure staff are not put at risk whilst the initial risk assessment is carried out. **It is assumed throughout this guidance that staff will be following standard precautions.** If these measures are not already in place, they must be introduced immediately when dealing with a patient in whom VHF is being considered.

8. The patient's VHF risk category can change depending on the patient's symptoms and/or the results of diagnostic tests. It is important to note that a patient with a VHF infection can deteriorate rapidly.

The patient's VHF risk category

9. The additional questions in the algorithm are designed to thoroughly assess the risk of VHF infection. Following the additional questions, the patient will be categorised as one of the following:
 - Unlikely to have a VHF (see below);
 - Low possibility of VHF ([see Section 3](#));
 - High possibility of VHF ([see Section 4](#));
 - Confirmed VHF ([see Section 5](#)).

10. Summary information on VHFs is available in [Appendix 1](#), and detailed information on geographic distribution is provided in the VHF risk maps on the [PHE](#) and [WHO](#) websites.

11. Information on recent VHF outbreaks can be accessed on travel health websites such as [Travax](#) and [NaTHNaC](#), the [PHE](#) website and via global disease updates on [ProMed](#) and [WHO](#).

Patients who are unlikely to have a VHF infection

Patients with a fever $\geq 37.5^{\circ}\text{C}$ are highly unlikely to have a VHF infection if:

- They have **not** visited a VHF endemic area within 21 days of becoming ill;
- They have not become unwell within 21 days of caring for or coming into contact with the bodily fluids of / handling clinical specimens from a live or dead individual or animal known or strongly suspected to have a VHF;
- If their UK malaria screen is negative and they are subsequently afebrile for >24 hours;
- If their UK malaria screen is positive and they respond appropriately to malaria treatment;
- If they have a confirmed alternative diagnosis and are responding appropriately.

12. The risk of VHF in the patient should be reassessed if a patient with a relevant exposure history fails to improve or develops one of the following:

- Nosebleed;
- Bloody diarrhoea;
- Sudden rise in aspartate transaminase (AST);
- Sudden fall in platelets;
- Clinical shock;
- Rapidly increasing O_2 requirements in the absence of other diagnosis

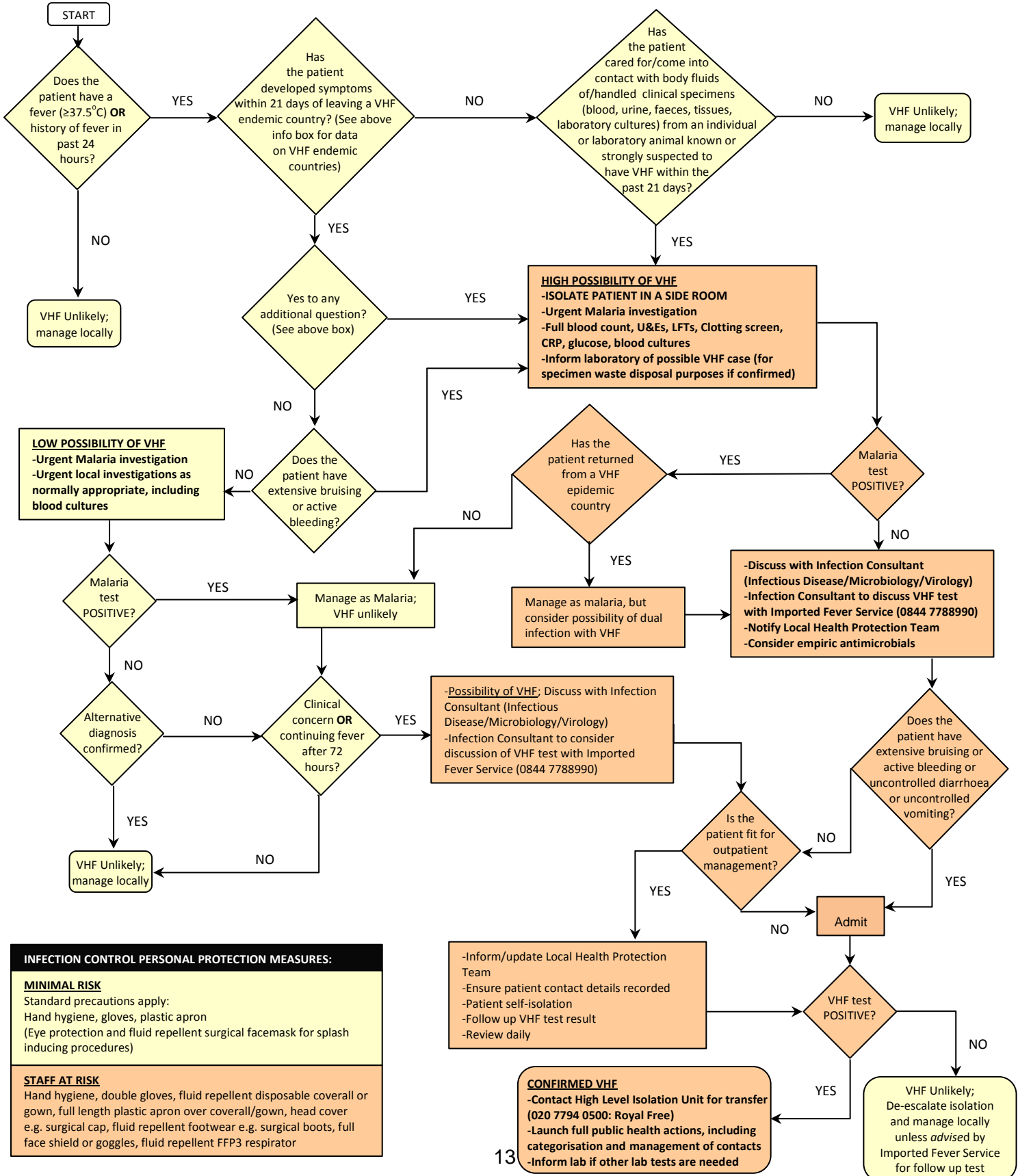
VIRAL HAEMORRHAGIC FEVERS RISK ASSESSMENT (Version 6: 15.11.2015)

VHF ENDEMIC COUNTRIES:

Information on VHF endemic countries can be found at <https://www.gov.uk/viral-haemorrhagic-fevers-origins-reservoirs-transmission-and-guidelines> or see VHF in Africa map at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/365845/VHF_Africa_960_640.png

ADDITIONAL QUESTIONS:

- Has the patient travelled to any area where there is a current VHF outbreak? (<http://www.promedmail.org/>) OR
- Has the patient lived or worked in basic rural conditions in an area where Lassa Fever is endemic? (<https://www.gov.uk/lassa-fever-origins-reservoirs-transmission-and-guidelines>) OR
- Has the patient visited caves / mines, or had contact with or eaten primates, antelopes or bats in a Marburg / Ebola endemic area? (<https://www.gov.uk/ebola-and-marburg-haemorrhagic-fevers-outbreaks-and-case-locations>) OR
- Has the patient travelled in an area where Crimean-Congo Haemorrhagic Fever is endemic (http://www.who.int/csr/disease/crimean_congoHF/Global_CCHFRisk_20080918.png?ua=1) AND sustained a tick bite* or crushed a tick with their bare hands OR had close involvement with animal slaughter? (*If an obvious alternative diagnosis has been made e.g. tick typhus, then manage locally)



INFECTION CONTROL PERSONAL PROTECTION MEASURES:

MINIMAL RISK

Standard precautions apply:
Hand hygiene, gloves, plastic apron
(Eye protection and fluid repellent surgical facemask for splash inducing procedures)

STAFF AT RISK

Hand hygiene, double gloves, fluid repellent disposable coverall or gown, full length plastic apron over coverall/gown, head cover e.g. surgical cap, fluid repellent footwear e.g. surgical boots, full face shield or goggles, fluid repellent FFP3 respirator

SECTION 3: MANAGEMENT OF A PATIENT CATEGORISED AS 'LOW POSSIBILITY OF VHF'

NOTE: It is recommended that, if a patient has extensive bruising or active bleeding, the lead clinician should manage the patient as “high possibility of VHF”; see [Section 4](#).

Patient categorised as 'low possibility of VHF'

- A senior member of the medical team who is responsible for the acute care of the patient should be the lead clinician;
- Infection control measures appropriate to the patient's risk category and clinical care procedures should be put in place;
- Instigate urgent malaria screen and local diagnostic investigations as normal;
- If an inpatient who is malaria negative has a continuing fever and relevant travel history, without diagnosis, discuss with Infection Consultant (ID/Microbiology/Virology) with a view to arranging VHF testing.

Infection control measures

1. A febrile patient categorised as 'Low possibility of VHF' should be isolated in a single side room to limit contact until the possibility of transmissible infection has been ruled out. The side room should have dedicated en-suite facilities or at least a dedicated commode.
2. It is assumed that all staff will already be using standard precautions (hand hygiene, gloves plastic apron) as appropriate. If not, these must be immediately introduced.

| Infection control measures for 'low possibility of VHF' | |
|---|--|
| Staff protection | Control measures |
| Standard precautions | <ul style="list-style-type: none"> • Hand hygiene • Gloves • Plastic apron |
| Additional protection for splash inducing procedures | <ul style="list-style-type: none"> • Fluid repellent surgical facemask • Eye protection |
| Additional protection for potential aerosol generating procedures based on risk assessment for other infections known to be transmitted through the airborne route. | <ul style="list-style-type: none"> • FFP3 respirator or EN certified equivalent • Eye protection |

3. Potential aerosol generating procedures include:

- Endotracheal intubation;
- Bronchoscopy;
- Airway suctioning;
- Positive pressure ventilation via face mask;
- High frequency oscillatory ventilation;
- Central line insertion;
- Diagnostic sputum induction.

4. [Appendix 8](#) gives information on personal protective equipment including respiratory protection.

5. Single use (disposable) equipment and supplies should be used. The use of a needle-free intravenous system to eliminate the risk of needle-stick injuries should also be considered.

Diagnostic investigations

6. All samples from patients in the 'low possibility of VHF' category can be treated as standard samples. Investigations required will include URGENT Malaria investigations. Other investigations, as locally appropriate, may include full blood count, urea and electrolytes (U&Es), liver function tests (LFTs), glucose, C-reactive proteins (CRP), coagulation studies, urine, stool and blood cultures, and chest x-ray (CXR). However, if the patient has extensive bruising or active bleeding, they should be regarded as "high possibility of VHF" and discussed with an Infection Consultant (ID/Microbiology/Virology).
7. Malaria remains the most likely diagnosis and therefore screening for malaria is most urgent even if the patient has already had a malaria screen performed with a negative result.
8. Testing of specimens for patient management should be performed using containment level 2 (CL2) laboratory procedures. [Appendix 6](#) provides guidance on collecting and handling specimens from a patient categorised as 'low possibility of VHF'.

Diagnostic test results and subsequent patient management

Malaria investigation results

9. If the malaria result is positive, treatment for malaria should begin immediately. Up-to-date [UK malaria treatment guidelines](#) (published in the Journal of Infection in 2007) are available on the [PHE website](#). The patient may be re-categorised as 'VHF unlikely' if they are responding to

malaria treatment; however, patients who fail to respond appropriately to antimalarial therapy, particularly if there is the development of further features suggestive of VHF, should be re-evaluated for the possibility of VHF and investigated accordingly. See [Section 2](#) for information on the management of patients categorised as 'VHF unlikely'.

10. If the malaria test is negative, but an alternative diagnosis has been made and/or the patient becomes afebrile, then the patient can be managed locally.

11. If the malaria result is negative, the patient remains febrile ($\geq 37.5^{\circ}\text{C}$) and no diagnosis has been made, the case should be discussed with a local Infection Consultant (ID/Microbiology/Virology). The Infection Consultant should consider discussion of VHF testing with Imported Fever Service (0844 7788990). See [Appendix 2](#) for details of VHF testing process.

SECTION 4: MANAGEMENT OF A PATIENT CATEGORISED AS 'HIGH POSSIBILITY OF VHF'

Patient categorised as 'high possibility of VHF'

- The lead clinician who is responsible for the acute care of the patient should be a senior member of the medical team;
- The patient should be isolated in a single side room immediately;
- Enhanced infection control measures appropriate to the patient's symptoms and clinical care procedures should be put in place;
- Carry out an urgent **malaria screen**, and local diagnostic investigations as appropriate (see [Appendix 7](#));
- If malaria test is negative, discuss with Infection Consultant (ID/Microbiology/Virology). Infection Consultant to arrange VHF test with Imported Fever Service (IFS)
- Contact Local Health Protection Unit
- If the patient's VHF test is **positive**, contact the HLIU ([Appendix 3](#)) and launch full public health actions.
- If malaria test is positive and the patient has returned from a country affected by a current VHF outbreak, then dual infection should be considered and discuss with infection consultant (infectious disease/microbiology/virology).

Infection control measures

1. The patient should be isolated in a single side room immediately to limit contact. The side room should have dedicated en-suite facilities or at least a dedicated commode.
2. The number of staff in contact with the patient should be restricted.

