Advisory Committee on Dangerous Pathogens

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

APPENDICES

SECTION 1: INTRODUCTION

Overview

1. This document replaces the previous Advisory Committee on Dangerous Pathogens' publication 'Management and Control of Viral Haemorrhagic Fevers', published in 1996 and provides guidance on the risk assessment and management of patients in whom infection with a viral haemorrhagic fever (VHF) is suspected or confirmed. The guidance aims to eliminate or minimise the risk of transmission to health care workers and others coming into contact with a suspected or confirmed case.

2. The guidance is also applicable 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.

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 a VHF in the UK to date (May 2011).

4. VHFs are of particular public health importance because of their proven ability to spread within a hospital setting, the often high case-fatality rate, and difficulties in their rapid recognition and lack of effective treatment.

5. The majority of viruses that cause VHFs are classified as ACDP Hazard Group 4 viruses. Further information about the range of ACDP Hazard Group 4 viruses that cause viral haemorrhagic fever is included in Appendix 1.

The viral haemorrhagic fevers viruses

ARENAVIRIDAE

Old World arenaviruses

Lassa

Lujo

New World arenaviruses

Chapare

Guanarito

Junín

Machupo

Sabiá

BUNYAVIRIDAE

Hantaviruses

Dobrava

Hantaan

Puumala

Saaremaa

Seoul

Nairoviruses

Crimean Congo haemorrhagic fever

FILOVIRIDAE

Ebola

Marburg

FLAVIVIRIDAE

Kyasanur forest disease

Alkhurma haemorrhagic fever

Omsk haemorrhagic fever

Who is the guidance for?

6. This guidance is for:

- **healthcare staff** in emergency departments, infectious disease departments, infection control, microbiology, acute medical units;
- **ambulance staff**, who may be required to transport a suspected or confirmed VHF patient;
- **those working in laboratories** dealing with specimends from patients suspected or confirmed to be infected with a VHF virus or similar infectious agent;

- **public health professionals** and those in Port Health Authorities, who may be required to carry out public health actions associated with a VHF case.

7. Parts of the guidance will also be relevant to those not covered by the above, such as mortuary staff 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 patient risk assessment algorithm on page 7 to determine whether a febrile patient with a travel or exposure history may have a VHF infection;
- The patient's risk category determines the level of staff protection and the management of the patient;
- The risk may change over time, depending on the patient's symptoms, the results of diagnostic tests and/or information from other sources.

Why is a risk assessment necessary?

1. The Control of Substances Hazardous to Health (CoSHH) Regulations require 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 is to enable decisions to be made about the actions needed to control the risk. These include the development and implementation of practical control measures, but also include 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; (ii) had contact with a patient or animal infected with VHF (including their blood or body fluids); 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.

4. Standard precautions and good infection control are paramount to ensure staff are not put at risk whilst the initial risk assessment is carried out.

5. For any patient who has had a fever [> 38°C] or history of fever in the previous 24 hours and a travel history or epidemiological exposure, follow the major steps in the pathway from identification to diagnosis in the patient risk assessment algorithm (page 7). This will establish the patient's 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.

6. Initiating the patient risk assessment algorithm should become normal practice in emergency departments or Acute Medical Units for any patient who has had a fever [> 38°C] or history of fever in the previous 24 hours and a travel history or epidemiological exposure

7. The second stage of the algorithm deals with the management of the patient, the diagnostic tests required and the level of staff protection, dependent on the likelihood of VHF infection and the patient's symptoms.

8. The patient's 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 risk category

9. The clinical and epidemiological questions in the algorithm are designed to thoroughly assess the risk of VHF infection. Following the clinical and epidemiological questions, the patient will be categorised as one of the following:
   - Possibility of VHF (see section 3)
   - High possibility of VHF (see section 4)

10. Basic information on endemic areas for VHFs (algorithm question 3) is available in Appendix 1, and detailed information is provided in the VHF risk maps on the HPA website. Information on recent VHF outbreaks can also be accessed on the HPA website and via daily global disease updates on ProMed.

Patient risk assessment algorithm to be inserted here

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

NOTE: It is recommended that, if a patient is bruised or bleeding or has uncontrolled diarrhoea or uncontrolled vomiting or a cough, the lead clinician should have an urgent discussion with the nearest High Security Infectious Disease Unit (HSIDU) concerning further management. See Appendix 2 for contact details.

Patient categorised as '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 must be placed in a single side room immediately;
- Infection control measures appropriate to the patient's risk category and clinical care procedures must be put in place;
- Continue with urgent local diagnostic investigations, including those for malaria
- If the patient is malaria negative, continue diagnostic investigations, re-assess at least daily;
- If an inpatient for longer than 72 hours with continuing fever and travel history, without diagnosis, initiate a VHF screen.

Infection control measures

1. A patient categorised as 'possibility of VHF' must be placed 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 level of staff protection required is dependent on the patient's symptoms as follows:

Infection control measures for 'possibility of VHF'	
Patient's symptoms	**Staff protection**
Bruised OR bleeding OR uncontrolled diarrhoea OR uncontrolled vomiting OR cough	Standard plus droplet precautions required: o hand hygiene o gloves o plastic apron o fluid repellent surgical facemask o disposable visor **In addition, for potential aerosol-or splash-inducing procedures:** o FFP3 respirator or equivalent
None of the above	Standard Precautions: o hand hygiene o gloves o plastic apron

3. Potential aerosol-or splash-inducing procedures include:
   - Endotrachael intubation;
   - Bronchoscopy;
   - Airway suctioning;
   - Positive pressure ventilation via face mask;
   - High frequency oscillatory ventilation;
   - Central line insertion;
   - Aerosolised or nebulized medication administration;
   - Diagnostic sputum induction.

4. Appendix 7 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 needlestick injuries should also be considered.

6. Guidance on waste, laundry and decontamination is provided in Appendices 9 and 10.

7. 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;
        - on contaminated instruments, tools and equipment;
        - in waste;
        - on contaminated clothing;
    - That exposure to virus may occur through:
        - direct personal exposure to blood during invasive, aerosolising or splash procedures;
        - dealing with unplanned procedures;
        - handling contaminated items during cleaning or disposal.

Diagnostic investigations

8. Liaison with the local microbiologist/virologist is essential. Investigations required may include:
    - URGENT Malaria investigations;
    - Full blood count (FBC);
    - Urea and electrolytes (U&E);
    - Liver function tests (LFTs);
    - Prothrombin Time (PT);
    - Activated Partial Thromboplastin Time (APTT);
    - Blood glucose;
    - Blood cultures;
    - Chest X-Ray (CXR)

9. Appendix 5 provides guidance on collecting specimens and Appendix 6 on the appropriate laboratory procedures for the processing of specimens from a patient categorised as 'possibility of VHF'. Testing of specimens taken for patient management may be conducted locally, subject to a suitable risk assessment.

Diagnostic test results and subsequent patient management

Malaria investigation results

10. If the malaria result is positive, treatment for malaria can begin immediately. Up-to-date treatment guidelines are available on the HPA website. The patient may be re-categorised as 'VHF highly unlikely' but should be continually assessed due to the possibility of dual infection with a VHF. See Section 5 for information on the management of these patients.

11. If the malaria result is **negative** and the patient has been an inpatient for **less than 72 hours**, diagnostic investigations should continue and the patient should be re-assessed at least daily.

12. If the malaria result is **negative** and the patient has been an inpatient for **longer than 72 hours**, remains pyrexial (>38^{o}C) and no diagnosis has been made, request an urgent VHF screen (EDTA and serology) through your local microbiology laboratory, who will contact the HPA reference laboratory. The reference laboratory will require the patient's travel and occupational history, collected during the patient risk assessment. Results are usually available within 6 hours following receipt of the specimen. See Appendix 2 for details of reference laboratory locations and contact numbers.

VHF screen results

13. **If the VHF screen is negative**, the possibility of the patient having a VHF infection should be maintained until an alternative diagnosis is confirmed. The patient should therefore remain in a single side room, and the infection control measures, including staff protection, as outlined in this Section should be maintained until an alternative diagnosis is confirmed.

