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

Advisory Committee on Dangerous Pathogens

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

Advisory Committee on Dangerous Pathogens

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

CONTENTS

EXECUTIVE SUMMARY

This document provides guidance on the risk assessment and management of patients in the United Kingdom in whom infection with a viral haemorrhagic fever (VHF) should be considered or is confirmed. This guidance aims to eliminate or minimise the risk of transmission to health care workers and others coming into contact with an infected patient or their samples. This guidance replaces the previous Advisory Committee on Dangerous Pathogens' (ACDP) publication 'Management and Control of Viral Haemorrhagic Fevers,' published in 1996.

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

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

SECTION 1: INTRODUCTION

Overview

1. This document replaces the previous Advisory Committee on Dangerous Pathogens' (ACDP) publication 'Management and Control of Viral Haemorrhagic Fevers', published in 1996, and provides guidance on the risk assessment and management of patients in the United Kingdom (UK) in whom infection with a viral haemorrhagic fever (VHF) should be considered or is confirmed.

2. The guidance aims to eliminate or minimise the risk of transmission to health care workers and others coming into contact with an infected patient. In this guidance, contact is defined as exposure to an infected person or their blood and body fluids, excretions or tissues following the onset of their fever.

3. VHFs are severe and life-threatening viral diseases that are endemic in parts of Africa, South America, the Middle East and Eastern Europe. Environmental conditions in the UK do not support the natural reservoirs or vectors of any of the haemorrhagic fever viruses. **All recorded cases of VHF in the UK have been acquired abroad, with one exception of a laboratory worker who sustained a needle-stick injury.** There have been no cases of person-to-person transmission of a VHF in the UK to date of publication of this guidance.

4. VHFs are of particular public health importance because:
   - They can spread readily within a hospital setting;
   - They have a high case-fatality rate;
   - They are difficult to recognise and detect rapidly;
   - There is no effective treatment.

5. In preparing this guidance, ACDP undertook a new assessment of the risks of transmission of VHF infection. Evidence from outbreaks strongly indicates that the main routes of transmission of VHF infection are **direct**

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

6. Following the revised risk assessment, this guidance recommends control options for the isolation of VHF patients in the UK. These options now include flexibility in the isolation of a patient with a VHF infection within a specialist High Security Infectious Disease Unit (HSIDU).

7. This guidance only covers those VHFs that are caused by pathogens classified as ACDP Hazard Group 4. Further information about the range of ACDP Hazard Group 4 viruses that cause viral haemorrhagic fever is included in Appendix 1.

The ACDP Hazard Group 4 viral haemorrhagic fevers viruses

ARENAVIRIDAE

Old World arenaviruses

Lassa

Lujo

New World arenaviruses

Chapare

Guanarito

Junín

Machupo

Sabiá

BUNYAVIRIDAE

Nairoviruses

Crimean Congo haemorrhagic fever

FLAVIVIRIDAE

Kyasanur forest disease

Alkhurma haemorrhagic fever

Omsk haemorrhagic fever

FILOVIRIDAE

Ebola

Marburg

8. The guidance also applies to cases of similar infectious diseases, including new or emerging infections, which have a significant health impact and may present a serious risk to public health in the UK.

Intended users of this guidance

9. 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 patient in whom VHF is confirmed or is considered a ‘possibility’ or ‘high possibility’;
- **those working in laboratories** dealing with specimens from patients in whom VHF is confirmed or considered to be a ‘possibility’ or ‘high possibility’;
- **public health professionals,** including those in Port Health Authorities, who may be required to carry out public health actions associated with a VHF case;
- **mortuary and funeral personnel**, who may need to deal with a VHF case.

For definition of ‘possibility’ or ‘high possibility’ see the Algorithm on page 13.