3. The level of staff protection required is dependent on the patient's symptoms and is set out in the table below:

| Infection control measures for 'high possibility of VHF' | |
|---|--|
| Staff protection | Control measures |
| Standard precautions plus droplet precautions | <ul style="list-style-type: none"> • Hand hygiene • Double gloves • Fluid repellent disposable coverall or gown • Full length plastic apron over coverall/gown • Head cover e.g. surgical cap • Fluid repellent footwear e.g. surgical boots/shoe covers • Full face shield or goggles • Fluid repellent FFP3 respirator used as splash protection. If the respirator is to be used as respiratory protection when managing a patient with infections known to be transmitted via the airborne route, it must be worn as per manufacturer's recommendations (see Appendix 8) |

4. [Appendix 8](#) gives further information on personal protective equipment including respiratory protection.
5. It is recommended that, if a patient is bruised or bleeding or has uncontrolled diarrhoea or uncontrolled vomiting, the lead clinician should ensure that VHF testing is carried out and have an urgent discussion with HLIU concerning patient management and possible early transfer to the HLIU. See [Appendix 3](#) for contact details and [Appendix 5](#) for transport information.
6. Single use (disposable) equipment and supplies should be used. The use of a needle-free intravenous system to eliminate the risk of needle-stick injuries should also be considered.
7. Guidance on waste, laundry, decontamination and disinfection is provided in Appendices [10](#) and [11](#).
8. Communication with staff about potential infection risks is paramount. Staff must be informed about and understand the risks associated with a VHF patient, for example:
 - The severity of a VHF if infection is confirmed;
 - That virus may be present:
 - in blood;
 - in body fluids, including urine;
 - on contaminated instruments and equipment;
 - in waste;
 - on contaminated clothing;
 - on contaminated surfaces.
 - That exposure to virus may occur:

- **directly**, through exposure (broken skin or mucous membranes) to blood and/or body fluids during invasive, aerosolising or splash procedures;
- **indirectly**, through exposure (broken skin or mucous membranes) to environments, surfaces, equipment or clothing contaminated with splashes or droplets of blood or body fluids.

Diagnostic investigations

9. Investigations required will include URGENT malaria tests as well as full blood count, U&Es, LFTs, clotting screen, CRP, glucose and blood cultures. These tests should be performed using CL2 laboratory procedures ([Appendix 7](#)). Analysis of specimens should not be delayed whilst awaiting the results of VHF tests. [Appendix 6](#) provides guidance on collecting specimens from a patient categorised as 'high possibility of VHF'.
10. Malaria remains the most likely diagnosis and therefore screening for malaria is urgent regardless of a previous negative malaria screen performed elsewhere.
11. For waste disposal purposes, the laboratory should be informed that specimens are to be retained until VHF status is known.
12. If the malaria screen is negative and VHF is still suspected clinically, the case should be discussed promptly with the local Infection Consultant (ID/Microbiology/Virology). The Infection Consultant should contact the Imported Fever Service (0844 7788990) to arrange an **urgent VHF test** (See [Appendix 2](#)). The Local Health Protection Team should also be informed at this stage.

13. If the malaria screen is positive and the patient has returned from a country affected by a current VHF outbreak, then dual infection should be considered and discuss with infection consultant (infectious disease/microbiology/virology).

VHF test results and subsequent patient management

14. **If the VHF test is positive, a number of urgent actions are required –** see [Section 5](#) for details.

15. If the VHF test is **negative**, then VHF is unlikely. Patient can be managed locally. If there is further clinical concern the patient should be discussed with Imported Fever Service.

SECTION 5: MANAGEMENT OF A PATIENT WITH CONFIRMED VHF

Patient with confirmed VHF A patient who has had a positive VHF test result should be managed in an HLIU, unless exceptional circumstances prevent transfer of the patient;

- Full public health actions should be launched;
- Once the patient has been transferred, testing of specimens should be carried out in the dedicated laboratory at the HLIU.

1. If a patient has a confirmed VHF, the following **urgent** actions are required:
 - **Restrict** the number of staff in contact with the patient and compile a list of all staff who have been in direct contact with the patient;
 - **Enhance** levels of personal protection for those in direct contact with the patient:
 - Hand hygiene;
 - Double gloves;
 - Fluid repellent disposable coverall or gown;
 - Full length plastic apron over coverall/gown;
 - Head cover e.g. surgical cap;
 - Fluid repellent footwear e.g. surgical boots/shoe covers;
 - Full face shield or goggles;
 - Fluid repellent FFP3 respirator used as splash protection.
 - If the respirator is to be used as respiratory protection when managing a patient with infections known to be transmitted via the airborne route, it must be worn as per manufacturer's recommendations (see Appendix 8).

- Lead clinician should discuss urgently with the HLIU to arrange for the immediate transfer (see [Appendix 3](#) for contact details, [Appendix 5](#) for transfer information).
 - **Notify** the infection control team of the positive VHF test result;
 - **Launch** full public health actions (see [Section 6](#)), including formation of an Incident Control Team.
2. If, after discussion with the HLIU, it is judged that the condition of the patient precludes transfer to the HLIU, an immediate discussion with the Lead for Infection Control should take place regarding local risk assessment and control measures. Discussions with the Health and Safety Executive and experts at the HLIU are also necessary. Advice on managing a VHF positive patient in a non-HLIU environment is provided in [Appendix 4](#).
 3. Prior to transfer, or if the patient is unable to be transferred, testing of specimens should be carried out in accordance with [Appendix 7](#).

SECTION 6: PUBLIC HEALTH ACTIONS

Public health actions must be launched if the VHF test result is positive.

- Inform Local Health Protection Team;
- Formation of an Incident Control Team;
- Notification of the case by the reference laboratory to the relevant regulatory health body;
- Notification of the case by PHE to the European Centre for Disease Control (ECDC) and the World Health Organisation (WHO);
- Categorisation and management of contacts; and
- Determine media handling strategy.

1. In **England**, VHF is a notifiable disease under Schedule 1 of the Health Protection (Notifications) Regulations 2010, and notification of VHF is classified as urgent. The registered medical practitioner (**RMP**) attending the patient must therefore notify the highly possible case by telephone to the **proper officer** of the local authority in which the patient currently resides, within 24 hours. The oral notification should be followed up with a written notification within three days.
2. In **Wales**, VHF is a notifiable disease under Schedule 1 of the Health Protection (Notifications, Wales) Regulations 2010, and notification of VHF is classified as urgent. The RMP must notify the highly possible case to the proper officer, who is the Consultant in Communicable Disease Control of the health protection team of the Public Health Wales NHS Trust, by telephone as soon as reasonably practicable.

3. In **Scotland**, VHF is a notifiable disease under Schedule 1, Part 1 (Notifiable Diseases) of the Public Health etc. (Scotland) Act 2008. The RMP must notify the suspected case to the relevant health board, by telephone as soon as possible.
4. In **Northern Ireland**, VHF is a notifiable disease under Schedule 1 of the Public Health Act (Northern Ireland) 1967. The **RMP** must notify the suspected case to the Regional Director of Public Health of the Public Health Agency by telephone as soon as reasonably practicable.
5. In all countries, the RMP should not wait for laboratory confirmation or results of other investigations in order to notify a suspect case. If laboratory test results refute the clinical diagnosis later, the RMP is not required to de-notify the case.

Forward notification of the suspected case

6. In **England** and **Wales**, the proper officer must disclose the content of notification received from the RMP to the following, by telephone, within 24 hours:
 - Public Health England (PHE) or the Public Health Wales NHS Trust (in **Wales**) – however, if the proper officer of the local authority is an employee of these institutions, then notification by the proper officer to the institution will be automatically effected;
 - The proper officer of the local authority in which the patient usually resides, if different; and
 - The proper officer of the port health authority or the local authority in which the port is located, if the patient has disembarked from a ship, hovercraft, aircraft or international train, and this fact is known to the proper officer of the local authority who receives the notification;
 - The local Director of Public Health;

- The Department of Health;
 - The Welsh Government.
7. In **Scotland**, the NHS Board health protection team must notify Health Protection Scotland and the Chief Medical Officer's team in the Scottish Government.
 8. In **Northern Ireland**, there are no forward notifications dictated by law.
 9. For the **UK**, patients being repatriated by air ambulance, the notification requirements of the [Public Health \(Aircraft\) Regulations 1979 as amended 2007](#) will apply.

Identification of contacts

10. It is a public health responsibility:
 - To identify, assess, and categorise contacts of a patient with VHF;
 - To ensure the appropriate monitoring of higher risk contacts;
 - To arrange further evaluation for contacts who develop a temperature of $\geq 37.5^{\circ}\text{C}$ within 21 days of the last possible exposure;
 - To consider antiviral prophylaxis, and arrange as necessary.
11. A contact is defined as a person who has been exposed to an infected person or their blood and body fluids, excretions or tissues following the onset of their fever. This may include contacts that are not in the UK. For management of staff accidentally exposed see [Appendix 9](#).
12. As soon as a patient has been categorised as confirmed VHF all those who have had contact with the patient should be identified as far as possible.

13. For guidance on risks to contacts on aircraft see European RAGIDA guidance at

http://ecdc.europa.eu/en/publications/Publications/1012_GUI_RAGIDA_2.pdf.

Formation and role of an Incident Control Team

14. An Incident Control Team (ICT) will need to be convened and should include representatives from all involved parties, including the local public health body and the hospital Trust. The lead for this will depend on the particular situation.

15. The ICT will also need to:

- Inform PHE, as the UK competent body, that the VHF test result was positive;
- Determine who is responsible for the assessment, categorisation and management of contacts, including those outside the UK, the actions to be taken and the advice to be given;
- Determine who is responsible for media handling;
- Agree all key media messages between all parties.

Notification of the case by the laboratory

16. The VHF test will be carried out by a PHE reference laboratory (see [Appendix 2](#) for contact details). Diagnostic evidence of VHF infection must be urgently **notified by the PHE reference laboratory** to the relevant public health body, **even if the case has already been notified by the RMP**. If the case is:

- In **England**, this notification is to the PHE;
- In **Wales**, this notification is to the Consultant in Communicable Disease Control of the health protection team of the Public Health Wales NHS Trust;

- In **Scotland**, this notification is to the local NHS Board health protection team;
 - In **Northern Ireland**, this notification is to the Public Health Agency.
17. Notification of the case to European Centre for Disease Control (ECDC) and World Health Organisation WHO.
 18. On receipt of confirmation that the VHF test result was positive, the PHE, as the UK competent body, will notify the ECDC via the early response and warning system (EWRS) and the WHO under the International Health Regulations (IHR), of the case.

Assessment, categorisation and management of contacts

19. The ICT will determine who is/are responsible for the assessment, categorisation and management of contacts, and designate a Monitoring Officer to monitor the higher risk contacts and the follow up actions to be taken.
20. Each potential contact should be individually assessed for risk of exposure and categorised as listed in the table below. However, in the event of an accident or incident occurring, an assessment needs to be carried out in consultation with infection experts to determine whether re-categorisation is required.

Categorisation of contacts

| Risk category | Description |
|-------------------------------|---|
| No risk (Category 1) | <p>No direct contact with the patient or body fluids.</p> <p>Casual contact, e.g. sharing a room with the patient, without direct contact with body fluids or other potentially infectious material.</p> <p>Handling of laboratory specimens under contained conditions</p> |
| Low risk (Category 2) | <p>Direct contact with the patient, e.g. routine medical/nursing care , or handling body fluids wearing appropriate personal protective equipment, or breach of laboratory containment without direct contact with specimen</p> |
| High risk (Category 3) | <p>Unprotected exposure of skin or mucous membranes to potentially infectious blood or body fluids, including on clothing and bedding.</p> <p>This includes:</p> <ul style="list-style-type: none">• Unprotected handling of clinical/laboratory specimens;• Mucosal exposure to splashes;• Needle-stick injury;• Kissing and/or sexual contact. |

21. Contacts should be managed as outlined in the table below. Sample information sheets (general, category 1, category 2 and category 3) are available from the PHE Duty Doctor (via 020 8200 6868). Information sheets should include contact details for the Monitoring Officer.

22. For most contacts there should be no restrictions on work or movement, unless disease compatible symptoms develop. However, some restrictions may be appropriate for HCWs in Category 2 or 3.

Management of contacts

Risk category

Action and Advice

No risk (Category 1)

Reassure about absence of risk;
Provide category 1 factsheet;

Low risk (Category 2)

Reassure about low risk;
Passive monitoring
Self-monitor for fever and other disease compatible symptoms for 21 days from last possible exposure; Report to the Monitoring Officer if temperature $\geq 37.5^{\circ}\text{C}$, with further evaluation as necessary;
Provide category 2 factsheet;

High risk (Category 3)

Inform about risks;
Active monitoring
Record own temperature daily for 21 days following last contact with the patient and report this temperature to the Monitoring Officer by 12 noon each day, with further evaluation as necessary; Inform Monitoring Officer urgently if symptoms develop; Provide category 3 factsheet.

23. Antivirals, specifically ribavirin, have been shown to be effective in the treatment of early-stage arenavirus infections, particularly Lassa fever. There is however evidence to suggest that ribavirin may prolong the incubation period for Lassa fever. **Antivirals are not generally recommended for contacts** due to the absence of evidence of their proven effectiveness for prophylaxis. However, antivirals may be considered for those direct contacts at highest risk, subject to individual risk assessment.

Media handling

24. A member of the ICT should be made responsible for media handling. It may be necessary to appoint a spokesperson if there is significant media attention.
25. There should be no release of information to, or discussions with, the media without the agreement of all parties. All media statements and messages will need to be agreed by all parties. Media statements and messages should also be shared with the relevant UK Health Department.