14. **If the VHF screen is positive,** a number of urgent actions are required – see Section 6 for details.

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 must be placed in a single side room immediately;
- Infection control measures appropriate to the patient's risk category and clinical care procedures must be put in place;
- An urgent VHF screen must be carried out, as well as local diagnostic investigations, including malaria investigations;
- If the patient's VHF screen is positive, urgent transfer to the local HSIDU must be arranged, and full public health actions launched.

Infection control measures

1. The patient must be placed in a single side room immediately to limit contact. The side room must have dedicated en-suite facilities or at least a dedicated commode.

2. 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'	
Patient's symptoms	**Staff protection**
Bruised OR bleeding OR uncontrolled diarrhoea OR uncontrolled vomiting OR cough	Enhanced precautions required (standard plus droplet plus respiratory protection): ○ hand hygiene; ○ double gloves; ○ fluid repellent disposable gown – an all-in-one disposable should be considered as an alternative; ○ disposable visor; ○ FFP3 respirator or equivalent.
None of the above	Droplet precautions (standard plus droplet) required: ○ hand hygiene; ○ gloves; ○ plastic apron; ○ fluid repellent surgical facemask; ○ disposable visor. **In addition, for potential aerosolisation or splash inducing procedures:** ○ FFP3 respirator or equivalent.

3. Appendix 7 gives further information on personal protective equipment including respiratory protection.

4. It is recommended that, if a patient is bruised or bleeding or has uncontrolled diarrhoea or uncontrolled vomiting or a cough, the lead clinician should have an urgent discussion with the nearest HSIDU concerning patient management and to consider early transfer to the HSIDU. See Appendix 2 for contact details and Appendix 4 for transport information.

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

6. Guidance on waste, laundry, decontamination and disinfection is provided in Appendices 9 and 10.

7. Communication with staff about the potential risks and infection control measures is paramount. The important risks to make staff aware of are listed in Section 3.

Diagnostic investigations

8. An urgent VHF screen (EDTA and serology as described in Section 4) should be requested through the local microbiology laboratory. Discussions should take place directly with the local microbiologist/virologist, who will contact the HPA reference laboratory regarding patient specimens. The reference laboratory will require the patient's travel and occupational history as collected during the patient risk assessment. Laboratory results should be available within 6 hours following receipt of the specimen. See Appendix 2 for details of reference laboratory locations and contact numbers.

9. Other investigations may include:
    - URGENT Malaria investigations;
    - Full blood count (FBC);
    - Urea and electrolytes (U&E);
    - Liver function tests (LFTs);
    - Prothrombin Time (PT);
    - Activated Partial Thromboplastin Time (APTT);
    - Blood glucose;
    - Blood cultures;
    - Chest X-Ray (CXR)

10. Appendix 6 provides guidance on obtaining specimens and Appendix 7 on the appropriate laboratory procedures for the processing of specimens from a patient categorised as 'high possibility of VHF' infection.

VHF screen results and subsequent patient management

11. **If the VHF screen is negative**, the possibility of the patient having a VHF infection should be maintained until an alternative diagnosis is confirmed. The patient should therefore remain in a single side room, and the infection control measures, including staff protection, as outlined in Section 3 for a patient categorised as 'possibility of VHF' should be maintained until an alternative diagnosis is confirmed.

12. **If the VHF screen is positive**, a number of urgent actions are required – see Section 6 for details.

SECTION 5: MANAGEMENT OF A PATIENT WHO IS HIGHLY UNLIKELY TO HAVE A VHF INFECTION

Patient who is highly unlikely to have a VHF infection

- 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 managed using standard precautions – hand hygiene, gloves, plastic apron;
- The patient should ideally be managed on an infectious diseases ward;
- Liaise with the local microbiologist/virologist;
- Reassess if failure to improve or patient develops certain symptoms;
- Consider dual infection if the patient deteriorates significantly despite antimalarial treatment.

Infection control measures

1. The patient should be managed on an infectious diseases ward, if possible, until the possibility of VHF is completely ruled out.

2. The patient should be handled using standard precautions – gloves, a plastic apron, hand hygiene.

3. Single use disposable equipment and supplies should be used where possible.

4. Guidance on waste, laundry, decontamination and disinfection is provided in Appendices 9 and 10.

Investigations and management

5. Consult with the local microbiologist/virologist to determine appropriate additional tests to be performed.

6. Reassess risk of VHF if the patient fails to improve or develops one of the following:
    - Nosebleed;
    - Bloody diarrhoea;
    - Sudden rise in AST;
    - Sudden fall in platelets;
    - Clinical shock;

- Rapidly increasing O_2 requirements in the absence of other diagnosis.

7. If the patient deteriorates significantly despite appropriate treatment, **consider dual infection with a VHF**. Multiple infections are not uncommon.

SECTION 6: MANAGEMENT OF A PATIENT WITH A POSITIVE VHF SCREEN

Patient with a positive VHF screen

- A patient who has had a positive VHF screen result should be managed in an HSIDU, unless exceptional circumstances prevent transfer of the patient;
- Clinical management of a patient with a positive VHF screen is conducted on a case-by-case basis by the clinicians at the HSIDU;
- Once the patient has been transferred, testing of specimens should be carried out in the dedicated laboratory at the HSIDU;
- Full public health actions should be launched.

1. If a patient has a positive VHF screen result, the following urgent actions are required:
    - Restrict the number of staff in contact with the patient;
    - Inform those in contact with the patient of the positive test, and emphasise infection control procedures to minimise risk of infection;
    - Ensure that staff protection for those in contact with the patient is at enhanced levels of personal protection:
        - Hand hygiene;
        - Double gloves;
        - Fluid repellent disposable gown – an all-in-one disposable should be considered as an alternative;
        - Disposable visor;
        - FFP3 respirator or equivalent.
    - Lead clinician should have an urgent discussion with the nearest HSIDU to arrange for the immediate transfer of the patient to the HSIDU (see Appendix 2 for contact details, Appendix 4 for transfer information).
    - Notify the infection control team of the positive VHF screen result;
    - Launch full public health actions (see Section 7), including formation of an Incident Control Team;

2. Where the condition of the patient is so serious that transfer to the HSIDU is not practical, an immediate discussion with the Lead for Infection Control must take

place regarding enhanced risk assessment and control measures. Discussions with the Health and Safety Executive and experts at the nearest HSIDU are also necessary.

3. The principles for the isolation of patients with a positive VHF screen are discussed in Appendix 3;

4. Once the patient is transferred, testing of specimens should be carried out in the dedicated laboratory at the HSIDU.

SECTION 7: PUBLIC HEALTH ACTIONS

When to launch public health actions

When to launch public health actions

Early public health actions must be launched if a patient has been categorised as 'high possibility of VHF'. Early actions are:

- Notification of the suspected case to the Proper Officer;
- Forward notification of the suspected case by the Proper Officer; and
- Identification of contacts.

Full public health actions must be launched if the VHF screen result is positive. In addition to the above actions:

- Formation of an Incident Control Team;
- Notification of the case by the laboratory to HPA;
- Notification of the case to the European Centre for Disease Control (ECDC) and the World Health Organisation (WHO);
- Categorisation and management of contacts; and
- Determine media handling strategy

Early public health actions

Notification of the suspected case to the proper officer

1. A patient categorised as 'high possibility of VHF' must be considered as a suspected case of VHF. In **England**, VHF is a notifiable disease under Schedule 1 of the Health Protection (Notifications) Regulations 2010, and notification of VHFs is classified as urgent. The registered medical practitioner (RMP) attending the patient must therefore notify the suspected 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**, the RMP must notify the suspected 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. In **Scotland**, the RMP must notify the

suspected case to the local NHS Board Health Protection Team (preferably via the Scottish Care Information Gateway, if available).