SECTION 2: PATIENT RISK ASSESSMENT

Risk assessment

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

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 of risk assessment is to enable decisions to be made about the actions needed to control the risk and prevent spread of infection. Risk assessment therefore embraces both assessment of the patient for possibility or high possibility of VHF and assessment of associated risks to staff. Measures to control any risks include implementation of practical infection control measures, information provision, training and health surveillance where the assessment shows that these are required.

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

laboratory with the infectious agents of VHFs; are at risk of infection from VHFs.

How to conduct the patient risk assessment

3. The patient risk assessment should be led by a senior member of the medical team responsible for the acute care of patients, for example the emergency care physician, emergency department consultant or admitting team consultant. The consultant microbiologist may also need to be involved.

4. For any patient who has had a fever [> 38^{o}C] or history of fever in the previous 24 hours and a travel history or epidemiological exposure within 21 days, follow the major steps in the pathway from identification to diagnosis in the patient risk assessment algorithm (page 13). This will establish the patient's VHF risk category, which determines the subsequent management of the patient and the level of protection for staff. Further information is provided in the subsequent sections of this guidance.

5. Initiating the patient risk assessment algorithm should become normal practice in emergency departments or Acute Medical Units for any patient who has had a fever [> 38^{o}C] or history of fever in the previous 24 hours and a relevant travel history or epidemiological exposure within 21 days.

6. The algorithm deals with the management of the patient, diagnostic testing and the level of staff protection, all of which are dependent on the possibility of VHF infection and the patient's symptoms.

7. Standard precautions and good infection control are paramount to ensure staff are not put at risk whilst the initial risk assessment is carried out. It is assumed throughout this guidance that staff will be using standard precautions as the norm. If these measures are not already in

place, they must be introduced immediately when dealing with a patient in whom VHF is being considered.

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

The patient's VHF risk category

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

10. Summary information on VHF endemic areas 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 be accessed on travel health websites such as Travax and NaTHNaC, the HPA website and via daily global disease updates on ProMed.

VIRAL HAEMORRHAGIC FEVER RISK ASSESSMENT - for use by Emergency Department, Acute Medical, Admitting Physicians

A) Does the patient have a fever **[> 380C]** or history of fever in previous 24 hours **AND** has returned from (or is currently residing in) a VHF endemic area within 21 days?
OR
B) Does the patient have a fever **[> 380C]** or history of fever in previous 24 hours **AND** has cared for / come into contact with body fluids of / handled clinical specimens (blood, urine, faeces, tissues, laboratory cultures) from a live or dead individual or animal known or strongly suspected to have a VHF?

NO to A and B

No possibility of VHF

YES to A only

ADDITIONAL QUESTIONS:
- Has the patient lived or worked in basic rural conditions where Lassa fever is endemic i.e. West/Central Africa?
- Has the patient travelled to any area where there is a current VHF outbreak?
- Has the patient travelled in an area endemic for Crimean-Congo Haemorrhagic Fever and either received a tick bite or crushed a tick with their bare hands?
- Has the patient visited caves or mines in a VHF endemic area?
- Has the patient had a fever [> 38^0C] persisting after 72 hours of appropriate antimalarials or antimicrobials?

NO to ALL ADDITIONAL QUESTIONS

POSSIBILITY OF VHF
ISOLATE PATIENT IN A SIDEROOM

CLINICAL QUESTION TO DETERMINE INFECTION CONTROL BEHAVIOUR AND PROTECT STAFF:
Does the patient have bruising OR bleeding?

NO

Urgent Malaria investigation
Urgent local investigations as normally appropriate, including blood cultures

Malaria Positive

If patient fails to improve or deteriorates, consider dual infection with VHF

Malaria negative

NO

Continuing fever?

YES

Other diagnosis; VHF highly unlikely

YES
Urgent discussion with High Security Infectious Disease Unit or local/regional ID unit

Re-assess patient at least daily until afebrile for >24 hours

VHF screen (EDTA & serum)

YES to B

YES to ANY ADDITIONAL QUESTION

HIGH POSSIBILITY OF VHF
ISOLATE PATIENT IN A SIDEROOM

CLINICAL QUESTION TO DETERMINE INFECTION CONTROL BEHAVIOUR AND PROTECT STAFF:
Does the patient have bruising OR bleeding OR uncontrolled diarrhoea OR uncontrolled vomiting?