APPENDIX 1: OVERVIEW OF ACDP HAZARD GROUP 4 VIRAL HAEMORRHAGIC FEVERS

1. Viral haemorrhagic fever is a term used to describe a severe, multi-organ disease in which the overall vascular system is damaged and the body's ability to regulate itself is impaired. Disease is often accompanied by varying degrees of haemorrhage which can add greatly to the difficulties of patient management and be life-threatening for the patient.
2. Several viruses from the arenavirus, filovirus, bunyavirus and flavivirus families are known to cause haemorrhagic fevers. They are zoonotic or arboviral infections and dependent on an animal or insect host for transmission. The viruses are geographically restricted to the areas of their host species.
3. Humans are not the natural reservoirs of any of these viruses, but can become infected when they come into contact with infected hosts. In addition, many of these viruses are capable of person-to-person transmission, usually via direct contact with infected blood or body fluids, or indirectly via contact with environments contaminated with splashes or droplets of blood or body fluids.
4. This guidance covers those VHFs that are classified as Hazard Group 4 pathogens. Other diseases with haemorrhagic manifestations such as dengue, yellow fever, leptospirosis, Rift Valley fever, and hantaviruses are not covered by this guidance.
5. The following table summarises Hazard Group 4 haemorrhagic fever viruses, their diseases, geographies and transmission routes.

| Virus | Disease | Geographical distribution | Transmission routes/vectors | Further information |
|-------------------------------|-------------|---|--|--|
| ARENAVIRIDAE | | | | |
| <u>Old World arenaviruses</u> | | | | |
| Lassa | Lassa fever | <p>West and Central Africa</p> <p>In particular: Guinea, Liberia, Sierra Leone, Nigeria</p> <p>Also consider: Benin, Mali, Senegal, Burkina Faso, Cote D'Ivoire, Ghana, Togo, Niger</p> | <p>Contact with excreta, or materials contaminated with excreta, of infected multimammate rat (<i>Mastomys</i> spp).</p> <p>Inhalation of aerosols of excreta of multimammate rat.</p> <p>Contact with blood or body fluids from infected patients, or sexual contact.</p> | <p>https://www.gov.uk/lassa-fever-origins-reservoirs-transmission-and-guidelines</p> |
| Lujo | Unnamed | <p>Southern Africa</p> <p>One outbreak to date (5 cases) in South Africa, ex-Zambia</p> | <p>Transmission to the index case unknown.</p> <p>Direct contact with infected patient, blood or body fluids.</p> | <p>First identified in October 2008 following a nosocomial outbreak in South Africa involving five people, four of whom died.</p> |

| Virus | Disease | Geographical distribution | Transmission routes/vectors | Further information |
|--|-------------------------------|---|---|---|
| <u>New World arenaviruses (Tacaribe complex)</u> | | | | |
| Chapare | Chapare haemorrhagic fever | Bolivia One outbreak to date in Cochabamba, Bolivia | Direct contact (e.g. bite) with infected rat or mouse . Direct contact with excreta of infected rat or mouse. | http://www.cfsph.iastate.edu/Factsheets/pdfs/viral_hemorrhagic_fever_arenavirus.pdf |
| Guanarito | Venezuelan haemorrhagic fever | Central Venezuela | Contact with materials (e.g. food) contaminated with excreta from infected rat or mouse. | |
| Junín | Argentine haemorrhagic fever | Argentina Pampas region | Inhalation of aerosols of excreta (often in dust) of rat or mouse. | |
| Machupo | Bolivian haemorrhagic fever | North eastern Bolivia Beni department | <u>Machupo and Guanarito only:</u> | |
| Sabiá | Brazilian haemorrhagic fever | Brazil One case to date | Contact with blood or body fluids from infected patients. | |

| Virus | Disease | Geographical distribution | Transmission routes/vectors | Further information |
|----------------------------------|----------------------------------|--|---|--|
| BUNYAVIRIDAE | | | | |
| <u>Nairoviruses</u> | | | | |
| Crimean Congo haemorrhagic fever | Crimean Congo haemorrhagic fever | <p>Central and Eastern Europe, Central Asia, the Middle East, East and West Africa.</p> <p>Recent outbreaks in Russia, Turkey, Iran, Kazakhstan, Mauritania, Kosovo, Albania, Pakistan and South Africa</p> | <p>Bite of an infected tick (most commonly <i>Hyalomma</i> ticks).</p> <p>Contact with infected patients, their blood or body fluids.</p> <p>Contact with blood or tissues from infected livestock.</p> | <p>https://www.gov.uk/crimean-congo-haemorrhagic-fever-origins-reservoirs-transmission-and-guidelines</p> |

| Virus | Disease | Geographical distribution | Transmission routes/vectors | Further information |
|---|----------------------------|--|---|--|
| FILOVIRIDAE | | | | |
| Ebola <ul style="list-style-type: none"> - Ebola Zaïre - Ebola Sudan - Ebola Tai Forest (formerly Côte d'Ivoire) - Ebola Bundibugyo - Ebola Reston and Siena | Ebola virus disease | Western, Central and Eastern Africa Outbreaks have occurred in the Democratic Republic of the Congo, Sudan, Uganda, Gabon, Republic of Congo, Côte D'Ivoire, Sierra Leone, Guinea, Nigeria and Liberia | Transmission to the index case probably via contact with infected animals . Contact with infected blood or body fluids . | https://www.gov.uk/government/collections/ebola-virus-disease-clinical-management-and-guidance https://www.gov.uk/ebola-and-marburg-haemorrhagic-fevers-outbreaks-and-case-locations |
| Marburg | Marburg haemorrhagic fever | Central and Eastern Africa Outbreaks have occurred in Angola, the Democratic Republic of Congo, Kenya, Uganda and South Africa (ex-Zimbabwe) | Transmission to the index case probably via contact with infected animals (fruit bats) . Contact with infected blood or body fluids . | https://www.gov.uk/marburg-virus-disease-origins-reservoirs-transmission-and-guidelines https://www.gov.uk/ebola-and-marburg-haemorrhagic-fevers-outbreaks-and-case-locations |

| Virus | Disease | Geographical distribution | Transmission routes/vectors | Further information |
|--|-----------------------------|---|--|---|
| FLAVIVIRIDAE | | | | |
| Kyasanur forest disease | Kyasanur forest disease | India Western districts of Karnataka state | Bite of an infected tick , most commonly <i>Haemaphysalis spinigera</i> . Contact with an infected animal , most commonly monkeys or rodents . | Common in young adults exposed in the forests of western Karnataka – approximately 100-500 cases per year. Case fatality rate is estimated at 2-10%. |
| Alkhurma (Al Khumrah) haemorrhagic fever (See info box in Section 1) | Alkhurma haemorrhagic fever | Saudi Arabia Makkah (Mecca), Jeddah, Jizan, Najran regions | Contact with an infected animal (sheep, camels) . Bite of an infected tick or mosquito (principal vector species not yet identified). | Cases have been reported outside Saudi Arabia, but have had contact with animals that likely originated in Saudi Arabia e.g. case in an Italian tourist in 2010 who visited a camel market in southern Egypt. |
| Omsk haemorrhagic fever | Omsk haemorrhagic fever | Russian Federation Novosibirsk region of Siberia | Bite of an infected tick , most commonly <i>Dermacentor reticulatus</i> . Person-to-person | Virus circulates in muskrats, and other animals, in the forest Steppe regions of Russia. Infection most common in farmers and their families. |

APPENDIX 2: VHF TESTING

Imported Fever Service

1. To discuss a case and/or arrange VHF testing, telephone **0844 7788990** (24 hour). In the event that this number is unobtainable, the duty Consultant for the Rare and Imported Pathogens Laboratory can be contacted via the PHE Porton switchboard number provided below.
<https://www.gov.uk/imported-fever-service-ifs>

VHF testing

2. If the malaria result is negative, the patient remains pyrexial ($\geq 37.5^{\circ}\text{C}$) and no diagnosis has been made, the case should be discussed with a local Infection Consultant (ID/Microbiology/Virology). The Infection Consultant should consider discussion of VHF testing with Imported Fever Service (0844 7788990). The IFS doctor will require full details of the patient's travel history, possible exposure activities, clinical presentation, investigation results and clinical management to date. The differential diagnosis, the appropriate samples to send (usually EDTA and clotted blood +/- urine), the necessary sample transport arrangements (Category A or Category B courier, appropriate to the probability that the sample contains a HG4 pathogen) and anticipated test turnaround times will be discussed.
3. Note that if a VHF test is being considered, the Infection Consultant must contact the Imported Fever Service prior to sending any samples. Samples will usually be directed to the Rare and Imported Pathogens Laboratory (RIPL) at PHE Porton at the address provided in [Appendix 3](#). Results are usually available within 6-8 hours following receipt of the specimen. In the meantime, diagnostic investigations and local management should continue. RIPL will normally test in parallel for other agents likely to cause similar presentations that occur in the country of origin e.g. dengue, rickettsial infections, leptospirosis.

VHF test results

4. **If the VHF test is positive**, a number of urgent actions are required – see [Section 5](#) for details.
5. **If the VHF test is negative**, in most cases the strict isolation and PPE can be stopped. However, if strong clinical suspicion remains, **AND** RIPL/IFS consider that repeat testing may be appropriate, then the patient should remain in isolation and the infection control measures, including staff protection, as outlined in this Section should be maintained until an alternative diagnosis is confirmed or the patient recovers.

Reference laboratories – for VHF test

6. Rare and Imported Pathogens Laboratory (RIPL)
PHE Porton
Porton Down
Salisbury Wiltshire
SP4 0JG
Tel: 01980 612100 (24 hour)
7. The Imported Fever Service will usually direct the referring laboratory to send samples to RIPL as above. In unusual circumstances, where the RIPL lab is not available, samples may be directed to Colindale at the address below.
Microbiology Services Division – Colindale
61 Colindale Avenue
Colindale
London
NW9 5HT
Tel: 0208 200 4400 or 0208 200 6868 (24 hour)

APPENDIX 3: CONTACT DETAILS FOR HLIU

High Level Isolation Units

1. Royal Free London NHS Foundation Trust, London
Telephone (24 hours, ask for infectious disease consultant on call) 020 7794 0500 or 0844 8480700 (local rate number when calling from outside London).

www.royalfree.nhs.uk

2. The HLIU at Newcastle upon Tyne NHS Foundation Trust is currently closed at the time of publication.

APPENDIX 4: PRINCIPLES FOR THE ISOLATION OF PATIENTS WITH CONFIRMED VHF

1. VHFs are severe and life-threatening diseases for which there is no proven treatment or prophylaxis. Therefore, patients with confirmed VHF infection should be managed in a specialist high level isolation unit (HLIU). In exceptional circumstances it may not be appropriate to transfer patients to an HLIU (see paragraph 25). In this case, the unit where the patient will be cared for must provide as near as possible complete containment and the use of enhanced PPE above and beyond that described in the algorithm. This appendix is specifically for the long-term care of patients with confirmed VHF.
2. This Appendix does not give advice on the clinical management of such patients. Clinical management of a patient infected with VHF should be undertaken by specialist infectious disease clinicians on a case-by-case basis, and cannot be prescribed here.

Patient containment requirements

3. Experts agree that there is no circumstantial or epidemiological evidence of an airborne transmission risk from VHF patients. A theoretical risk has been postulated. Evidence from outbreaks strongly indicates that the main routes of transmission of VHF infection are direct contact (through broken skin or mucous membrane) with blood or body fluids, and indirect contact with environments contaminated with splashes or droplets of blood or body fluids.
4. Avoiding contact with a patient's body fluids, minimising contamination of the environment, and safely containing contaminated fluids and materials, is paramount to protecting staff and the wider public against infection risks.

5. Following a revised assessment of the risks for the transmission of VHF by the ACDP, this guidance recommends two control options for the containment and isolation of VHF patients in the UK. These two control options provide flexibility in the isolation of a patient with a VHF infection within an HLIU.

6. **Option 1:** VHF patients can be completely isolated using a negative pressure patient isolator (“Trexler”) within a negative pressure isolation suite. Exhaust air from the Trexler isolator is HEPA filtered, as is the exhaust air from the isolation suite, providing double HEPA protection. Staff are protected due to their physical separation from the patient by a flexible film barrier and an air barrier. Access to the patient is via built-in access portholes within the flexible film. The patient isolator will contain all body fluids so contamination of the isolation suite is minimised. Staff will normally wear theatre blues and gloves where necessary but should not require additional if this option is used.

7. **Option 2:** VHF patients can be isolated within a negative pressure isolation suite that has an appropriately designed ventilation system **without** utilising a Trexler isolator. Due to the potential for greater exposure to blood and body fluids as a result of ongoing long-term patient management of a confirmed case, staff protection must be provided through the use of enhanced PPE, **including Respiratory Protective Equipment**, as follows:
 - Power-assisted personal respirator with a P3 filter and full hood (whilst inhalation is not strongly linked to transmissibility of VHF, as a precaution RPE must be included, see [Appendix 8](#));
 - Coveralls i.e. all in one water repellent disposable clothing that covers the whole body;
 - Full length plastic apron over disposable coverall;
 - Fluid repellent footwear e.g. surgical boots/shoe covers;

- Double gloves as a minimum.
8. It is important to ensure that each element of the PPE/RPE ensemble is compatible to combine adequate protection with user comfort (see [Appendix 8](#) for more details).
 9. Correct protocols for putting on (donning) and removing (doffing) PPE and RPE must be strictly adhered to maintain staff protection. More information on PPE, including RPE, is included in [Appendix 8](#).

High Level Isolation Units (HLIU)

10. The purpose of an HLIU is the complete containment of patients infected with an ACDP Hazard Group 4 pathogen. In order to control and contain the possible spread of the pathogen to healthcare staff, other patients or the general public, there are a number of structural and operational requirements that the HLIU must fulfil as described below.