Northern Ireland to provide details of the notification procedure

3. 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 by the proper officer

4. The proper officer must disclose the content of notification received from the RMP to the following, by telephone, within 24 hours:
    - the HPA – however, if the proper officer of the local authority is an HPA employee, then notification by the proper officer to the HPA 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 and, if appropriate, the health department of the relevant devolved administration (Welsh Assembly Government, Scottish Government, Northern Ireland Assembly).

Devolved administrations to confirm whether these forward notifications are relevant to their notification procedures

5. Advice should be sought from the HPA if necessary.

Identification of contacts

6. When a patient has been categorised as 'high possibility of VHF', all those who have had contact with the patient should be identified as far as possible. This helps to be prepared for the possibility of a positive test, and the subsequent urgent need to monitor all those who have been exposed to the patient.

7. A contact is defined as a person who has been exposed to an infected person or their secretions, excretions or tissues following the onset of their illness. This may include contacts who are not in the UK.

Full public health actions

Formation and role of an Incident Control Team

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

9. The ICT will need to:
   - inform those listed in paragraph 4 above that the VHF screen 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 to the HPA

10. Diagnostic laboratories have a duty to notify the HPA urgently when they identify evidence of VHF infection, even if the case has already been notified by an RMP to the proper officer.

Notification of the case to ECDC and WHO

11. The Department of Health, working with the HPA, will notify ECDC (via EWRS) and WHO (under the International Health Regulations) of the case, on receipt of confirmation that the VHF screen result was positive.

Assessment, categorisation and management of contacts

12. The ICT will determine who is/are responsible for the assessment, categorisation and management of contacts, including the individual who will monitor the higher risk contacts (the Monitoring Officer) and the follow up actions to be taken.

13. Each potential contact should be individually assessed for risk of exposure and categorised according to categories listed in the table below:

Categorisation of contacts	
Risk category	**Description**
Unclear	Not sure of contact.
No risk (Category 1)	No contact with the patient or body fluids. Casual contact, e.g. sharing a room with the patient, without direct contact with body fluids or other potentially infectious material.
Low risk (Category 2)	Direct contact with the patient, e.g. routine medical/nursing care, handling of clinical/laboratory specimens, but did not handle body fluids, and wore personal protective equipment appropriately.
High risk (Category 3)	Unprotected exposure of skin or mucous membranes to potentially infectious blood or body fluids, including on clothing and bedding. This includes: • unprotected handling of clinical/laboratory specimens; • mucosal exposure to splashes; • needlestick injury; • kissing and/or sexual contact.

14. Contacts should be managed as outlined in the table below. Sample information sheets (general, category 1, category 2 and category 3) are available on the HPA website, and include contact details for the Monitoring Officer.

15. There need not be any should be no restrictions on work or movement for <u>any</u> contacts, unless disease compatible symptoms develop.

Management of contacts	
Risk category	**Action and Advice**
Unclear	Reassure about absence of risk Advise to contact the Monitoring Officer should they recall any contact. Provide general factsheet.
No risk (Category 1)	Reassure about likely absence of risk. Provide category 1 factsheet.
Low risk (Category 2)	Reassure about low risk <u>Passive monitoring</u> Self-monitor for fever and other disease compatible symptoms for 21 days from last possible exposure. Report to the Monitoring Officer if temperature ≥38.0ºC, with further evaluation as necessary. Provide category 2 factsheet.
High risk (Category 3)	Inform about risks. <u>Active monitoring</u> 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. Provide category 3 factsheet.

16. **Antivirals are not recommended for contacts** due to the absence of evidence of their proven effectiveness for prophylaxis. Antivirals, specifically ribavirin, have been shown to be effective in <u>treatment</u> of early-stage arenavirus infections, particularly Lassa fever. Antivirals may be considered for those direct contacts at highest risk, subject to individual risk assessment.

<u>Media handling</u>

17. 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.

18. There should be no release of information to, or discussions with, the media without the agreement of all parties. All media statements and messages must be agreed by all parties.

19. Media statements and messages should be shared with DH.

APPENDICES

APPENDIX 1: OVERVIEW OF VIRAL HAEMORRHAGIC FEVERS (VHFS)

1. Viral haemorrhagic fever (VHF) 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 be capable of causing haemorrhagic fevers. The survival of these viruses is dependent on an animal or insect host, so 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 splash of infected body fluids and their contact with mucous membranes.

4. This guidance covers those VHFs that are caused by Hazard Group 4 pathogens. Other diseases with haemorrhagic manifestations such as dengue, yellow fever, chikungunya and Rift Valley fever are not covered by this guidance.

5. Lassa fever is the only infection that has been imported into the UK over the last 30 years.

6. The following table summarises haemorrhagic fever viruses, their diseases, geographies and transmission routes.

Virus	Disease	Geographical distribution	Transmission routes/vectors	Further information
ARENAVIRIDAE				
Old World arenaviruses				
Lassa	Lassa fever	**West and Central Africa** In particular: **Guinea, Liberia, Sierra Leone, Nigeria** Also consider: Central African Republic, Mali, Senegal, Burkina Faso, Cote D'Ivoire, Ghana, Gabon, Uganda	Contact with **excreta**, or materials contaminated with excreta, of infected multimammate **rat** (*Mastomys* spp). Inhalation of **aerosols of excreta** of multimammate rat. Contact with **blood** or **body fluids** from infected patients, or **sexual contact**.	http://www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/LassaFever/
Lujo	Unnamed	**Southern Africa** One outbreak to date (5 cases) in South Africa, ex-Zambia	Transmission to the index case unknown. Direct contact with **infected patient**, **blood** or **body fluids**.	First identified in October 2008 following a nosocomial outbreak in South Africa involving five people, four of whom died. Details of the outbreak and the virus are available here and here.

Virus	Disease	Geographical distribution	Transmission routes/vectors	Further information
New World arenaviruses (Tacaribe complex)				
Chapare	Unnamed	**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. Contact with **materials** (e.g. **food**) **contaminated with excreta** from infected rat or mouse. Inhalation of **aerosols of excreta** (often in dust) of rat or mouse. Machupo and Guanarito only: Contact with **blood** or **body fluids** from infected patients.	Details of the outbreak and genetic analysis are available here.
Guanarito	Venezuelan haemorrhagic fever	**Central Venezuela**		Need decent reference
Junín	Argentine haemorrhagic fever	**Argentina** **Pampas region**		Need decent reference
Machupo	Bolivian haemorrhagic fever	**North eastern Bolivia** **Beni department**		Need decent reference
Sabiá	Brazilian haemorrhagic fever	**Brazil** One case to date		Need decent reference

Virus	Disease	Geographical distribution	Transmission routes/vectors	Further information
BUNYAVIRIDAE				
Hantaviruses				
Dobrava	Haemorrhagic fever with renal syndrome	**The Balkans** In particular **Bosnia, Serbia, Greece**	Inhalation of **excreta** or **body fluids** from an infected **yellow-necked field mouse** (*Apodemus flavicollis*)	http://www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/Hantaviruses/
Hantaan	Haemorrhagic fever with renal syndrome	**Eastern Asia** In particular **China, Russian Federation, the Korean peninsula**	Inhalation of **excreta** or **body fluids** from an infected **striped field mouse** (*Apodemus agrarius*)	
Puumala	Haemorrhagic fever with renal syndrome	**Scandinavia, western Europe, and Russian Federation**	Inhalation of **excreta** or **body fluids** from an infected **bank vole** (*Clethrionomys glareolus*)	
Saaremaa	Haemorrhagic fever with renal syndrome	**Europe**	Inhalation of **excreta** or **body fluids** from an infected **striped field mouse** (*Apodemus agrarius*)	
Seoul	Haemorrhagic fever with renal syndrome	**Worldwide** in rodent populations	Inhalation of **excreta** or **body fluids** from an infected **rat** (*Rattus rattus*, *Rattus norvegicus*)	