NO

YES
Urgent discussion with High Security Infectious Disease Unit - consider early transfer to HSIDU

Launch initial public health actions – including notification of suspected case and identification of contacts

Urgent VHF screen (EDTA & serum)
Urgent Malaria investigation
Urgent local investigations (inform lab of VHF likelihood) as normally appropriate, including blood cultures

VHF screen negative
- Maintain possibility of VHF until alternative diagnosis has been confirmed

VHF screen positive
- Urgent discussion with HSIDU, transfer via Category 4 ambulance to HSIDU
- Launch full public health actions, including categorisation and management of contacts

INFECTION CONTROL MEASURES

NO/ MINIMAL RISK
Hand hygiene, gloves, plastic apron

STAFF AT RISK
Hand hygiene, gloves, plastic apron, fluid repellent surgical facemask, disposable visor.
In addition, FFP3 respirator and eye protection for potential aerosolisation or splash procedures

STAFF AT HIGH RISK
Hand hygiene, fluid repellent disposable gown, double gloves, disposable visor, eye protection, FFP3 respirator or equivalent

LABORATORY - POSSIBILITY
Lab coat, gloves.

In addition, eye protection for potential aerosolisation or splash procedures

LABORATORY – HIGH POSSIBILITY
Lab coat, gloves, eye protection.
In addition, fluid repellent surgical facemask for potential aerosolisation or splash procedures

Patients who are unlikely to have a VHF infection

Patients with a fever >38^{0}C are highly unlikely to have a VHF infection if:

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

11. The risk of VHF in the patient should be reassessed if a patient with a relevant exposure history fails to improve or develops one of the following:
    - Nosebleed;
    - Bloody diarrhoea;
    - Sudden rise in aspartate transaminase (AST);
    - Sudden fall in platelets;
    - Clinical shock;
    - Rapidly increasing O_2 requirements in the absence of other diagnosis.

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

NOTE: It is recommended that, if a patient is bruised or bleeding, the lead clinician should have an urgent discussion with the nearest High Security Infectious Disease Unit or the local/regional Infectious Diseases Unit concerning further management. See Appendix 2 for contact details.

Patient categorised as 'possibility of VHF'

- A senior member of the medical team who is responsible for the acute care of the patient should be the lead clinician;
- The patient should be isolated in a single side room immediately;
- Infection control measures appropriate to the patient's risk category and clinical care procedures should be put in place;
- Instigate urgent malaria screen and continue with local diagnostic investigations as normal;
- If an inpatient who is malaria negative has a continuing fever and relevant travel history, without diagnosis, initiate a VHF screen and consult HSIDU or local/regional Infectious Diseases Unit. Also reassess daily and continue other diagnostic investigations.

Infection control measures

1. A patient categorised as 'possibility of VHF' should be isolated in a single side room immediately to limit contact until the possibility of VHF has been ruled out. The side room should have dedicated en-suite facilities or at least a dedicated commode.

2. It is assumed that all staff will already be using standard precautions as appropriate. If not, these must be immediately introduced. The level of any additional staff protection is dependent on the patient's symptoms as follows:

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

3. Potential aerosol-or splash-inducing procedures include:
    - Endotracheal intubation;
    - Bronchoscopy;
    - Airway suctioning;
    - Positive pressure ventilation via face mask;
    - High frequency oscillatory ventilation;
    - Central line insertion;
    - Aerosolised or nebulised 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 and disinfection 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;
        - in body fluids, including urine;
        - on contaminated instruments and equipment;
        - in waste;
        - on contaminated clothing;
        - on contaminated surfaces.
    - That exposure to virus may occur:
        - **directly**, through exposure (broken skin or mucous membranes) to blood and/or body fluids during invasive, aerosolising or splash procedures;
        - **indirectly**, through exposure (broken skin or mucous membranes) to environments, surfaces, equipment or clothing contaminated with splashes or droplets of blood or body fluids.