HLIU structural requirements

11. The unit should be part of a specialist infectious disease unit, sited in an area away from general circulation or form part of a separate isolation building. The aim is to:
 - Achieve complete physical separation of VHF patients to mitigate against disease spread;
 - Provide direct access for VHF patients to specialist infectious diseases clinical expertise;
 - Ensure security against disruption and crime;
 - Allow for secure and direct transfer of patients from ambulance to unit;
 - Allow for building systems monitoring for the HLIU as a whole;
 - Construct so as to avoid having walls adjacent to the outside for rooms in which care is provided or contaminated material is stored

i.e. have walls that are internal to the main building to avoid accidental release.

12. The unit must be kept at negative pressure relative to the surrounding area, and patient isolation suites within the unit must also be at negative pressure relative to the rest of the unit. The direction of air circulating within the unit should follow a gradation of increased negative pressure and flow from clean through to contaminated areas, and be HEPA (or equivalent) filtered before discharge to the atmosphere.
13. There must be clear segregation of clean and potentially contaminated areas of the unit. Clearly delineated and separate pathways through the unit for staff, patients, visitors, supplies and waste should be integrated into the structural design.
14. Changing rooms and showers for staff are required within the unit. Negative pressure ventilation is required within the changing rooms and showers relative to the surrounding area and must form part of the gradation of negative pressure within the suite.
15. All surfaces within the unit must be easy to clean. Floor, walls and other surfaces must be impervious to water and resistant to damage from disinfectants.
16. An autoclave should be installed within the unit.

HLIU design considerations for negative pressure ventilation

17. Negative pressure ventilation is used to control the direction of airflow between the patient isolation suite and adjacent areas. Its aim is to prevent contaminated air from escaping from the isolation suite into other areas of the unit or beyond. Negative pressure ventilation needs to

be carefully and specifically designed in order to achieve the desired protective effect.

18. Research studies demonstrate that:

- Room sealing (air tightness) must be effective and should be designed into the construction of the HLIU environment through a clear specification for ventilation performance. Poor room sealing results in unpredictable airflow and failure in containment, even if large negative pressure differentials are used;
- Effective sealing of doors is necessary, and door self-closing devices and interlock arrangements are required to prevent both loss of negative pressure and containment, and unintended airflow;
- All internal and external windows and viewing panels should be sealed;
- A stepped negative pressure approach is recommended with the highest negative pressure in the patient isolation room, with progressive decrease in nominal pressures extending outwards to the periphery of the unit. A well designed stable system could operate on a 3-step basis at, for example, -40 Pa, -25 Pa and -15 Pa relative to the outside atmosphere in line with movement from the isolation suite out to the staff circulation and changing facilities within the unit;
- An air change rate of at least 25 air changes per hour should be provided in those areas where dispersal of contamination is likely to be the greatest in order to dilute and remove contaminants. This would apply whether or not a Trexler isolator is used;
- Heat from equipment and personnel can adversely affect the air flow pattern within the room and must be taken into account.

19. Validation for performance and against technical specification should be carried out, with re-validation at specified agreed intervals.

20. Environmental monitoring should be built-in to monitor the performance of negative pressure ventilation systems.

HLIU operational requirements

21. The unit should have in place detailed written operational policies covering all activities in the unit. These should include:
 - Unit activation and deactivation;
 - Roles and responsibilities of staff;
 - Patient admittance and discharge;
 - Staff entry and exit;
 - Personal Protective Equipment (PPE, see paragraph 19) and Respiratory Protective Equipment (RPE, see [Appendix 8](#)) use, disposal and storage;
 - Management of spillages;
 - Taking of specimens and subsequent handling;
 - Ambulance and ambulance crew decontamination;
 - Disinfection, decontamination and terminal cleaning of the unit (see [Appendix 10](#) of this guidance);
 - Special arrangements for waste handling, disinfection and disposal (see [Appendix 11](#) of this guidance);
 - Special arrangements for laundry (see [Appendix 10](#) of this guidance);
 - Emergencies, for example fire or flooding, including evacuation;
 - Maintenance and repair.
22. If specialist services such as radiology are necessary, these should be carried out at the patient's bedside.
23. The unit should be staffed by individuals trained in the management of infectious disease. All staff must receive regular appropriate training and instruction in use of the high risk facility.

24. Access must be restricted to authorised personnel – the general public, including patients, relatives and visitors should be excluded from the area when the unit is in use. A register of all personnel including clinical, non-clinical and maintenance staff entering the unit must be kept as a means of tracking potential exposure to infection.

Managing a VHF positive patient in a non-HLIU environment

25. In exceptional circumstances it may not be appropriate to transfer patients to an HLIU. In this case, it is important that advice is sought from HLIU specialist staff. The patient must be housed in a single occupation infectious disease unit side room ('enhanced single room'), preferably with a ventilated lobby (isolation suite), with en-suite sanitary facilities and where complete physical separation from other patients can be achieved. See Department of Health guidance HBN 4 Supplement 1 - Isolation Facilities in Acute Settings:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/148503/HBN_04-01_Supp_1_Final.pdf

26. Enhanced single rooms will have extract ventilation and operate at negative pressure relative to the rest of the unit. In isolation suites with a ventilated lobby, the lobby will be at positive pressure to ensure that air from the corridor does not enter the isolation room, and that air from the room does not escape into the corridor. This design enables these suites to be used for both source and protective isolation. Although this does not adhere to the stepped negative pressure approach applied in HLIUs, it provides acceptable containment under exceptional circumstances.
27. There must be a clear segregation and gradation of clean and potentially contaminated areas in the room, with PPE changing in the lobby of isolation suites or nearest the door in enhanced single rooms without a lobby.

28. An operational policy following the principles described in paragraph 21 must be created, documented and agreed with all staff involved. Enhanced PPE, **including Respiratory Protective Equipment**, should be used as follows:
- Power-assisted personal respirator with a P3 filter and full hood (whilst inhalation is not strongly linked to transmissibility of VHF, as a precaution RPE must be included, see [Appendix 8](#));
 - Coveralls i.e. all in one water repellent disposable clothing that covers the whole body;
 - Full length plastic apron over disposable coverall;
 - Fluid repellent footwear e.g. surgical boots/shoe covers;
 - Double gloves as a minimum.
29. It is important to ensure that each element of the PPE/RPE ensemble is compatible to combine adequate protection with user comfort (see [Appendix 8](#) for more details).
30. Correct protocols for putting on and removing PPE and RPE must be strictly adhered to maintain staff protection. More information on PPE, including RPE, is included in [Appendix 8](#).
31. A segregated holding area for contaminated material must be designated as near as possible to the side room, with procedures in place for transfer of material to that area with minimum potential for cross-contamination.
32. Procedures must be put in place for disinfection, decontamination and terminal cleaning as soon as possible following transfer of the patient out of the isolation suite. See further details in [Appendix 10](#).

33. Procedures must also be put in place for safe transfer of waste from the holding area to where it will be inactivated. See further details in [Appendix 11](#).

APPENDIX 5: TRANSFER OF A PATIENT

Transfer of a patient within the UK

1. Patients without confirmed VHF being transferred between hospitals (not HLIU) may be transported by standard means provided that they do not have bruising, bleeding, uncontrolled diarrhoea or uncontrolled vomiting.
2. The decision to transfer a patient to HLIU should be made by the senior clinician responsible for the patient's care, after consultation and agreement with clinicians at the HLIU to which the patient is to be transferred. Only patients with confirmed VHF should be transferred to the HLIU, however in exceptional circumstances patients may be transferred before the diagnosis is confirmed. The ambulance crew and staff must be made aware of the patient's clinical condition.
3. Transfer by road, in an ambulance, is the preferred option for all patients. Transfer to the HLIU will be arranged by the HLIU staff. VHF's are classified as Category 4 infectious diseases across all Ambulance Trusts in England, Scotland, Wales and Northern Ireland.
4. Ambulance Trusts should follow the guidance for category 4 infection prevention and control measures (IHCD Ambulance Service Basic Training Manual, 2008. Section 17.5 Category 4 Infections), which provides clear operational procedures for the transfer of a VHF patient in the UK. Ambulance crew and staff transferring a VHF patient must be specifically and adequately trained, and undertake periodic exercises to test their procedures. It is advisable that regular training exercises with the HLIU are also performed. Female staff can decline to transfer patients at Category 4 if they are pregnant.

5. Transportation by Ambulance of patients with a Category 4 infectious disease will need to be carried out in accordance with a number of basic requirements for ambulance contents, PPE, decontamination and after care. These are outlined below.

Ambulance contents

6. The minimum equipment and supplies necessary for the transfer should be retained on board – everything else should be removed to reduce risk of cross contamination. Consideration should also be given to the location of equipment on board to minimise the potential for contamination.

PPE

7. As a minimum PPE should include for a confirmed or of high degree of suspicion patient the agreed PPE is worn over an appropriate base layer (such as the cooler layer worn under CR1) and consists of:
 - Coveralls i.e. all in one water repellent disposable clothing that covers the whole body including head and neck such as Tyvek or Tychem F Suit;
 - A Fit tested FFP3 facemask;
 - Eye protection;
 - CR1 boot covers or wellington boots or equivalent washable/disposable footwear;
 - Disposable double gloves.

PHE recommend the use of Tyvek/FP3, but if unavailable CR1/FM12 may be considered.

8. Procedures should be in place for safe donning and removing of the PPE, including the correct order in which this should be done.

Decontamination of ambulance and equipment

9. The ambulance should be driven to the decontamination area at the HLIU and treated as specified in the guidance. All disposable ambulance equipment, blankets, linen, cloths etc., plus materials used in the decontamination procedure must be treated as Category A clinical infectious waste, secured and labelled 'infectious for incineration', the labels endorsed with the patient identifier and disposed of by hospital staff.

Decontamination of ambulance crew and staff, clothing

10. Decontamination of crew and staff should take place in the HLIU. In summary this should include the following:
 - All PPE and disposable items, which must be treated as Category A clinical infectious waste, removed, bagged and labelled 'infectious for incineration' along with the patient identifier and disposed of by hospital staff;
 - Any recoverable items (spectacles, non-disposable contact lenses), which should be placed in a clear plastic bag and handed to HLIU staff for decontamination;
 - Crew members should take a shower including hair wash before entering the clean area.

After care of ambulance crew and staff

11. All ambulance staff and crew who have been in the ambulance whilst the patient is being transferred should be identified as contacts and followed up if the patient is confirmed to have a VHF infection. A contact is defined as a person who has been exposed to an infected person or their blood and body fluids, excretions or tissues following the onset of

their illness. Guidance on the management of contacts is available in [Section 6](#) of this guidance.

12. If a member of ambulance crew or staff is accidentally exposed to potentially infectious material from the patient, this should be reported immediately. Hospital trust emergency procedures should be followed with additional advice from the HLIU. [Appendix 9](#) also contains guidance on accidental exposures.
13. In extraordinary circumstances, transfer of a patient presenting an enhanced risk to crew and staff (due to bleeding, uncontrolled diarrhoea, uncontrolled vomiting) could be requested. In such circumstances, transfer should be discussed with HLIU who will provide special instructions and guidance.
14. Further information on ambulance requirements for VHF patient transfer is available at <http://naru.org.uk/wp-content/uploads/2014/08/VHF.pdf>.

Transfer by air within the UK

15. Although road transfer is preferable, air transfer may be necessary in some circumstances. Following advice and contacts provided by the receiving HLIU, a patient may be moved by air ambulance with a crew suitably trained for this.
16. A standard operating procedure has been developed by NHS England and the Royal Air Force (MoD) to facilitate the transfer of a patient by air using the Air Transport Isolator.

Key points for ambulance crew and staff to remember before transferring a VHF patient

CHECK:

- ✓ That you are trained to undertake a Category 4 infectious disease transfer;
- ✓ That you have received full information about the condition of the patient and the possibility of sudden deterioration during the journey, and that you give this information to the receiving clinical team;
- ✓ The specific arrangements for the journey, including possible escort for long road journeys
- ✓ That you are aware of arrangements in case of an emergency.

ENSURE:

- ✓ That you are fully familiar with the procedures necessary for safe transport
- ✓ That you maintain close communication with the receiving clinical team at the HLIU at all times;
- ✓ That suitable PPE is worn by all members of ambulance crew and staff at all times;
- ✓ That under no circumstances should direct oral resuscitation be carried out – a bag and mask should be used to resuscitate patients;
- ✓ That no members of staff who have been in contact with the patient leave the ambulance en route.

APPENDIX 6: SPECIMEN COLLECTION

Specimens collected from patients categorised as 'low possibility of VHF'

1. The main risk of infection to the healthcare worker when collecting the specimens is direct contact with blood or body fluids from the patient. The risk of exposure to VHF when collecting specimens from patients categorised as 'low possibility' is small, as an alternative diagnosis such as malaria is usually found. There are therefore no additional precautions to be taken for these specimens, above those already in place under standard precautions. It is not necessary for the managing doctors to inform the laboratory, as the risk to laboratory staff is extremely low.
2. Healthcare waste generated as a result of specimen collection from patients categorised as 'low possibility of VHF' must be treated as Category B infectious waste.

Specimens collected from patients categorised as 'high possibility of VHF'

3. Although the risk of infection from patients categorised as 'high possibility of VHF' many eventually turn out to be low as a result of an alternative diagnosis for example malaria, until an alternative diagnosis has been confirmed enhanced standard precautions should be followed ([Section 4](#)). It is important to inform the laboratory, to ensure that (i) the appropriate laboratory containment (CL2) is in place for specimen handling and (ii) correct waste disposal procedures are followed. Waste should be securely stored pending laboratory results. In the event that VHF infection is confirmed this would require disposal as Category A waste, otherwise it can be disposed of as Category B.