Virus	Disease	Geographical distribution	Transmission routes/vectors	Further information
Nairoviruses				
Crimean Congo haemorrhagic fever	Crimean Congo haemorrhagic fever	**Central and Eastern Europe, Central Asia, the Middle East, East and West Africa.** Recent outbreaks in Russia, Turkey, Iran, Kazakhstan, Mauritania, Kosovo, Albania, Pakistan and South Africa	**Bite** of an infected **tick** (most commonly *Hyalomma* ticks). Contact with infected **patients**, their **blood** or **body fluids**. Contact with **blood** or **tissues** from infected **livestock**.	http://www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/CCHF/
FILOVIRIDAE				
Ebola - Ebola Zaïre - Ebola Sudan - Ebola Côte d'Ivoire - Ebola Bundibugyo - Ebola Reston	Ebola haemorrhagic fever	**Western, Central and Eastern Africa** Outbreaks have occurred in the Democratic Republic of the Congo, Sudan, Uganda, Gabon, Republic of Congo and Côte D'Ivoire	Transmission to the index case probably via contact with **infected animals**. Contact with infected **blood** or **body fluids**.	http://www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/Ebola/

Virus	Disease	Geographical distribution	Transmission routes/vectors	Further information
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**.	http://www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/MarburgHaemorrhagicFever/
FLAVIVIRIDAE				
Kyasanur forest disease	Kyasanur forest disease	**India** **Western districts of Karnataka state**	**Bite** of an infected **tick**, most commonly *Haemaphysalis spinigera*. 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	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 *Dermacentor reticulatus.* **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: CONTACT DETAILS

High Security Infectious Disease Units

Royal Free Hampstead NHS Trust, London

Telephone (24 hrs, ask for infectious disease physician on call) +44 (0)20 7794 0500 or 0844 8480700 (local rate number when calling from outside London)

www.royalfree.nhs.uk

The Newcastle upon Tyne Hospitals NHS Foundation Trust, Newcastle

Telephone (24 hrs, ask for infectious disease physician on call) +44 (0)191 233 6161

www.newcastle-hospitals.org.uk

This unit is currently closed until 2013.

Reference Laboratories – for VHF screen

HPA Viral Zoonosis Unit

Virus Reference Department

61 Colindale Avenue

London NW9 5HT

Tel: 0208 327 6017 or 0208 200 4400 (24 hour)

HPA Special Pathogens Reference Unit

Centre for Emergency Preparedness and Response

Porton Down

Salisbury SP4 0JG

Tel: 01980 612224 or 01980 612100 (24 hour)

APPENDIX 3: PRINCIPLES FOR THE ISOLATION OF PATIENTS WITH A POSITIVE VHF SCREEN

1. As VHFs are severe and life-threatening diseases for which there is no proven treatment or prophylaxis, patients in whom VHF infection is diagnosed should always be managed in a specialist high security infectious diseases unit (HSIDU).

2. There are currently two HSIDUs in the UK, at the Royal Free Hospital in London, and at the Royal Victoria Infirmary, Newcastle-Upon-Tyne. This Appendix outlines the principles for isolation of a patient with a VHF infection in an HSIDU. This Appendix does not give advice on the clinical management of such patients. Clinical management of a patient infected with a VHF should be undertaken by specialist infectious disease clinicians on a case-by-case basis, and cannot be prescribed here.

3. The purpose of an HSIDU 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 HSIDU must fulfil.

Structural requirements of HSIDUs

4. 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 ensure direct access for all patients to specialist infectious diseases clinical expertise and complete physical separation of the patients to mitigate against disease spread.

5. The unit must be kept at negative pressure relative to the surrounding area, and patient isolation suites within the unit should be at negative pressure relative to the rest of the unit. More information on design considerations to ensure suitable graded negative pressure, and advice on pressure differentials, is included later in this appendix.

6. There must be clear segregation of clean and potentially contaminated areas of the unit. Clearly delineated pathways through the unit for staff, patients, visitors,

supplies and waste should be integrated into the structural design. The direction of air circulating within the unit must follow a gradation of increased negative pressure and flow from clean through to contaminated areas, and be HEPA filtered before discharge to the atmosphere.

7. 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 should form part of the gradation of negative pressure within the suite.

8. All surfaces within the unit must be easy to clean. Floor, wall and other surfaces should be impervious to water and resistant to damage from disinfectants.

9. An autoclave must be installed within the unit.

Operational requirements

10. The unit should produce detailed written operational policies covering all activities in the unit. These should include:
    - Unit activation and deactivation
    - Patient admittance and discharge
    - Staff entry and exit
    - Roles and responsibilities of staff
    - Management of spillages
    - Taking of specimens and subsequent handling
    - Ambulance and ambulance crew decontamination
    - Disinfection, decontamination and terminal cleaning of the unit (see Appendix 9 of this guidance)
    - Special arrangements for waste handling, disinfection and disposal (see Appendix 10 of this guidance)
    - Special arrangements for laundry (see Appendix 9 of this guidance)
    - Emergencies, for example fire or flooding, including evacuation
    - Maintenance and repair

11. If specialist services such as radiology are necessary, these should be carried out at the patient's bedside.

12. 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.

13. Access must be restricted to authorised personnel – the general public 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 should be kept.

Patient containment requirements

14. To date, protection of staff and the wider community when isolating VHF patients in the UK has occurred 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 contamination of the isolation suite is minimised.

15. Following a revised risk assessment for the transmission of VHF by the ACDP, this guidance also recommends a second control option for the 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 HSIDU.

16. Experts agree that there is no circumstantial or epidemiological evidence that there is an aerosol transmission risk from VHF patients, but there remains a theoretical risk. Evidence from outbreaks strongly indicates that the main routes of transmission of VHF infection are via splashes and droplets, direct contact with body fluids, particularly through needlestick, and with environments contaminated by splashes, droplets and spills of body fluids.

17. Therefore patients with VHF infection can be isolated within the negative pressure isolation suite without utilising a Trexler isolator. Staff protection is provided through the use of enhanced PPE, including RPE, as follows:
    - FFP3 respirator or equivalent;
    - Face visor;
    - Waterproof clothing;

- Waterproof boots;
- Double gloves;

18. More information on PPE, including RPE, in included in Appendix 7.

Design considerations for negative pressure ventilation

19. Negative pressure ventilation is used to control the direction of airflow within an isolation unit, specifically between the patient isolation suite and adjacent areas. This prevents contaminated air from escaping from the suite into other areas of the unit. Negative pressure ventilation needs to be carefully and specifically designed.

Section to be inserted here on engineering considerations to ensure negative pressure – inlet/outlet positioning, general principles of balanced airflows, proper sealing of the room.

APPENDIX 4: TRANSFER OF A PATIENT

Transfer of a patient within the UK

1. The transfer of a patient known to be, or suspected of being, infected with a VHF within the UK will only be necessary if the patient requires transfer to an HSIDU. Transfer should be considered when either:
    - the patient has been categorised as 'high possibility of VHF' and has bruising or bleeding or uncontrolled diarrhoea or uncontrolled vomiting or cough; or
    - the patient has had a positive VHF screen result.

2. The decision to transfer a patient should be made by the senior clinician responsible for the patient's care, after consultation and agreement with clinicians at the HSIDU to which the patient is to be transferred.

Transfer by road within the UK

3. Transfer by road, in an ambulance, is the preferred option for all patients. VHFs are classified as Ambulance Category 4 infectious diseases across all Ambulance Trusts, and thus all transfer by ambulance must be carried out at Ambulance Category 4.

4. Ambulance Trusts should follow the guidance in the IHCD Category 4 Infection Measures document (reference once published), which provides clear operational procedures for the transfer of a VHF patient. As stipulated in this guidance, 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 HSIDU are also performed.

5. Transportation by Ambulance Category 4 must be carried out in accordance with a number of basic requirements for communication, ambulance contents, PPE, decontamination and after care. These are outlined below.

Communication

6. The ambulance crew and staff must be made aware of the patient's clinical condition, the possibility of deterioration on the journey and the routes of transmission of VHF.

7. During the journey, maintain close communication with:
    - the HSIDU, for example to give estimated time of arrival, clinical condition of the patient;
    - others involved in the transfer, for example the escort, if applicable.