Diagnostic investigations

8. All samples from patients in the 'possibility of VHF' category can be treated as standard samples. Investigations required will include URGENT Malaria investigations. Other investigations, as locally appropriate, may include urine, stool and blood cultures, and chest x-ray (CXR). However, liaison with the local Microbiologist/Virologist is advised, particularly if the patient has bruising or bleeding.

9. Malaria remains the most likely diagnosis and therefore screening for malaria is most urgent even if the patient has already had a malaria screen performed abroad with a negative result.

10. Testing of specimens taken for patient management may be conducted locally at standard containment level 2 conditions, subject to a suitable risk assessment. Appendix 5 provides guidance on collecting and handling specimens and Appendix 6 on the appropriate laboratory procedures for the processing of specimens from a patient categorised as 'possibility of VHF'.

Diagnostic test results and subsequent patient management

Malaria investigation results

11. If the malaria result is positive, treatment for malaria can begin immediately. Up-to-date UK malaria treatment guidelines are available on the HPA website (published in the Journal of Infection in 2007). The patient may be re-categorised as 'VHF highly unlikely' if they are responding to malaria treatment; however, patients who fail to respond appropriately to antimalarial therapy, particularly if there is the development of further features suggestive of VHF, should be re-evaluated for the possibility of VHF and investigated accordingly. See Section 2 for information on the management of patients categorised as 'VHF highly unlikely'.

12. If the malaria result is negative and the patient remains pyrexial (>38^{o}C) and no diagnosis has been made, request an urgent VHF screen on EDTA and clotted blood through your local microbiology laboratory, which 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.

Diagnostic investigations should continue and the patient should be re-assessed at least daily whilst awaiting results.

VHF screen results

13. **If the VHF screen is positive**, a number of urgent actions are required – see Section 5 for details.

14. **If the VHF screen is negative**, the possibility of the patient having a VHF infection should be maintained until an alternative diagnosis is confirmed or the patient has been afebrile for 24 hours. The patient should therefore remain isolated 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.

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

Patient categorised as 'high possibility of VHF'

- The lead clinician who is responsible for the acute care of the patient should be a senior member of the medical team;
- The patient should be isolated in a single side room immediately;
- Enhanced infection control measures appropriate to the patient's symptoms and clinical care procedures should be put in place;
- Carry out an urgent **VHF** and **malaria screen**, and continue local diagnostic investigations as appropriate and with additional laboratory precautions (see Appendix 6);
- Commence early public health actions;
- If the patient's VHF screen is **positive**, arrange urgent transfer to the local HSIDU and launch full public health actions. See Section 6 for public health actions.

Infection control measures

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

2. The number of staff in contact with the patient should be restricted.

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

Infection control measures for 'high possibility of VHF'	
Patient's symptoms	**Staff protection**
Bruising OR bleeding OR uncontrolled diarrhoea OR uncontrolled vomiting	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 EN certified 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 aerosol-or splash-inducing procedures:** ○ FFP3 respirator or EN certified equivalent

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

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

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

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

8. Communication with staff about the potential VHF risks and infection control measures is paramount. The important risks to make staff aware of are listed on page 13.

9. Commence early public health actions as soon as the patient is categorised as 'high possibility,' and launch full public health actions if VHF screen positive (see Section 6).

Diagnostic investigations

10. An **urgent VHF screen** (on EDTA and clotted blood as described in Section 4) and **urgent malaria screen** should be requested through the local microbiology or virology 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. Other investigations, as appropriate, may include urine, stool and blood cultures, and CXR.