4. Specimens must be transported to the laboratory using appropriate precautions i.e. specimens should be carried in suitably sealed containers.
5. Healthcare waste generated as a result of specimen collection from patients categorised as 'high possibility of VHF' must be securely stored pending laboratory results. In the event that VHF infection is confirmed, this would require disposal as Category A infectious waste, otherwise it can be treated as Category B waste.

Specimens from patients with confirmed VHF

6. There are potential risks of infection to the healthcare worker associated with collecting and handling specimens from patients with confirmed VHF. The main risk of infection when collecting and handling specimens is direct contact with blood or body fluids from the patient, for example by accidental inoculation (needle-stick) or contact with broken skin or mucous membranes.
7. In patients with confirmed VHF, specimens taken for laboratory analysis should be kept to the minimum necessary for patient management and diagnostic evaluation. Specimens should be discussed in advance between clinicians and the appropriate specialist for each laboratory area. During specimen collection, standard infection control principles and practices should always be adopted. In addition, staff must select PPE in accordance with the risk category of the patient – see the patient risk assessment algorithm and [Section 5](#) of this guidance and [Appendix 8](#).
8. Healthcare waste generated as a result of specimen collection from patients with confirmed VHF must be treated as Category A infectious waste. Waste should be dealt with according to the guidance set out in

["https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/167976/HTM_07-01_Final.pdf"](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/167976/HTM_07-01_Final.pdf) (HTM 07-01) i.e. autoclaved on site or incinerated (see [Appendix 11](#)).

9. The following principles should be followed to ensure safe transfer of these specimens to the laboratory:
 - Laboratory staff should be notified prior to receipt of all specimens from patients with confirmed VHF;
 - Specimens must be transported in person i.e. not be sent on automatic transport systems (e.g. pneumatic transport systems) nor in standard mail;
 - Specimens must be transported to the laboratory using appropriate precautions i.e. specimens should be carried in suitably sealed containers;

If a member of staff is exposed to body fluids during specimen collection e.g. accidental percutaneous contamination, or requires information about decontamination of body fluid spillages, please refer to Appendices [9](#) and [10](#).

APPENDIX 7: LABORATORY PROCEDURES

1. There are potential risks of infection to laboratory staff associated with handling specimens from all types of patient. Patients suspected of VHF infection are clinically assessed as one of the following categories:
 - Low possibility of VHF infection;
 - High possibility of VHF infection;
 - Confirmed VHF infection;
 - VHF infection unlikely.

2. For specimens from all patients in whom VHF is being considered, appropriate risk assessments together with local codes of practice must be in place. This information can be used to ensure that the risks are effectively managed; relevant facilities are in place and are managed properly. The risk assessment should include evaluation of the risks associated with each analytical technique and the application of appropriate control measures.

3. Autoanalysers used to process laboratory samples are considered to pose minimal risk to laboratory staff. Routine processing of samples for each of the above categories therefore pose no greater risk than samples containing Hepatitis B, Hepatitis C, HIV and other blood-borne viruses. To ensure a safe system of work, protocols for machine decontamination, maintenance, management of spillages and waste disposal must be in place and followed, taking into consideration manufacturers' recommendations. Autoanalysers should be disinfected following local procedures after sample processing and before scheduled maintenance.

4. Autoanalysers with standard precautions should remain the preferred method for processing specimens. In certain circumstances the use of

discrete analysers could be considered e.g. to maintain work flow of standard specimen processing. However, this is not considered to be a safer option to using autoanalysers and would require risk assessment for manual processing of the specimen e.g. pipetting.

5. Point of care (POC) blood gas analysers present a risk of splashing and should only be used in exceptional circumstances and in a controlled environment i.e. limited for use in the patient room by appropriately trained staff.

Specimens from a patient categorised as 'low possibility of VHF'

6. The overall risk to laboratory workers from specimens from these patients is considered to be minimal, and specimens may be processed at containment level 2. Analysis of specimens should not be delayed whilst awaiting the results of VHF tests. Routine laboratory tests should be carried out where possible in autoanalysers using standard practices and procedures at **containment level 2**.

Specimens from a patient categorised as 'high possibility of VHF'

7. The overall risk to laboratory workers from specimens from this category of patient is also considered to be low, and specimens may continue to be processed (for a restricted list of investigations – see algorithm) at containment level 2 in routine autoanalysers. Waste from these machines is not considered to pose a significant risk because of the small sample size and dilution step and will therefore require no special waste disposal precautions. Procedures must be in place for the effective management of spillages (see [Appendix 10](#)). A sealed centrifuge bucket or rotor should be used for centrifugation procedures that are being undertaken manually i.e. not within an autoanalyser.
8. For specimens categorised as 'high possibility of VHF' laboratory staff should be informed so that original patient specimens can be retained

and provision made for disposal as category A waste in the event that VHF is subsequently confirmed.

9. When preparing blood film slides for malaria testing consideration should be given to the potential for splash and therefore should be carried out in a microbiological safety cabinet or alternatively facial protection should be used. Blood film slides should be disposed of in a dedicated sharps bin, which should be retained and processed as category A waste in the event that VHF is subsequently confirmed in any of the samples. After use, the work surfaces should be treated with 1,000 ppm available chlorine (see [Appendix 10](#)).

Specimens from a patient with confirmed VHF

10. The number of patients with a positive VHF test in the UK is very low (~1-2 cases every two years). In most cases, patients with a positive VHF test will be transferred to an HLIU and specimens will be analysed at the dedicated HLIU laboratory. However, where transfer is delayed or considered inadvisable, the specimens may be processed in a containment level 2 laboratory using routine autoanalysers provided that the additional precautions outlined below are followed.

Additional precautions

- Experienced laboratory staff should be available to manage the coordination of testing and liaise where appropriate with other laboratories;
- Specimen cuvettes from routine autoanalysers should be safely disposed of as category A waste;
- A risk assessment should be carried out for test protocols not undertaken in routine autoanalysers that are likely to result in the production of splashes or aerosols. Where appropriate, these tests should be undertaken in a microbiological safety cabinet or other equipment providing a similar level of protection;

- For manual centrifugation procedures, a sealed centrifuge bucket or rotor must be used;
- Patient samples that are not for immediate disposal should be packed in rigid containers, which should be surface decontaminated and retained within the laboratory awaiting safe disposal;
- Disinfection and decontamination procedures, validated as effective against blood-borne viruses, must be in place;
- Autoanalyser disinfection procedure should be carried out following sample processing and before scheduled maintenance;
- Retained specimens must be disposed of as Category A waste and inactivated by autoclave;
- Blood film slides should be disposed of in a dedicated sharps bin, which must be processed as category A waste;
- Work surfaces should be treated with 1,000 ppm available chlorine (see [Appendix 10](#)).

Specific instructions for speciality areas

11. Automated instruments can be used to process blood cultures for microbiological analysis; however, care should be taken when sub-culturing potentially positive specimens and procedures should be undertaken in a microbiological safety cabinet by experienced staff.

12. If a member of staff is assessed as likely to have been exposed to VHF-positive specimens, they should liaise with their occupational health provider about following health monitoring (see [Appendix 9](#)).

APPENDIX 8: PERSONAL PROTECTIVE EQUIPMENT (INCLUDING RESPIRATORY PROTECTIVE EQUIPMENT)

1. Control and containment when managing patients who may have VHF infection, or confirmed VHF, is important to protect staff and the wider community. The isolation of the patient in either a single side room or a negative pressure isolation room, supplemented by appropriate PPE, or a physical barrier are key risk control measures. To ensure the effectiveness of PPE, care will need to be taken in its initial selection and subsequent maintenance, storage and use, as described in this Appendix.
2. When selecting PPE, the infection risk, the tasks to be undertaken, the environment in which the PPE is being used and the person using the PPE must be considered.
3. When selecting PPE for protection of healthcare staff the potential exposure routes to be considered are **direct contact** (through broken skin or mucous membrane) with blood or body fluids, and **indirect contact** with environments contaminated with splashes or droplets of blood or body fluids. Regarding VHF infection risk:
 - transmission has usually been associated with patient care when appropriate barrier precautions have not been in place to prevent exposure to blood and other body fluids;
 - the risk for person-to-person transmission of VHFs is highest during the later stages of illness, when vomiting, diarrhoea, and often haemorrhage, may lead to splash and droplet generation.

4. Selection of PPE In patient management, PPE selection should be proportionate to the likelihood of VHF infection as defined in the viral haemorrhagic fevers risk assessment (algorithm), Sections 3, 4, 5 and Appendix 4.
5. It is important to consider ergonomic factors to give maximum protection while ensuring minimum discomfort to the wearer. Uncomfortable equipment is unlikely to be worn properly. More than one type or size of PPE may be needed and should be tested to fit the wearer. Some types of RPE e.g. disposable respirators and half- masks, are not suitable for staff with beards or facial hair as they will not seal to the wearer's face, and achieving a good face fit can be a particular problem for a person with a small face (see also below).
6. The PPE selected should be of suitable quality and construction to provide the required level of protection in the working conditions and must bear a "CE" mark that signifies compliance with the Personal Protective Equipment Regulations 2002. This implements the European PPE Directive concerning design and manufacture and demonstrates conformance with European (EN) or International (ISO) standards.
7. Further guidance on the selection and correct wearing of RPE is given in the HSE guidance [Respiratory protective equipment at work: A practical guide](#). Further information on suitability and instructions for correct use should be provided by RPE manufacturers.
8. The PPE should provide suitable barrier protection for staff. The barrier function will need to be maintained throughout all clinical/nursing procedures, and when following appropriate procedures for the removal and disposal or decontamination of potentially contaminated equipment by the wearer.

9. The PPE/RPE combination has to establish a barrier against contact with contaminated surfaces, splash, spray, bulk fluids and aerosol particles as follows:
- Should provide adequate coverage of all exposed skin, with sufficient integrity to prevent ingress or seepage of bulk liquids or airborne particles, under foreseeable conditions of usage;
 - The materials from which the PPE is made should resist penetration of relevant liquids/suspensions and aerosols;
 - The various components (body clothing, footwear, gloves, respiratory/face/eye protection) should be designed to interface sufficiently well to maintain a barrier, e.g. sleeves long enough to be adequately overlapped by glove cuffs.

Respiratory Protective Equipment

10. There is no circumstantial or epidemiological evidence of airborne transmission risk from VHF patients. However, as a precautionary measure it is considered appropriate to wear RPE to a high level Assigned Protection Factor when managing a confirmed case of VHF. This will usually be provided by a powered hood type respirator in specialist centres; the use of a disposable filtering face-piece (FFP) respirator type EN 149 FFP3, certified as PPE under the European Directive 89/686/EEC can be considered as an alternative.
11. When using FFP3 respirators it is important that wearers have undergone face-fit testing to ensure such respirators achieve a good seal as required under the Control of Substances Hazardous to Health (CoSHH) 2002 as amended. While disposable RPE may be more practical to avoid the need for decontamination of re-usable RPE, facial hair (a beard or stubble) may prevent a good seal being achieved with a disposable respirator. In this instance a powered hood type respirator given a classification of TH2 according to European Standard EN 12941 may be necessary. Likewise, certain face shapes may prevent a good

seal being achieved with a disposable respirator, but in this case a half mask re-usable respirator with P3 filter may be a practical solution.

Donning and doffing PPE

12. As described above, PPE should be chosen to ensure an adequate barrier to exposure is created and maintained. This will need to be taken into consideration when putting on the various items of PPE. After use, it should be assumed that PPE may be contaminated and an appropriate removal procedure is essential to prevent risks of exposure to the wearer. Consequently, a detailed and pre-defined sequence for donning and doffing items should be developed, implemented and monitored.
13. Staff should be trained in procedures to don and especially doff PPE, including the correct order to avoid cross contamination, and to check that the RPE with which they are provided fits properly. They must also receive clear instructions on when it 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 and training records should be kept for all participating individuals.
14. PPE should be donned before starting procedures likely to cause exposure and only doffed after moving away from a source of exposure.
15. PPE should not be a source of further contamination e.g. by being removed and left on environmental surfaces.
16. Further detailed guidance on safe donning and doffing can be found in PHE VHF emergency department PPE dressing procedure (add link or further info).

Disposal or decontamination

17. Following removal, disposable PPE will need to be placed into suitable disposal receptacles and treated as clinical infectious waste. If re-usable

PPE is unavoidable, it must be decontaminated using an appropriate method prior to storage. The method should be validated as effective against VHF (see [Appendix 10](#)) and compatible with the PPE to ensure it is not damaged so that its effectiveness in subsequent use is not compromised.

Storage and Maintenance

18. PPE should be suitably stored to prevent accidental damage and contamination. Infrequently used PPE should be subject to stock selection and control procedures with regard to shelf-life to ensure it is available for use at short notice with no deterioration in protective qualities. RPE requiring powered respirator units should be thoroughly examined, tested and maintained at suitable intervals (at least once a month). Records of the tests must be kept for at least five years after the date of the test.

Summary of good practice in the use of PPE/RPE

- PPE must be appropriate, fit for purpose and suitable for the person using/wearing it. A scheme for periodical repetition of face fit testing (either annually, due to change of facial features, or alteration to respiratory function) should be developed and implemented;
- Training must be provided with consideration of susceptibility to human error;
- A strategy for implementing and monitoring the correct use of PPE which could include visual check, cross check or supervision by responsible person should be developed;
- A detailed and pre-defined sequence for donning and doffing items should be developed, implemented and monitored;
- PPE should be located close to the point of use;
- PPE should not be a source of further contamination e.g., by being removed and left on environmental surfaces, or by being removed inappropriately thus contaminating the wearers hands;
- The use of PPE such as gloves does not negate the need for hand hygiene;
- The integrity of PPE should not be compromised during nursing procedures. It might otherwise potentially lead to exposure to blood or body fluids. For example solvents or certain products such as hand creams, can affect integrity;
- There should be validated procedures for the disinfection of re-useable PPE;
- Stocks of PPE should be stored off the floor, e.g., on appropriate shelving in a designated, clean and dry storage area to ensure that they are not contaminated prior to use.