Ambulance contents

8. A full list of required contents is provided in the IHCD guidance.

9. 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

10. A full list of appropriate PPE is provided in the IHCD guidance and should include:
    - disposable underwear and socks;
    - white boiler suits;
    - white gumboots or similar;
    - infectious diseases suit (one piece polyurethane-coated nylon with high collar, hood, elasticated cuffs and full length zip);
    - disposable gloves;
    - respiratory protection appropriate to the health status of the patient (see Appendix 7)

11. Procedures in place for safe donning and removing of the PPE, including the correct order in which this should be done, are provided in the IHCD guidance.

Decontamination of ambulance and equipment

12. Full details of decontamination procedures are given in the IHCD guidance. In summary:
    - The ambulance should be driven to the decontamination area at the HSIDU 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

13. Decontamination of crew and staff should take place in the HSIDU decontamination suite following the procedures specified in the IHCD guidance. In summary:
    - All PPE and disposable items 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) should be placed in a clear plastic bag and handed to HSIDU staff for decontamination;
    - Crew members should take a shower including hair wash before entering the clean area.

After care of ambulance crew and staff

14. All ambulance staff and crew who have been in contact with the patient must be followed up as contacts. Guidance on the management of contacts is available in Section 7 of this guidance.

15. If a member of ambulance crew or staff is accidentally exposed to potentially infectious material from the patient, hospital trust emergency procedures should be followed with additional advice from the HSIDU. Appendix 8 also contains guidance on accidental exposures.

16. 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 could be carried out using a transit isolator available from the HSIDUs. Special instructions and guidance will be supplied by the HSIDU staff.

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

CHECK:

- ✓ 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 – these may be necessary as there are only two HSIDUs in the UK;
- ✓ that you are aware of arrangements in case of an emergency.

ENSURE:

- ✓ that you are fully familiar with the procedures provided in the IHCD guidance;
- ✓ that you maintain close communication with the receiving clinical team at the HSIDU 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.

Transfer by air within the UK

17. Although road transfer is preferable, air transfer may be necessary in some circumstances. Following advice and contacts provided by the receiving HSIDU, an ambulant and continent patient may be moved by air ambulance with a suitably trained crew. For transfer of a non-ambulant or incontinent patient, air transfer using a transit isolator can be facilitated through special arrangements with the RAF.

APPENDIX 5: SPECIMEN COLLECTION AND HANDLING

1. There are potential risks of infection to the healthcare worker associated with collecting and handling specimens from patients suspected of having a VHF infection, or those with a positive VHF screen. The main risk of infection for healthcare staff is the potential for accidental inoculation or contamination through broken skin or mucous membranes with blood, urine or other body fluids from infected patients.

2. During specimen collection, universal infection control principles and practices should always be adopted. In addition, staff should select PPE in accordance with the risk category of the patient – see the patient risk assessment algorithm, Sections 3 and 4 of this guidance and Appendix 7.

Specimens from patients categorised as 'possibility of VHF'

3. The risk of VHF infection from patients categorised as 'possibility of VHF' is low, as they are highly likely to be diagnosed with an alternative infection, for example malaria. There are therefore no additional precautions to be taken for these specimens, above those already in place under standard precautions.

4. Healthcare waste generated as a result of specimen collection from patients categorised as 'possibility of VHF' should be treated as Category B infectious waste.

Specimens from patients categorised as 'high possibility of VHF' or those with a positive VHF screen

5. There is a slightly higher risk of VHF infection from collecting and handling specimens from patients categorised as 'high possibility of VHF' and those with a positive VHF screen, due to the increased possibility of infection in the patient. In these cases 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.

6. Healthcare waste generated as a result of specimen collection from patients categorised as 'high possibility of VHF' and those with a positive VHF screen should be treated as Category A infectious waste. Waste should be dealt with

according to the guidance set out in HTM 07-01 i.e. autoclaved on site or incinerated (see Appendix 10)

7. The following procedures must be followed to ensure safe transfer of these specimens to the laboratory:
    - Laboratory staff must be notified prior to receipt of all specimens from patients with a 'high possibility of VHF' or with a positive VHF screen;
    - Specimens must not be sent on automatic transport systems (e.g. pneumatic transport systems) or in standard mail;
    - Specimens should be transported to the laboratory using appropriate precautions i.e. specimens should be carried in suitably sealed containers and the responsible person transporting specimens should wear the correct PPE;
    - Policies for the transportation of specimens to a HSIDU laboratory should be agreed between sender and recipient e.g. hospital to HSIDU laboratory, or HSIDU laboratory to a Containment Level 4 laboratory.

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 the main guidance and Appendices 8 and 9.

APPENDIX 6: LABORATORY PROCEDURES

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

2. For all patient specimens with a risk of VHF, specific risk assessments should be developed alongside local codes of practice, which should be agreed between clinical and laboratory staff. This information can be used to ensure that the risks are effectively controlled and 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.

Specimens from a patient categorised as 'possibility of VHF'

3. Statistically, the majority of patients will be categorised as 'possibility of VHF' and, although VHF cannot be ruled out at this stage, clinical experience has shown that most patients will have infections other than VHF such as malaria. The overall risk to laboratory workers from specimens from these patients is therefore considered to be minimal, and specimens may be processed using standard procedures and practices at containment level 2 using the associated controls and PPE (Box 1).

Box 1 **Specimens from a patient categorised as 'possibility of VHF'**
• Routine laboratory tests should be carried out where possible in closed system analysers at standard **containment level 2** conditions

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

4. Fewer patients will have been categorised as 'high possibility of VHF', and whilst many of these are likely to turn out to be negative for VHF, there is an increased risk of infection to laboratory workers when analysing specimens from patients in this category. Such specimens may be analysed at containment level 2 with

some additional precautions (Box 2) and laboratory staff (e.g. clinical haematology, clinical biochemistry, or medical microbiology) must be informed prior to receipt of specimens in order for them to be segregated and processed separately using dedicated equipment. In addition, the number of specimens taken for laboratory analysis should be kept to the minimum necessary for patient management and diagnostic evaluation.

Box 2 **Specimens from a patient categorised as 'high possibility of' VHF'**
• Laboratory staff must be informed before specimens are sent for analysis to ensure experienced and senior members of staff are available to manage the coordination of testing, liaise with other laboratories i.e. HSIDU, HPA, and to supervise processing of the specimens
• Specimens must be handled at a minimum of **containment level 2**
• Specimen handling and storage must be kept to a minimum
• Where possible, specimens must be inactivated before they are tested. Where this is not possible or appropriate, the additional controls listed below are necessary
• If not inactivated, specimens must be processed in a segregated area using a dedicated blood/gas analyser or similar standalone machine. Protocols should be in place for safe processing, handling and disposal including waste from the analyser
• If specimens not inactivated, consideration should be given to using face protection for practices and procedures that have been assessed as likely to create splashes or aerosolisation
• If specimens not inactivated, suitable and sufficient disinfection and decontamination procedures validated as effective against VHF should be in place, including those for automated systems
• If specimens not inactivated, for centrifugation procedures a sealed centrifuge bucket or rotor should be used

Specimens from a patient with a positive VHF screen

5. The number of patients with a positive VHF screen in the UK are rare (~1-2 cases every two years). In most cases, patients with a positive VHF screen will be transferred to an HSIDU and specimens will be analysed at the dedicated HSIDU laboratory (Box 3). However, where transfer is delayed or considered inadvisable, the nearest containment level 3 laboratory may undertake analysis of specimens

for **emergency testing only**. The requirements outlined in Box 3 must be adhered to when processing specimens at containment level 3 in a standard laboratory, as the viral titres of specimens are likely to be high.