11. Appendix 5 provides guidance on obtaining specimens and Appendix 6 on the appropriate laboratory procedures for the processing of specimens from a patient categorised as 'high possibility of VHF' infection. Testing of specimens taken for patient management may be

conducted locally at a minimum of containment level 2 subject to a suitable risk assessment. See Appendix 6 for details.

VHF screen results and subsequent patient management

12. **If the VHF screen is positive, a number of urgent actions are required** – see Section 5 for details.

13. If the VHF screen is **negative**, a VHF infection in the patient should still be considered until either the patient has been afebrile for over 24 hours or an alternative diagnosis is confirmed. The patient should therefore remain isolated in a single side room and the infection control measures continued until VHF infection is no longer being considered.

SECTION 5: 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;
- Full public health actions should be launched;
- 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.

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 and compile a list of all staff with exposure;
    - **Inform** those in contact with the patient of the positive test, and emphasise infection control procedures to minimise risk of infection;
    - Enhance levels of personal protection for those in contact with the patient:
        - Hand hygiene;
        - Double gloves;
        - Fluid repellent disposable gown – an all-in-one disposable should be considered as an alternative;
        - Disposable visor;
        - FFP3 respirator or EN certified equivalent.
    - Lead clinician should urgently discuss 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 6), including formation of an Incident Control Team.

2. If the condition of the patient is so serious (as judged by the lead clinician) that transfer to the HSIDU would adversely affect the patient, an immediate discussion with the Lead for Infection Control should 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. The lead for Infection Control should also consult with intensivists and radiology. Advice on managing a VHF positive patient in a non-HSIDU environment is provided in Appendix 3.

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. If the patient is unable to be transferred, testing of specimens should be carried out in accordance with Appendix 6.

SECTION 6: 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 highly possible case;
- Forward notification of the highly possible case; 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;
- Notification of the case by HPA 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 highly possible case

1. VHF is a notifiable disease. A patient categorised as 'high possibility of VHF' should be notified urgently by telephone during working hours to the consultant in communicable disease control (CCDC; or consultant in public health medicine in Scotland), or out-of-hours to the duty public health professional. A patient categorised as 'possibility of VHF' does not need to be notified.

2. 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 highly possible case by telephone to

the **proper officer** of the local authority in which the patient currently resides, within 24 hours. The oral notification should be followed up with a written notification within three days.

3. In **Wales**, VHF is a notifiable disease under Schedule 1 of the Health Protection (Notifications, Wales) Regulations 2010, and notification of VHFs is classified as urgent. The RMP must notify the highly possible case to the proper officer, who is the Consultant in Communicable Disease Control of the health protection team of the Public Health Wales NHS Trust, by telephone as soon as reasonably practicable.

4. In **Scotland**, VHF is a notifiable disease under Schedule 1, Part 1 (Notifiable Diseases) of the Public Health etc. (Scotland) Act 2008. The RMP must notify the suspected case to the relevant health board, by telephone as soon as possible.

5. In **Northern Ireland**, VHF is a notifiable disease under Schedule 1 of the Public Health Act (Northern Ireland) 1967. The **RMP** must notify the suspected case to the Regional Director of Public Health of the Public Health Agency by telephone as soon as reasonably practicable.

6. In all countries, the RMP should <u>not</u> 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.

<u>Forward notification of the suspected case</u>

7. In **England** and **Wales**, the proper officer must disclose the content of notification received from the RMP to the following, by telephone, within 24 hours:
    - the HPA (in **England**) or the Public Health Wales NHS Trust (in **Wales**) – however, if the proper officer of the local authority is an employee of these institutions, then notification by the proper officer to the institution will be automatically effected;

- the proper officer of the local authority in which the patient usually resides, if different; and
- the proper officer of the port health authority or the local authority in which the port is located, if the patient has disembarked from a ship, hovercraft, aircraft or international train, and this fact is known to the proper officer of the local authority who receives the notification;
- the local Director of Public Health;
- the Department of Health;
- the Welsh Assembly Government (**Wales** only).