APPENDIX 9: MANAGEMENT OF STAFF ACCIDENTALLY EXPOSED TO POTENTIALLY INFECTIOUS MATERIAL

1. Procedures must be in place to deal with any accidental exposure of staff to blood or body fluids from high possibility or confirmed cases of VHF.
2. Accidental exposures that need to be dealt with promptly are:
 - **Percutaneous injury e.g. needle-sticks:**

Immediately wash the affected part with soap and water. Encourage bleeding via gentle squeezing.
 - **Contact with unprotected intact or broken skin:**

Immediately wash the affected part with soap and water.
 - **Contact with mucous membranes (eyes, nose, or mouth):**

Immediately irrigate the area with emergency wash bottles, which should be accessible in case of such an emergency.
3. In all cases, the incident will need to be reported immediately to the local Clinical Virologist, Clinical Microbiologist or Infectious Disease Physician.
 - a. For a high possibility “suspected” source case on which VHF testing has not been completed, the local Clinical Virologist, Clinical Microbiologist or Infectious Disease Physician to whom the incident has been reported should immediately discuss it with the duty RIPL physician, contacted by telephoning the Imported Fever Service on 0844 77 88 99 0.
 - b. For a source case in which VHF infection has been confirmed by laboratory testing, the local Clinical Virologist, Clinical Microbiologist or Infectious Disease Physician to

whom the incident has been reported should immediately discuss it with the duty Infectious Disease Physician at the Royal Free Hospital contacted by telephoning the HLIU on 020 7794 0500 or 0844 848 0700.

4. In the event that VHF infection in the source patient is excluded by laboratory testing, the recipient of the body fluids exposure incident may still require the appropriate follow-up for possible blood borne virus (HIV, HBV, HCV) exposure, including with their local occupational health provider.

5. In the event that VHF infection is confirmed in the source patient, the exposed individual should be followed up as a Category 3 contact – see Section 6 for details. In **Great Britain**, the incident may need to be reported under Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR) to HSE (<http://www.hse.gov.uk/riddor/>). In **Northern Ireland**, it may need to be reported under RIDDOR (NI) to HSENI (<http://www.hseni.gov.uk/>). Under RIDDOR, a definite exposure would be reported as a dangerous occurrence, whereas if the staff member actually acquired an infection it would need to be reported under the occupational disease category.

APPENDIX 10: DECONTAMINATION, INCLUDING TREATMENT OF LAUNDRY

1. VHFs are enveloped viruses. This type of virus has been shown to be susceptible to a broad range of disinfectants including chlorine and alcohol, and to thermal inactivation (1 hour at 58 – 60⁰C, or 30 minutes at 75⁰C). There is no evidence to suggest that they have any greater resistance to inactivation than other enveloped or blood borne viruses such as HIV. Therefore it can be assumed that decontamination methods used against blood borne viruses will be effective.
2. Survival of viruses outside the body is dependent on several factors. For example, Ebola virus survival on different surfaces is dependent on a number of environmental factors (type of surface, humidity, light, concentration of virus present, etc.). It can survive for several hours when dried onto surfaces such as doorknobs and worktops, and up to several days in body fluids such as blood at room temperature. However it is easily inactivated at higher temperatures and by soap and water.
3. For patients categorised as low possibility of VHF, standard precautions, cleaning and decontaminating procedures apply, including the treatment of laundry. All procedures should be in keeping with those used when caring for a patient with malaria.
4. The information in this Appendix applies to those patients who have been categorised as high possibility of VHF or have been confirmed with VHF infection.
5. Materials or equipment requiring decontamination may be segregated and stored whilst awaiting PCR test results if facilities are available to do so safely. If results confirm patient as negative for VHF, waste can then

be treated using standard precautions. However, if it is not practicable to segregate and store pending PCR results then materials from high possibility cases must be decontaminated in the same way as confirmed cases as outlined in the rest of this Appendix. If test results confirm VHF infection, procedures as in this Appendix shall then be applied.

6. Staff should ensure that areas and equipment used for the care of patients who have been categorised as high possibility of VHF or have been confirmed with VHF infection are decontaminated and cleaned following the procedures in this Appendix. Decontamination and cleaning must be conducted wearing appropriate PPE (see [Appendix 8](#) for general principles and apply local rules for specific PPE and procedures). For information on decontamination of ambulance vehicles see IHCD Ambulance Service Basic Training Manual, 2008. Section 17.5 Category 4 Infections.

7. It is important to ensure that products used in the decontamination procedure have been validated as effective against blood-borne viruses. Control measures against such viruses in clinical settings are described in recently updated [ACDP guidance on blood-borne viruses](#).

Bleaches, hypochlorites and chlorine releasing agents

In various protocols and guidance, reference will be made to bleach or hypochlorite solution. To clarify:

- The active disinfectant component of bleach is sodium hypochlorite (NaOCl);
- Typical household bleach is a solution of sodium hypochlorite generally containing 50,000ppm (5%) available chlorine;
- It is important to check the concentration in the formulation before use, as it is likely to require dilution;
- The strength of the bleach may reduce with long-term storage;
- Typical in-use concentrations are 10,000ppm (1%; 1 in 5 dilution of typical bleach) for the disinfection of blood-spills and 1,000ppm (0.1%; 1 in 50 dilution of typical bleach) for general environmental cleaning;
- Sodium dichloroisocyanurate (NaDCC) may be used as an alternative to NaOCl. This is also available in granule form, which may be practical to absorb, contain and disinfect spills. Refer to suppliers' instructions for in-use concentrations;
- Note that there is a minimum contact time for chlorine-based absorbent granules. This contact time is usually 2 minutes, but may vary from product to product;
- Gloves should be suitable for use and inspected before they are put on to ensure that they are intact. Where the task involves using chemicals such as chlorine-based products, the gloves should be certified as suitable for chemical resistance and comply with the PPE directive (refer to the healthcare cleaning manual);
- Ensure adequate ventilation when disinfecting areas with chlorine-based products i.e. open windows or doors where necessary.

Recommended procedures when there has been no obvious contamination by blood and/or body fluids

8. Validated standard washing and cleaning methods can adequately treat areas and equipment, which have not been contaminated with blood, body fluids or laboratory specimens.

Recommended procedures when there has been contaminated by blood and/or body fluids

9. VHF viruses have been known to survive for two weeks or even longer on contaminated fabrics and equipment. Persons carrying out decontamination and cleaning procedures must wear appropriate PPE and use suitable disinfectant products determined by a robust risk assessment. Refer to Info box on spillages of blood and body fluids.

Crockery and cutlery

10. Disposable crockery and cutlery should be used where possible for those patients categorised as high possibility or confirmed VHF. Subject to risk assessment, these items should be disposed of as category A waste.

Toilets

11. Toilets or commodes may be used by patients categorised as 'high possibility' or 'confirmed' for VHF infection. Where commodes are employed, a dedicated commode should be used with a disposable bowl. After use, the contents are to be solidified with high-absorbency gel and then autoclaved or incinerated. Toilets and commodes should be disinfected with hypochlorite containing 10,000ppm available chlorine at least daily, preferably after each use, and upon patient discharge. For non-ambulant patients, disposable bedpans should be used and the contents to be solidified with high-absorbency gel and then autoclaved or incinerated.

Treatment of Laundry

Use and treatment of disposable linen

12. The use of disposable linen should always be considered when appropriate, in particular when caring for a patient with a 'high possibility of' or 'confirmed' VHF infection. Subject to risk assessment, this linen may need to be treated and disposed of as category A waste.

Use and treatment of non-disposable linen

All re-useable linen from patients with a 'confirmed' VHF infection should not be returned to a laundry and must therefore be treated and disposed of as a category A infectious waste as set out by Health Technical Memorandum HTM 07-01 Safe Management of Healthcare Waste. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/167976/HTM_07-01_Final.pdf

13. All re-usable linen from patients classified as 'high possibility' may be segregated and safely stored whilst awaiting PCR test results if facilities are available. However, if it is not practicable to segregate and store pending PCR results then waste from 'high possibility' cases must be treated as Category A. If PCR results subsequently confirm the patient as negative for VHF, re-usable linen can then be treated as Category B.

Terminal disinfection of HLIU or IDU

14. Following the discharge of a confirmed VHF positive patient, HLIU wards will need to be decontaminated by fumigation. Rooms used to house confirmed VHF patients in a non-specialist IDU will also need to be decontaminated via fumigation (see info box on room fumigation below). This procedure will need to be carried out following a thorough risk assessment and in consultation with HLIU staff.

Spillages of blood or body fluids

For small spots of blood or small spills:

- Gloves should be worn and lesions on exposed skin covered with waterproof dressings;
- Contamination should be mopped up with absorbent material (e.g. disposable paper towels, gel preparations), which are then disposed of through the correct waste stream;
- The area should then be disinfected with freshly prepared hypochlorite solution containing 10,000ppm available chlorine (1%; 1 in 5 dilution of typical bleach) ensuring a contact time of two minutes before wiping up with disposable paper towels;
- The surface should then be washed with warm water and detergent;
- All waste, including gloves and paper towels, should be autoclaved or incinerated.

For larger spills:

- The procedure followed should be as per small spills, however, the following additional measures may be required:
- Where possible, allow any potential aerosols to settle out;
- It may be necessary based on a risk assessment to wear disposable plastic overshoes or rubber boots;
- If splashing is likely to occur while cleaning up, other appropriate PPE should be worn;
- Towels, gloves, disposable overshoes and any contaminated clothing should be autoclaved or incinerated, according to local protocols. Rubber boots may be cleaned then disinfected with hypochlorite solution containing 10,000ppm available chlorine (1%; 1 in 5 dilution of typical bleach).

Room fumigation

- In order to ensure successful room decontamination, gross contamination will need to be cleaned and disinfected appropriately prior to the fumigation process (refer to box above on spillages);
- The fumigation process should be validated as effective against the target agent. Vaporised hydrogen peroxide and formaldehyde are known to be effective against VHF's;
- Specialist advice should be sought for undertaking the fumigation process. A risk assessment should be prepared which provides a safe system of work. All staff involved must be fully trained and follow the procedures outlined in the risk assessment;
- It may be necessary to move nearby patients to a more suitable location prior to the fumigation procedure;
- Rooms to be fumigated must be suitably sealed so as to prevent leakage of fumigant and ensure that levels of fumigant in adjacent areas do not exceed the Workplace Exposure Limit (WEL);
- Before entering the room after fumigation, it is necessary to ensure levels of fumigant are below the WEL;
- After fumigation, rooms should be cleaned following locally established protocols.

APPENDIX 11: WASTE TREATMENT AND DISPOSAL

1. The Department of Health (DH) Health Technical Memorandum HTM 07-01 Safe Management of Healthcare Waste https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/167976/HTM_07-01_Final.pdf contains comprehensive, best practice guidance on the management of all types of healthcare waste in the UK, including waste that is highly infectious.
2. All waste from patients classified as 'low possibility of' having a VHF infection should be treated as category B infectious waste.
3. All waste from patients from patients with a 'confirmed' VHF infection is classified as Category A infectious waste, on the basis that it is known or suspected to be contaminated with pathogens presenting the most severe risk of infection. All treatment, disposal and transport of waste should therefore follow the guidance for Category A infectious waste as set out in HTM 07-01, i.e. autoclaved on site or sent for incineration.
4. Waste from patients classified as 'high possibility' may be segregated and safely stored whilst awaiting PCR test results if facilities are available. However, if it is not practicable to segregate and store pending PCR results then waste from 'high possibility' cases must be treated as Category A. If PCR results subsequently confirm the patient as negative for VHF, waste can then be treated as Category B.

Inactivation of waste on-site

5. As far as reasonably practicable, Category A infectious waste should be treated on-site prior to transport to a disposal facility. On-site treatment will in most cases involve the autoclaving of waste in purpose-built facilities (e.g., dedicated autoclaves in HLIUs).
6. Where a dedicated autoclave is not available, arrangements to coordinate transport should be put in place before transporting waste to a remote autoclave. Waste should be put into two layers of containment. Autoclavable bags should be the primary containment, with the secondary containment being robust, leak-proof containers with a secure lid, transported on a trolley where appropriate. Waste should be transported direct to the autoclave for immediate treatment, thus avoiding storage in the autoclave room or in communal areas.
7. Autoclave cycles must be appropriately validated to ensure that the required temperature and pressure conditions are reached for the appropriate length of time. Autoclaves must comply with British Standard BS 2646-1:1993 (Autoclaves for sterilization in laboratories. Specifications for design, construction, safety and performance) and must be maintained according to the Pressure Systems Safety Regulations 2000.
8. After autoclaving, waste is no longer considered to be infectious and should be classed as EWC Non-hazardous 18.01.04 “offensive waste”, which can be disposed of via landfill or municipal incineration/energy from waste as described in HTM 07-01.
9. Waste water can be safely disposed of through sanitary sewers without the need for additional water treatment on the basis that the volume of effluent will be small and the survival time of the virus in the sewerage system is likely to be short.