Box 3 **Specimens from a patient with a positive VHF screen**
• All work should be conducted in a **containment level 3** facility
• Appropriate laboratory staff members must be informed before specimens are sent for analysis to ensure senior staff are available to manage the coordination of testing, liaise with other laboratories and process specimens
• The laboratory should not be used for any other purpose during patient management testing
• Specimen handling and storage must be kept to a minimum
• Where possible, specimens should be inactivated before they are tested
• Test protocols likely to result in the production of aerosols should be carried out in an MSC
• All analytical equipment should be located in the laboratory
• Consideration should be given to use of face protection to avoid risk of splash
• The laboratory must have a dedicated blood/gas analyser or similar stand-alone machine. Protocols should be in place for safe processing, handling and disposal including waste from the analyser, which must remain within the laboratory throughout patient management testing
• For centrifugation procedures, a sealed centrifuge bucket or rotor should be used
• Patient material requiring storage should be packed in rigid containers, which should be surface decontaminated and retained within the containment level 3 laboratory awaiting safe disposal
• Suitable and sufficient disinfection and decontamination procedures, validated as effective against VHF, should be in place, including those for automated systems
• All waste should be treated as Category A waste and inactivated by autoclave

• All effluent from laboratory sinks should be rendered safe by either validated chemical disinfection or heat treatment, prior to discharge to drain
• The integrity of drainage systems should be confirmed if an effluent treatment tank is used, including integrity of drains from laboratory to treatment tank
• A list of all authorised personnel specifically trained and experienced to work at this containment level should be maintained and a register should be kept of all those who use the laboratory
• When the laboratory is in use, negative pressure should be maintained by mechanical air extraction to achieve an inward, non-re-circulated airflow with HEPA filtration on the extracted air. This is not generally achieved by using MSCs as sole source of air extract
• Negative pressure differentials must be monitored. Gauges or pressure monitoring devices at entry should be used. Audible alarms should be used to identify failure of the exhaust system
• A clothing change area should be provided adjacent to the containment area. Dedicated, protective clothing and gloves must be provided for wear during analysis of the VHF specimens. If visibly contaminated or considered to be contaminated after use, clothing should be bagged and autoclaved
• The laboratory should be equipped with a communication system between the containment area and the support area

Specific instructions for speciality areas

6. 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 an MSC by experienced staff.

7. Specimens from patients subsequently found to be positive for VHF should be retrieved, appropriately labelled and safely stored or disposed of by autoclaving or incineration.

8. 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 8).

Malaria test

9. Experience has shown that most patients suspected of having a VHF infection will have malaria. Laboratory tests to exclude or confirm malaria should be carried out as soon as possible. Malaria is a serious infection that can be life

threatening and prompt treatment can significantly affect the course of disease. It is essential that several blood films be examined to exclude this diagnosis, bearing in mind that false negative results occasionally occur. Treatment may need to be considered in the absence of a firm diagnosis. The WHO Malaria Microscopy Quality Assurance Manual (2009) states:

"*laboratory diagnosis by microscopic examination of stained blood films continues to be the method of choice, or the common reference standard, for case management and epidemiological studies. Rapid Diagnostic Tests (RDTs) are also an important component of a diagnostic strategy for malaria and can be used to confirm the presence of parasites in certain circumstances, however, they cannot be considered as a gold standard*."

10. While following standard protocols, the following additional precautions are recommended at containment level 2 ('possibility of VHF' specimens) or enhanced containment level 2 ('high possibility of VHF' specimens):
    - Immediate and appropriate disposal of blood film slides is important as some active virus may remain (see Appendix 10);
    - After use, the work surfaces should be treated with 1% sodium hypochlorite (this should be left for at least two minutes before drying off, see Appendix 9).

VHF screen

11. The Health Protection Agency reference laboratories at Colindale, London and Porton Down, Salisbury have the appropriate facilities to carry out a VHF screen. If a VHF screen is required, contact the HPA (contact details are in Appendix 2).

APPENDIX 7: PERSONAL PROTECTIVE EQUIPMENT (INCLUDING RESPIRATORY PROTECTIVE EQUIPMENT)

Background

1. Control and containment when managing patients with the possibility of VHF infection, or a positive VHF screen, is important to protect staff and the wider community. Many of the control strategies described in this document for patients categorised as 'possibility of VHF' or 'high possibility of VHF', involve the isolation of the patient in either a single side room or a negative pressure isolation room, supplemented by appropriate PPE including RPE, or a physical barrier. To ensure its effectiveness, care must be taken in its initial selection and subsequent maintenance, storage and use, as described in this Appendix.

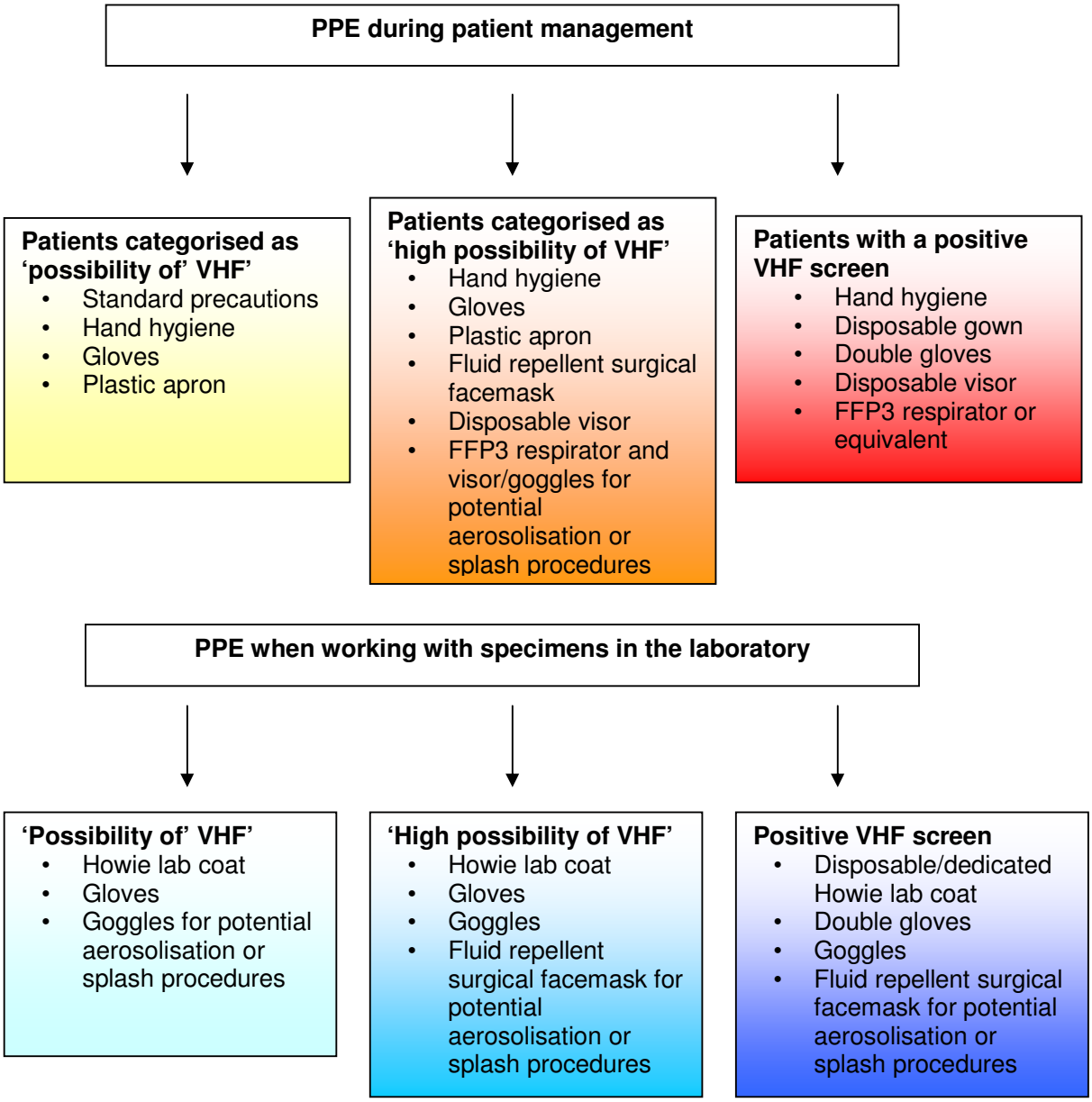
Criteria for appropriate selection of PPE

2. Information that must be taken into consideration when selecting appropriate and practical PPE controls include the infection risk, the tasks to be undertaken, the environment in which the PPE is being used and the person using the PPE.

3. When selecting PPE for protection of healthcare and laboratory staff the potential exposure routes are direct (dermal or mucous membrane) contact with contamination via splash or droplets, indirect contact via deposits on surfaces, or inhalation of droplets or aerosols. Regarding VHF infection risk:
    - Transmission has usually been associated with patient care in the absence of appropriate barrier precautions to prevent exposure to blood and other body fluids;
    - Most staff acquiring infection had multiple contacts with multiple fluids;
    - The risk for person-to-person transmission of VHF viruses is highest during the latter stages of illness, when vomiting, diarrhoea, shock, and often haemorrhage may lead to droplet generation;
    - Airborne transmission via inhalation during patient care is considered unlikely, but in the absence of data cannot be ruled out.
    - In the laboratory, procedures such as testing of potentially contaminated blood specimens should be undertaken so as to minimise droplet or aerosol generation (see Appendix 6).

PPE selection – general

4. In patient management, PPE selection should be proportionate to the likelihood of VHF infection as defined in the algorithm and summarised below:



5. Ergonomic factors must be considered. PPE must be chosen 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 must 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 must 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 of RPE is given in the HSE guidance *Respiratory protective equipment at work: A practical guide*. Information on suitability and instructions for correct use should be provided by RPE manufacturers.

PPE selection – further considerations for management of patients with a diagnosis of VHF

8. It is imperative that the PPE provides a barrier of adequate coverage and integrity to prevent staff contact (direct or indirect) with contamination. The barrier function must 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 combination has to establish a barrier against contact with contaminated surfaces, splash, spray, bulk fluids and aerosol particles as follows:
   - Must provide complete 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 must resist penetration of relevant liquids/suspensions and aerosols;
   - The various components (body clothing, footwear, gloves, respiratory/face/eye protection) must be designed to interface sufficiently well to maintain a barrier, e.g., sleeves long enough to be adequately overlapped by glove cuffs.

10. Whilst inhalation is not strongly linked to transmissibility of VHF, as a precaution RPE to a high level Assigned Protection Factor of 20 (APF20) may be considered appropriate. This would normally be achieved by the use of a disposable filtering face-piece (FFP) respirator type FFP3, certified as PPE under the European Directive 89/686/EEC.

11. It is important that wearers have undergone face-fit testing to ensure such respirators achieve a good seal. 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.

Putting on and taking off PPE

12. As described above, PPE must be chosen to ensure an adequate barrier to exposure is created and maintained. This must 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 inappropriate removal procedure therefore could expose the wearer. Consequently, a detailed and pre-defined sequence for putting on and taking off items should be developed, implemented and monitored.

13. PPE should be put on before starting procedures likely to cause exposure and only removed after moving away from a source of exposure. For example, PPE must be put on and removed in the HSIDU anteroom if present.

14. PPE should not be a source of further contamination e.g. by being removed and left on environmental surfaces.

Disposal or decontamination

15. Following removal, disposable PPE must be placed into suitable disposal receptacles and treated as clinical infectious waste for incineration (Category A). If re-usable PPE is unavoidable, it must be decontaminated using an

appropriate method prior to storage. The method must be validated as effective against VHF (see Appendix 9) and compatible with the PPE to ensure it is not damaged so that its effectiveness in subsequent use is not compromised.

Storage and Maintenance

16. 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 should be kept for at least five years after the date of the test.

Staff training on the use of PPE

17. Staff should be trained in procedures to put on and especially to take off PPE, including the correct order to avoid cross contamination, and to check that the RPE with which they are provided fits properly. They should 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.

Summary of good practice in the use of PPE/RPE

- PPE should 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) must be developed and implemented;
- Training must be provided with consideration of susceptibility to human error;
- Effective communication between all members of the healthcare team is imperative for patient safety;
- 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 putting on and taking off items should be developed, implemented and monitored;
- PPE should be removed in the HSIDU anteroom if present;
- PPE should be located close to the point of use;
- Hand washing must not be performed while wearing gloves, nor products such as alcohol based hand rub used to clean gloves;
- 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 must not be affected 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 8: 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 suspected or confirmed cases of VHF.

2. Accidental exposures that must be dealt with promptly are:

   - **percutaneous injury e.g. needlesticks:**
   Immediately wash the infected part with soap and water and apply a disinfectant solution. Encourage bleeding via squeezing.

   - **contact with broken skin:**
   Immediately wash the infected part with soap and water and apply a disinfectant solution.

   - **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 must be reported and the individual referred urgently to the Clinical Microbiologist or Infectious Disease Physician.

4. The individual should be followed up, as a minimum, as a Category 3 contact – see Section 7 for details. The incident may need to be reported under Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) to HSE (http://www.hse.gov.uk/riddor/).

APPENDIX 9: DECONTAMINATION AND TREATMENT OF LAUNDRY

Background

1. Staff should ensure that areas and equipment used for care of patients who are known or suspected to have a VHF infection are adequately decontaminated and cleaned. Decontamination and cleaning should be conducted wearing appropriate PPE (see Appendix 7).

2. It is important to ensure that products used in the decontamination procedure have been validated as effective against VHF agents. 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 5% (50g/litre or 50,000ppm) 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.
- Because of potential instability, and because hypochlorite solutions may be inactivated by organic matter such as blood, excreta, faeces etc. chlorine releasing tablets made with sodium dichloroisocyanurate (NaDCC) may be used as an alternative to provide an available chlorine solution.
- Typical in-use concentrations are 10,000ppm (1%) for the disinfection of blood-spills and 1,000ppm (0.1%) for general environmental cleaning.
- NaDCC is also available in granule form for use on spills, however, these are not always practical and may increase the risk of slip and trip incidents.

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

3. 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 contamination by blood and/or body fluids

4. 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 should wear appropriate PPE and use suitable disinfectant products determined by a robust risk assessment.

Crockery and cutlery

5. Disposable crockery and cutlery should be used where possible. If non-disposable items are used, these should be transported to a washing-up machine in a secure disposable container or a strong plastic bag. The bag or container should then be placed in an appropriate colour-coded clinical waste bag for immediate disposal after the items have been transferred to the machine.

Toilets

6. Toilet bowls 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 bed pans should be used, the contents to be solidified with high-absorbency gel and then autoclaved or incinerated.

Treatment of Laundry

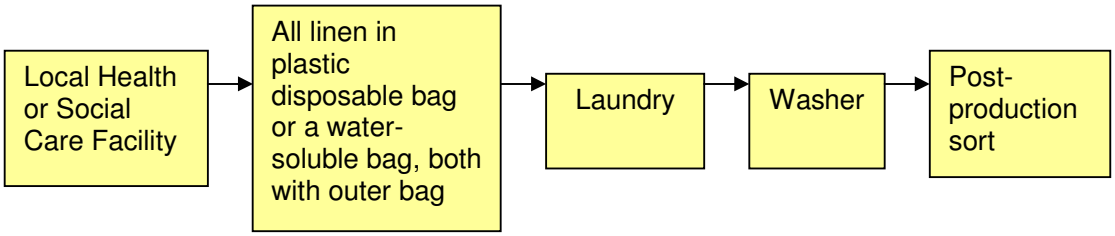
Use and treatment of disposable linen

7. 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. This linen should be treated and disposed of as category A waste.

Use and treatment of non-disposable linen

8. All re-useable linen should be processed as infectious linen with no pre-wash segregation in a suitable colour-coded bag as per diagram below.

9. Large amounts or heavily contaminated linen must be treated as category A waste and managed accordingly – autoclaved on-site or incinerated.