10. Any liquid effluent that does not go into a lavatory plumbed into the sewerage system should however be stored in a sealed, leak proof container and disposed of as Category A waste. If possible, contents should be solidified with high-absorbency gel.

Inactivation of waste off-site

11. Where it is not possible to inactivate waste on site from patients categorised as 'high possibility' or 'confirmed', a risk assessment must be undertaken for off-site waste disposal with advice from the on-site Transport of Dangerous Goods Advisor. This should include:
 - Consideration of the volume of waste generated;
 - Availability of UN approved containers for storage and transportation of Category A waste;
 - Provision of safe and secure on site storage prior to transfer;
 - Liaison with a licensed Category A waste contractor to ensure safe collection, transport and disposal compliant with the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR);
 - Appropriate approval from Department for Transport.

Laboratory waste

12. The infectious component of laboratory waste can be classified as either Category A (specimens from patients 'confirmed' with VHF infection) or Category B (specimens from patients classed as 'low possibility of' VHF infection, or from patients classed as 'high possibility' that have been confirmed as negative for VHF) as set out in HTM 07-01 (refer to paragraphs 3 and 4 of this appendix). Pathogen cultures represent an increased risk of exposure because of the higher concentrations in the sample and should be inactivated on site prior to final disposal. Waste from autoanalysers is not considered to pose a significant risk because of the small sample size and dilution step and will therefore require no special waste disposal precautions.

Inactivation of laboratory waste off-site

13. In exceptional circumstances where it is not possible to inactivate laboratory waste on site, a full risk assessment should be undertaken and consideration given to:

- The volume of waste generated;
- Availability of UN approved containers for storage and transportation of the laboratory waste;
- Provision of safe and secure on site storage prior to transfer;
- Liaison with a licensed waste contractor.
- Appropriate approval from Department for Transport.

14. For UN classification and packing groups:

ADR Class 6.2: Infectious substances

- Category A infectious waste will require UN No. 2814 'infectious substance, affecting humans'. Waste in this category must be packaged in accordance with P620 of ADR;
- Category B infectious waste will require UN No. 3291 'clinical waste, unspecified, N.O.S', or '(bio) medical waste N.O.S.', or 'regulated medical waste, N.O.S.'. Waste in this category must be packaged in accordance with P621 or LP621 or IBC620 of ADR;
- Decontaminated medical and clinical wastes that previously contained infectious substances will not be subject to the provisions of ADR unless they meet the criteria for inclusion in another class.

15. Guidance on the transport of clinical waste in the UK is provided by the HSE: <http://www.hse.gov.uk/cdg/manual/clinical/index.htm>

Bulk transport

16. Special provisions under ADR allow for the carriage of Category B infectious waste in bulk in specially equipped vehicles and containers “in a manner which avoids risks to humans, animal and the environment, e.g., by loading the waste in bags or by airtight connections”.
17. If unavoidable circumstances require Category A infectious waste to be transported in bulk, then authorisation must be sought from the [Dangerous Goods Division at the Department for Transport](#) (**England, Wales and Scotland**) or from [HSENI](#) (**Northern Ireland**).
18. Waste bags must be UN approved, comply with BS EN ISO 7765:2004 and BS EN ISO 6383:2004, and be marked accordingly.
19. Prior to transport the detailed requirements of ADR and HTM 07-01 should be discussed with the waste contractor and then implemented in full and regularly monitored throughout the operation.

APPENDIX 12: AFTER DEATH CARE

Post-mortem examination

1. A post-mortem examination on a person known to have died of VHF exposes staff to unwarranted risk and **should not be performed**.
2. Where a patient suspected of having VHF dies prior to a definitive diagnosis, it may be necessary on public health grounds to undertake some diagnostic tests to either establish or eliminate the diagnosis of VHF or to provide an alternative diagnosis including e.g. malaria. Consultation with appropriate specialists may help to determine the extent of the limited amount of sampling that will suffice such an assessment.
3. Personnel undertaking diagnostic tests must wear appropriate PPE following the guidance for safe collection and transport of specimens. Where the deceased is in a Trexler isolator, the specimens should be taken before transferring the body to a leak-proof body bag. Where the results of such tests have found the deceased to be negative for VHF then a post mortem may be required.

Disposal of the deceased

4. Where a confirmed VHF case has died whilst being cared for in an isolator, the body should be removed into a sealable plastic body bag (specially designed for use with the isolator) fitted to the port of the bed isolator. The bag should be sealed, separated from the isolator, labelled as high-risk of infection and then placed in a robust coffin, which will need to have sealed joints. It should then be kept, by special prior arrangement with mortuary staff, in a separate and identified cold store unit to await prompt cremation or burial.

5. An infection control notification sheet should be completed in readiness for the funeral directors. Once sealed as above, the coffin and body bag should not be opened. Only in exceptional circumstances should the coffin or body bag be opened and only then by a designated person after consultation, and with the authority of, the Consultant in Communicable Disease Control (CCDC) (in **England, Wales and Northern Ireland**) or the NHS Board Consultant in Health Protection (in **Scotland**).

6. Where the body of a confirmed or suspected VHF patient is not in an isolator, staff wearing suitable PPE/RPE (see [Appendix 8](#)) should place the body in a double body bag. Absorbent material should be placed between each bag, and the bag sealed and disinfected with 1000 ppm available chlorine or other appropriate disinfectant. The bag should be labelled as high risk of infection and placed in the coffin as described above. An infection control notification sheet should be completed in readiness for the funeral directors.

Public health and controlling the risk of exposure

7. Under public health law, every person having the charge or control of premises in which is lying the body of a person who has died while suffering from a notifiable disease such as VHF must take such steps as may be reasonably practicable to prevent persons coming unnecessarily into contact with, or proximity to, the body.

8. In **England**, the Health Protection (Local Authority Powers) Regulations 2010, and in **Wales**, the Health Protection (Local Authority Powers, Wales) Regulations 2010, grant discretionary powers to local authorities to restrict contact with, and access to, an infected dead body where necessary. In **Scotland**, Part 6 (Protection of public from risks arising from bodies) of the Public Health etc. (Scotland) Act 2008 grants powers to health boards to restrict the release of infected bodies from hospitals. In **Northern Ireland** the Public Health Act (Northern Ireland) 1967 grant

powers to the Director of Public Health to prohibit persons coming into contact with a body of a person who has died while suffering from a notifiable disease.

Funeral directors and embalmers

9. Funeral directors will need to be consulted beforehand and provided with sufficient information of the infection risk normally provided by an infection control notification sheet.

10. It is recognised that in most other circumstances in this country, bodies often receive some form of hygienic preparation or are fully embalmed as a means of delaying putrefaction (e.g. when the funeral is delayed or for transportation over long distances within the UK or internationally). However in the case of confirmed VHF cases, embalming or hygienic preparation of bodies presents an unacceptably high risk and should not be undertaken.

Religious/ritual preparations, viewing of the deceased and funeral arrangements

11. Exceptions to the above include necessary preparation of bodies for other safety reasons. For example, it is a requirement to remove pacemakers and some other implants before cremation. In addition to the information provided on the infection control notification sheet, it is advised that the funeral director discusses appropriate infection control procedures, use of personal protective equipment and waste disposal arrangements with specialists (CCDC and HLIU consultants).

12. As far as is reasonably practicable the needs and wishes of the deceased's family should be respected. However, the serious nature of this infection and the associated occupational and public health risks necessarily impose significant limitations and constraints, which aim to limit contact with the body by the next of kin. Due to the unusual

circumstances, there will be a need to communicate sensitively that the following will need to be avoided: religious/ritual preparation of the body, washing, dressing and viewing, touching or kissing of the deceased.

Repatriation/expatriation of the deceased's remains

13. In general, the transportation of human remains to or from the UK is governed by a number of authorities:
 - The receiving country (normally regarded as being the body of law that controls how the remains should be handled as regards control of infection);
 - The country of origin; and
 - The carrier – whose requirements will be governed by the International Air Transport Association (IATA) Restricted Articles Regulations, under which human remains need to be accompanied by a notification of infection form or “free from infection” certificate.

14. VHF infected bodies should not be embalmed on grounds of risk (see above), and both for this reason and because of the consequent difficulty there would be in achieving full compliance with IATA requirements, the transportation of bodies out of the country is not recommended. However, following cremation, ashes may be safely transported.

15. In the unlikely event of a VHF infected body being embalmed abroad and transported back to the UK, it would need to be contained within a sealed zinc lined transport coffin in accordance with IATA requirements. Upon arrival in the UK a change of coffins is to be avoided and this may dictate the options for burial or cremation, which should be promptly arranged.

The return of the deceased's clothing and personal effects to relatives

16. The family of the deceased should be consulted and as far as is reasonably practicable their needs and wishes should be respected. In principle clothing, personal effects and valuables may be returned to relatives in accordance with normal health service procedure following decontamination.

17. However:
 - Items of clothing visibly contaminated should be safely disposed of, other items of clothing should be autoclaved prior to laundering;
 - Wedding rings, jewellery and other physical artefacts should either be autoclaved or decontaminated using a validated disinfectant.

18. With customary sensitivity and respect for the dignity of the bereaved, relatives should be alerted that some clothing fabrics and materials from which personal effects are made (e.g. plastics) may be adversely affected or even destroyed by autoclaving or disinfection (hypochlorite, the disinfectant of choice is a powerful bleach). In such cases, with the agreement of relatives, subsequent disposal may be the preferred option.

APPENDIX 13: RELEVANT HEALTH AND SAFETY LEGISLATION

The legislation framework in the UK

1. This Appendix is a summary of UK health and safety legislation and guidance relevant to working in healthcare with patients infected with VHF, or in laboratories with specimens potentially contaminated by haemorrhagic fever viruses.

| | | |
|---|---|---|
| Primary Legislation | Health and Safety at Work Act 1974 Health and Safety at Work (Northern Ireland) Order 1978 | |
| | | |
| General Health and Safety Regulations | Control of Substances Hazardous to Health Regulations 2002 Control of Substances Hazardous to Health Regulations (Northern Ireland) 2003 | Management of Health and Safety at Work Regulations 1999 Management of Health and Safety at Work Regulations (Northern Ireland) 2000 |
| | | |
| Specific Health and Safety Regulations | Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 Reporting of Injuries, | Carriage of Dangerous Goods and Use of Transportable Pressure Equipment |

| | | |
|------------------|---|--|
| | Diseases and Dangerous Occurrences Regulations (Northern Ireland) 1997 | Regulations 2009 |
| | | |
| Guidance | Healthcare | Laboratories |
| From ACDP | Infection at work: Controlling the risks, A guide for employers and the self employed on identifying, assessing and controlling the risks of infection in the workplace | |
| | Biological agents: Managing the risks in laboratories and healthcare premises | |
| From HSE | | The management, design and operation of microbiological containment laboratories |
| | | Safe working and the prevention of infection in clinical laboratories and similar facilities |
| | Bloodborne viruses in the workplace: Guidance for employers and employees | |

| | | |
|--------------------------------|--|--|
| | <u>Controlling the risks of infection at work from human remains</u> | |
| | <u>Safe working and the prevention of infection in the mortuary and post-mortem room</u> | |
| From DH | <u>Safe management of healthcare waste</u> | |
| Other relevant guidance | | |

2. **The Health and Safety at Work etc. Act (HSWA) 1974** is the primary piece of legislation covering occupational health and safety in the UK. Under HSWA, employers have a duty to provide a safe place of work and protect the health and safety of their employees and others that may be affected by their work activities. It also places duties on employees to cooperate with their employer, so far as is necessary, to enable their employer to comply with their health and safety duties as set down under HSWA and under relevant legislation.

3. **The Control of Substances Hazardous to Health Regulations (COSHH)** provide a framework of actions designed to control the risk from a range of hazardous substances including biological agents. In particular, Schedule 9 specifically refers to biological agents which include the VHF viruses.

4. Under the **Management of Health and Safety at Work Regulations** and COSHH, once a risk assessment has been completed methods must be chosen to adequately control the identified risks following a hierarchical approach of:
 - Eliminating risk;
 - Controlling risk at source or by safer design;
 - Using physical engineering controls and safeguards; Supported by:
 - Safe systems of work;
 - The use of personal protective equipment.

5. These Regulations require employers to assess the risk of infection for both their employees and others who may be affected by the work, for example, waste disposal workers, service engineers and members of the public. When a risk has been identified, there is a duty to select and properly apply appropriate prevention or control measures. Engineering controls used, such as microbiological safety cabinets, must be kept in efficient working order and good repair and regularly maintained. Personal protective equipment must be properly stored, cleaned, maintained and, if found to be defective, repaired or replaced.

6. COSHH requires that employers take all reasonable steps to ensure that the control measures they provide are used, which includes provision of information and training, as well as appropriate supervision of employees. Risk assessments must be reviewed regularly and revised when conditions change, an incident occurs, a deficiency is noted or if for any other reason it is suspected that the assessment is no longer valid. In addition, employees must receive suitable and sufficient information, instruction and training about the risks they may encounter at work. Subject to assessment, there may also be the need to provide health surveillance for employees and offer them vaccines.

7. Other health and safety regulations may apply, for example equipment provided must meet the requirements of the **Provision and Use of Work Equipment Regulations (PUWER)**, i.e. suitable and safe for use, and safely maintained. In this context, equipment also includes needles. Laboratory equipment such as autoclaves must comply with the **Pressure Equipment Regulations 1999** and the **Pressure Systems Safety Regulations 2000**.