Terminal disinfection of HSIDU or IDU wards

10. Following patient discharge, HSIDU wards will be decontaminated by fumigation then cleaned following locally established protocols. Rooms used to house VHF patients treated in an (non-specialist) IDU will need to be decontaminated via fumigation (see info box on room fumigation below). This will need to be carried out following a thorough risk assessment. Procedures for decontamination by fumigation and cleaning will be established in consultation with HSIDU 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 disposable paper towels, 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 ensuring a contact time of two minutes before wiping up with disposable paper towels;
- The surface should then be washed with warm water.
- 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 measure may be required:
- 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.

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 fumigant and fumigation process used must be validated for use.
- Service engineers / staff undertaking the fumigation process must be fully trained to do so and maintain infection control procedures when preparing the room for fumigation.
- Rooms to be fumigated must be suitably sealed so as to prevent leakage of fumigant into unwanted areas.
- It may be necessary to move nearby patients to a more suitable location during the fumigation procedure.
- Air outside the room being fumigated must not contain levels of fumigant above the WEL and as such should be monitored to ensure the room has been adequately sealed.
- Post fumigation, levels of fumigant within the now decontaminated room must be below the WEL. Where this is not possible e.g. where windows are required to be opened for ventilation purposes, suitable PPE including RPE must be worn following a risk assessment.

APPENDIX 10: WASTE TREATMENT AND DISPOSAL

1. The Department of Health "Health Technical Memorandum: Safe Management of Healthcare Waste" (HTM 07-01) contains comprehensive, best practice guidance on the management of all types of healthcare waste, including waste that is highly infectious.

2. All waste from patients classified as 'possibility of' having a VHF infection should be treated as category B infectious waste.

3. All waste from patients classed as 'high possibility of' or '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 incinerated.

Inactivation of waste on-site

4. 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 HSIDUs). However, in the case of other infectious disease units or hospital ward environments, an assessment will need to be made of reasonably practicable means for safe storage and disposal dependent upon such factors as:
    - The volume of waste;
    - The availability and practicality of on-site autoclaving;
    - The availability of secure storage;
    - Safe methods of transfer off site –see below

5. Before transporting waste to a remote autoclave, arrangements to coordinate transport must be put in place. Waste should be contained within two layers of containment with the secondary containment being robust, leak-proof containers with a secure lid, transported on a trolley where appropriate. Autoclavable bags should be used as the primary containment. Waste should

be transported direct to the autoclave for immediate treatment, thus avoiding storage in the autoclave room or in communal areas.

6. Autoclave cycles should be appropriately validated to ensure that the required temperature and pressure conditions are reached for the appropriate length of time. The autoclave must be maintained according to relevant established standards.

7. After autoclaving, waste is no longer considered to be infectious or hazardous. However, waste has traditionally been subject to further treatment rather than being sent for landfill, because of the public sensitivity associated with clinical waste and offensive rather than infectious considerations. In practice, autoclaved infectious waste will usually follow the waste stream of Category B substances and will be disposed by incineration or deep landfill (yellow or orange colour coded).

8. In the case of HSIDUs, dedicated effluent treatment plants may inactivate potentially infectious liquid waste on-site.

Laboratory waste

9. The infectious component of laboratory waste can be classified as either category A (specimens from patients classed as 'high possibility of' or 'confirmed' VHF infection) or category B (specimens from patients classed as 'possibility of' VHF infection) as set out in HTM 07-01.

10. Irrespective of whether the infectious waste is categorised as A or B, all cultures of pathogens should be inactivated on site prior to final disposal because of the increased risk of exposure associated with higher concentrations of biological agents. Further detailed guidance on the handling of laboratory waste can be found in the relevant section of HTM 07-01.

Inactivation of waste off-site

11. It is recognised that it may not always be reasonably practicable to autoclave on-site the large volumes of waste generated during the clinical care of a patient. Other exceptional circumstances could involve autoclave malfunction. In these circumstances, waste should be packaged for carriage and transferred

to an incinerator as soon as possible. Waste (including sharps receptacles) should be placed in appropriate yellow UN-approved packages for transport.

12. A reputable and licensed waste contractor should undertake transport to the incinerator. Adequate contingency arrangements should be made in advance with the contractor to ensure safe collection, transport and disposal demonstrably in full compliance with ADR.

13. Prior to collection by the contractor, waste must be stored securely and access restricted to authorised and trained personnel.

14. For UN classification and packing groups refer to the box below.

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.

- Transport of clinical waste guidance: http://www.hse.gov.uk/cdg/manual/clinical/index.htm

Bulk transport

15. 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".

16. If unavoidable circumstances elicit Category A infectious waste to be transported in bulk, then authorisation must be sought from DfT, dangerous goods branch.

17. Waste bags must be UN approved, comply with BS EN ISO 7765:2004 and BS EN ISO 6383:2004, and be marked accordingly.

18. 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 11: AFTER DEATH CARE

Subject to comment by the Association of Anatomical Pathology Technologists

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 should 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 must 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 (an example sheet forms part of this annex). 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).

6. Where the body of a confirmed or suspect (non-conclusive) VHF patient is not in an isolator, staff wearing suitable PPE/RPE (see Appendix 7) should place the body in a double body bag with absorbent material between each bag, sealed and disinfected with 1% hypochlorite (1000ppm available chlorine) or other appropriate disinfectant before labelling as high risk of infection and placing it 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 shall take such steps as may be reasonably practicable to prevent persons coming unnecessarily into contact with, or proximity to, the body.

8. The Health Protection (Local Authority Powers) Regulations 2010 grant discretionary powers to local authorities to restrict contact with, and access to, a dead body where necessary (England and Wales).

Funeral directors and embalmers

9. Funeral directors must 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 must not be undertaken.

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

11. 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 must be avoided: religious/ritual preparation of the body, washing, dressing etc. and viewing, touching or kissing of the deceased.

Whilst it is recognised that aerosol transmission is only a theoretical risk, the above requirements have been maintained due to VHFs being caused by a Hazard Group 4 agent. Based on the requirements of COSHH, the risk to individuals can be mitigated by these aforementioned restrictions.

Repatriation/expatriation of deceased's remains

12. 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.

13. In the UK, it is considered that VHF infected bodies must 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.

14. 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 deceased's clothing and personal effects to relatives

15. 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.

16. 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.

17. 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 12: RELEVANT HEALTH AND SAFETY LEGISLATION

The legislation framework

1. Health and safety legislation relevant to working in healthcare with patients infected with VHF or in laboratories with specimens potentially contaminated by haemorrhagic fever viruses is summarised below, together with guidance that may be useful as well as this guidance.

Primary Legislation	Health and Safety at Work Act 1974	
General Health and Safety Regulations	Control of Substances Hazardous to Health Regulations 2002	Management of Health and Safety at Work Regulations 1999
Specific Health and Safety Regulations	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995	Carriage of Dangerous Goods and Use of Transportable Pressure Equipment 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	

	Controlling the risks of infection at work from human remains	
	Safe working and the prevention of infection in the mortuary and post-mortem room	
From Dept Health/ NHS	Safe management of healthcare waste	

2. **The Health and Safety at Work etc. Act (HWSA) 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 2002 (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 1999** and COSHH, once a risk assessment has been completed methods should 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 etc., 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 of Work Equipment Regulations 1998 (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 1995 (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 must:**

    a. Ensure the organisation has the necessary management framework to protect the health and safety of staff and to provide a safe working environment;
    b. Have access to competent help in applying the provision of health and safety law;
    c. Consult with employees' safety representatives on health and safety matters;
    d. Establish procedures to be followed by any worker if situations presenting serious and imminent danger were to arise;
    e. Co-operate and co-ordinate where two or more employers or self-employed persons share a workplace.
    f. 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.
    g. 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;
    h. Keep health records in relation to work involving risk of exposure to VHF;
    i. 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 must:**

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 polices, 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 13: GLOSSARY

APPENDIX 14: ABBREVIATIONS

APPENDIX 15: ACKNOWLEDGEMENT

Members of ACDP, subgroups and drafting groups