8. Under the **Reporting of Incidents, Diseases and Dangerous Occurrences Regulations (RIDDOR)** there is a requirement for employers to report 'acute illness which requires medical treatment where there is reason to believe that this resulted from an exposure to a biological agent or its toxins'. They must also report 'any infection reliably attributable to the performance of particular work, specified as being work with micro-organisms; work with live or dead human beings in the course of providing any treatment or service or in conducting any investigation involving exposure to blood or body fluids; work with animals or any potentially infected material derived from any of the above'. There is also a duty to report any 'accident or incident, which resulted or could have resulted in the release or escape of a biological agent likely to cause severe human infection or illness' and 'any viral haemorrhagic fever on offshore workplaces'.

9. The **Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009** stipulate requirements for secure packaging and clear hazard labelling that are applicable to the safe transfer of specimens potentially contaminated by haemorrhagic fever viruses.

Summary of responsibilities for health and safety

10. The employer will need to:

- Ensure the organisation has the necessary management framework to protect the health and safety of staff and to provide a safe working environment;
- Have access to competent help in applying the provision of health and safety law;
- Consult with employees' safety representatives on health and safety matters;
- Establish procedures to be followed by any worker if situations presenting serious and imminent danger were to arise;
- Co-operate and co-ordinate where two or more employers or self-employed persons share a workplace;
- Make health and safety policy and local codes of practice freely accessible either by putting them on display or by individual issue, and ensure all staff, including all newcomers and temporary workers are aware of them;
- Manage and follow-up recognised dangerous occurrences, accidents or incidents at work which could result in the release of a biological agent likely to cause severe human illness or infection, e.g., sharps injuries during surgical and needle-related procedures, including reporting under RIDDOR;
- Keep health records in relation to work involving risk of exposure to VHF;
- Provide proactive health surveillance for occupations where contact with known or suspected VHF infected patients, or with VHF contaminated materials, is likely.

11. Specifically for VHF this should include information on:

- Whether employees could be exposed to VHF and how;
- The risks posed by this exposure;
- The main findings of any risk assessment;

- The precautions employees should take to protect themselves and other employees, contract staff or visitors;
- How they should use and dispose of any PPE that is provided; and
- What procedures they should follow in the event of an emergency.

12. The employee will need to:

- a. Comply with agreed risk assessments following the COSHH hierarchy;
- b. Adhere to agreed safe systems of work, e.g., laboratory rules, sharps and waste disposal policies, decontamination and disinfection procedures;
- c. Properly use the control measures provided by their employers, including personal protective equipment (PPE), and report any problems with them;
- d. Bring to the attention of their employers any instances of dangerous occurrences, accidents or incidents arising out of their work which could result in the release of a biological agent likely to cause severe human illness or infection, or a sharps injury involving a known VHF infected source so that necessary remedial or preventative actions can be taken, including reporting under RIDDOR.

APPENDIX 14: GLOSSARY

Active monitoring: Clinical decision that the patient will remain under the care of a consultant or NHS Allied Health Professional Service, possibly whilst the patient receives symptomatic support, but without any specific or significant clinical intervention at this stage.

Aerosol: Suspension of small or liquid particles in air which are so small and light that they take very long time to settle out.

Aerosol-generating procedure: A procedure that stimulates coughing and promotes the generation of aerosols.

Aerosolized or nebulised medication administration: The administration of medication via air particles or aerosols, delivered by an appropriate device, which is inhaled and absorbed into the patient's body via the lungs.

Aerosol/ Airborne transmission: A transmission mechanism in which the infectious agent is spread as an aerosol that usually enters a person through the respiratory tract.

Ambulance Category 4 infectious disease: Diseases that require a special (category 4) infection control measure for ambulance transfer. Currently, these diseases include rabies, plague, Lassa fever, Marburg, Ebola and Crimean/Congo haemorrhagic fever.

Assigned protection factor: The level of respiratory protection that can realistically be expected to be achieved in the workplace by 95% of adequately trained and supervised wearers using a properly functioning and correctly fitted respiratory protective device.

Autoclave: A strong, pressurised, steam-heated vessel for sterilisation.

Available chlorine: The measurement of the oxidising capacity of a hypochlorite solution.

Category 1 contact: A contact that is not at risk of becoming infected i.e. has not had direct contact with contaminated body fluids or other potentially infectious material.

Category 2 contact: A contact that is at a low risk of becoming infected i.e. has had direct contact with contaminated body fluids or other potentially infectious material whilst wearing appropriate PPE.

Category 3 contact: A contact that is at high risk of becoming infected i.e. has had unprotected exposure of skin or mucus membrane to potentially infectious body fluids or other potentially infectious material.

Category A infectious waste: Waste that is known or suspected to be contaminated with pathogens presenting the most severe risk. A list of such pathogens can be found in Health Technical Memorandum HTM 07-01 Safe Management of Healthcare Waste https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/167976/HTM_07-01_Final.pdf.

Category B infectious waste: Waste that is known or suspected to be contaminated with pathogens not listed for inclusion into category A waste (Health Technical Memorandum HTM 07-01 Safe Management of Healthcare Waste https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/167976/HTM_07-01_Final.pdf).

Centrifugation: Piece of equipment used to separate contained materials of different specific gravities, or to separate colloidal particles suspended in a liquid.

Closed system autoanalyser: An automated analysis machine, where specimens are uploaded and remain within the system during analysis, therefore greatly reducing or preventing the risk of infection to laboratory staff via contact with the specimen.

Containment level 2 laboratory: Laboratory generally used for working with Hazard Group 2 biological agents.

Containment level 3 laboratory: Laboratory generally used for working with Hazard Group 3 biological agents.

Containment level 4 laboratory: Laboratory generally used for working with Hazard Group 4 biological agents.

Droplets: A small indefinite quantity (usually of liquid). Droplets are larger than aerosols, although the cut-off size between droplets and aerosols are often debated between 5 and 10µm.

Dual infection: Patient infected with more than one infectious agent e.g. *Plasmodium falciparum* and Ebola virus.

Endemic: Occurring in a particular region or population.

Epidemiology/epidemiological: The study of the occurrence and cause of disease in populations.

Face fit testing: A method for testing that a tight fitting facepiece (i.e. full face mask, half mask, or filtering facepiece – commonly known as a disposable mask/respirator) correctly fits the wearer i.e. ensuring that the facepiece matches the wearer's facial features and seals adequately to the wearer's face so as to ensure that when donned accurately will confer the required protection to the wearer. Note that fit testing is not required for surgical masks as these are not respiratory protective devices.

Filtering facepiece: A particulate respirator (mask) with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering material.

Half-mask: A respirator that covers the user's nose and mouth and is fitted with either cartridges or canisters to filter particulates or vapours.

Hazard: The intrinsic danger associated with the nature of an object or a substance, an activity or, in the context of this guidance, an infectious agent.

Hazard Group (for biological agents): The classification of a biological agent based on its ability to cause disease by infection based on whether the agent is pathogenic for humans, whether the agent is a hazard to employees, whether the agent is transmissible to the community, and whether there is effective treatment or prophylaxis available.

Hazard Group 4 pathogen: A biological agent that causes severe human disease and is a serious hazard to employees. It is likely to spread to the community and there is usually no effective prophylaxis or treatment available.

Healthcare worker: Clinical and other staff, including those in primary care, who have regular, clinical contact with patients; Laboratory and other staff e.g. mortuary staff, who have direct contact with potentially infectious specimens; Non-clinical ancillary staff who may have social contact with patients, but not usually of prolonged or close nature.

Host: An organism that is infected with or is fed upon by a parasitic or pathogenic organism e.g. a virus. The host does not benefit and is often harmed by the association.

Howie laboratory coat: A style of lab coat that provides extra protection to the wearer. It has elasticated cuffs, mandarin collar and buttons usually on the left flank so as to overlap the material across the centre of the torso to offer extra protection against splash.

Negative pressure differential: The difference in pressure between one room (e.g. isolation suite) and another (e.g. ante room), which is negative to the standard room pressure (e.g. ward).

Negative pressure isolator (Trexler): A sealed envelope of transparent flexible polyvinylchloride (PVC) film in the shape of a truncated tent inside which a negative pressure is maintained.

Powered hood: A hood that completely covers at least the face (eyes, nose, mouth and chin) head and neck and may also cover portions of the shoulders and torso of the wearer. a power operated fan and one or more filters, which should provide a flow of filtered ambient air to the wearer in excess of the wearer's demand, with the exhaled air being discharged outside the respirator by exhalation valves or other outlets. There are different classifications of powered hoods, which confer different levels of protection to the wearer.

Proper officer: In relation to a purpose and to an authority, an officer appointed for that purpose by that authority.

Respirator: A protective mask with a filter that protects the face and lungs against harmful aerosols.

Respiratory protective equipment: Personal protective equipment designed to protect the respiratory tract of the wearer.

Risk: The probability that under certain circumstances, the hazard will be expressed, in the context of this guidance, the likelihood that infection and disease will occur.

Risk assessment: Describing and quantifying the risk associated with a hazard.

Standard precautions: A set of precautions used in order to minimise the risk of infection from a patient.

Terminal clean: A procedure required to ensure that an area has been cleaned/decontaminated following discharge of a patient with an infection in order to ensure a safe environment for the next patient.

Vector: Any agent (living or inanimate) that acts as an intermediate carrier or alternative host for a pathogenic organism and transmits it to a susceptible host.

VHF test: Testing of a patient's sample for the presence or absence of VHF genetic material via PCR analysis.

Zoonosis: An infectious disease in animals that can be transmitted to people, however, the natural reservoir for the infectious agent is an animal.

APPENDIX 15: ABBREVIATIONS

| | |
|---------|---|
| ACDP | Advisory Committee on Dangerous Pathogens |
| ADR | The European Agreement concerning the International Carriage of Dangerous Goods by Road |
| APF | Assigned Protection Factor |
| APTT | Activated partial thromboplastin time |
| AST | Aspartate transaminase |
| BS | British Standard |
| CCDC | Consultant in Communicable Disease Control |
| CE | Conformité Européenne (European Conformity) |
| CK | Creatine kinase |
| CoSHH | Control of Substances Hazardous to Health |
| CRP | C-Reactive Protein |
| CXR | Chest X-ray |
| ECDC | European Centre for Disease Prevention and Control |
| EDTA | Ethylenediaminetetraacetic acid |
| EN | European PPE and RPE standards |
| EWRS | Early warning and response system |
| FBC | Full blood count |
| FFP3 | Filtering facepiece type 3 (filtering efficiency of 99%) |
| HEPA | High efficiency particulate air |
| PHE | Public Health England |
| HSE | Health and Safety Executive |
| HSENI | Health and Safety Executive, Northern Ireland |
| HLIU | High Level Isolation Unit |
| HSWA | The Health and Safety at Work etc. Act |
| HTM | Health technical memorandum |
| IATA | International Air Transport Association |
| ICT | Incident control team |
| IDU | Infectious disease unit |
| IHCD | Institute of Healthcare Development |
| IHR | International Health Regulations |
| ISO | International Organisation for Standardization |
| LDH | Lactate dehydrogenase |
| LFTs | Liver function tests |
| MSC | Microbiological safety cabinet |
| NaDCC | Sodium dichloroisocyanurate |
| NaOCL | Sodium hypochlorite |
| NaTHNaC | National Travel Health Network and Centre |
| NHS | National Health Service |

| | |
|----------------|---|
| NI | Northern Ireland |
| N.O.S | Not Otherwise Specified |
| O ₂ | Oxygen |
| P3 | Particle filter (filtering efficiency of at least 99.95%) |
| Pa | Pascals |
| PCR | Polymerase Chain Reaction |
| ppm | parts per million |
| PT | Prothrombin time |
| PPE | Personal protective equipment |
| PUWER | Provision and Use of Work Equipment Regulations |
| RAF | Royal Air Force |
| RIDDOR | Reporting of Injuries, Diseases and Dangerous Occurrences Regulations |
| RMP | Registered medical practitioner |
| RPE | Respiratory protective equipment |
| TH2 | Turbo Hood type 2 (equivalent to the protection afforded by an FFP3 respirator) |
| U&E | Urea and electrolytes |
| UK | United Kingdom |
| UN | United Nations |
| WEL | Workplace Exposure Limit |
| WHO | World Health Organisation |
| VHF | Viral haemorrhagic fever |

APPENDIX 16: ACKNOWLEDGEMENTS

| | |
|--------------------------|--|
| Dr Michael Jacobs | Royal Free London NHS Foundation Trust |
| Dr Anne Tunbridge | Sheffield Teaching Hospitals NHS Foundation Trust |
| Dr Emma Aarons | Rare and Imported Pathogens Lab, PHE |
| Dr Rob Shorten | Central Manchester University NHS Foundation Trust |
| Professor Peter Chiodini | Hospital for Tropical Diseases, UCL Hospitals NHS Foundation Trust |
| Stephen Groves | NHS |
| Dr Tim Brooks | Public Health England |
| Dr Ian Cropley | Royal Free Hospital |
| Group Captain Andy Green | Ministry of Defence |
| Professor George Griffin | Advisory Committee on Dangerous Pathogens |
| Dr Susan Hopkins | Royal Free Hospital |
| Mr Trevor Hubbard | London Ambulance Service |
| Dr Dilys Morgan | Public Health England |
| Dr Ed Ong | Newcastle General Hospital |
| Dr Michael Kidd | University College London |

Secretariat

| | |
|----------------------------|------------------------------|
| Dr Brian Crook | Health and Safety Laboratory |
| Dr Catherine Makison Booth | Health and Safety Laboratory |
| Mr John Newbold | Health and Safety Executive |
| Mr Lee Wilson | Health and Safety Executive |
| Dr Ginny Belson | Public Health England |
| Dr Mariam Orme | Public Health England |