8. In **Scotland**, the NHS Board health protection team must notify Health Protection Scotland and the Chief Medical Officer's team in the Scottish Government.

9. In **Northern Ireland**, there are no forward notifications dictated by law.

10. For the **UK**, patients being repatriated by air ambulance, the notification requirements of the *Public Health (Aircraft) Regulations 1979* as amended 2007 will apply.

Identification of contacts

11. It is a public health responsibility:
    - To identify, assess, and categorise contacts of a patient with VHF;
    - To ensure the appropriate monitoring of higher risk contacts;
    - To arrange further evaluation for contacts who develop a temperature of >38ºC within 21 days of the last possible exposure;
    - To consider antiviral prophylaxis, and arrange as necessary.

12. A contact is defined as a person who has been exposed to an infected person or their blood and body fluids, excretions or tissues following the onset of their fever. This may include contacts that are not in the UK. For management of staff accidentally exposed see Appendix 8.

13. As soon as 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.

14. For guidance on risks to contacts on aircraft see European RAGIDA guidance at http://ecdc.europa.eu/en/publications/Publications/1012_GUI_RAGIDA_2.pdf.

Full public health actions

Formation and role of an Incident Control Team

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

16. The ICT will need to:
    - inform relevant parties (listed in paragraphs 7-10) that the VHF screen result was positive;
    - inform HPA, as the UK competent body, that the VHF screen result was positive (see paragraph 19);
    - 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

17. The VHF screen will be carried out by an HPA reference laboratory (see Appendix 2 for contact details). Diagnostic evidence of VHF infection must be urgently **notified by the HPA reference laboratory** to the relevant public health body, **even if the case has already been notified by the RMP**. If the case is:
    - in **England**, this notification is to the HPA;
    - in **Wales**, this notification is to the Consultant in Communicable Disease Control of the health protection team of the Public Health Wales NHS Trust;
    - in **Scotland**, this notification is to the local NHS Board health protection team;
    - in **Northern Ireland**, this notification is to the Public Health Agency.

Notification of the case to ECDC and WHO

18. On receipt of confirmation that the VHF screen result was positive, the HPA, as the UK competent body, will notify the European Centre for Disease Control (ECDC) via the early response and warning system (EWRS) and the World Health Organisation (WHO) under the International Health Regulations (IHR), of the case.

Assessment, categorisation and management of contacts

19. The ICT will determine who is/are responsible for the assessment, categorisation and management of contacts, and designate a Monitoring Officer to monitor the higher risk contacts and the follow up actions to be taken.

20. Each potential contact should be individually assessed for risk of exposure and categorised 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.

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

22. There should be no restrictions on work or movement for any 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; Inform Monitoring Officer urgently if symptoms develop; Provide category 3 factsheet.

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

Media handling

24. A member of the ICT should be made responsible for media handling. It may be necessary to appoint a spokesperson if there is significant media attention.

25. There should be no release of information to, or discussions with, the media without the agreement of all parties. All media statements and messages will need to be agreed by all parties. Media statements and messages should also be shared with the relevant UK Health Department.

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

1. Viral haemorrhagic fever is a term used to describe a severe, multi-organ disease in which the overall vascular system is damaged and the body's ability to regulate itself is impaired. Disease is often accompanied by varying degrees of haemorrhage which can add greatly to the difficulties of patient management and be life-threatening for the patient.

2. Several viruses from the arenavirus, filovirus, bunyavirus and flavivirus families are known to cause haemorrhagic fevers. They are zoonotic or arboviral infections and dependent on an animal or insect host for transmission. The viruses are geographically restricted to the areas of their host species.

3. Humans are not the natural reservoirs of any of these viruses, but can become infected when they come into contact with infected hosts. In addition, many of these viruses are capable of person-to-person transmission, usually via direct contact with infected blood or body fluids, or indirectly via contact with environments contaminated with splashes or droplets of blood or body fluids.

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

5. The following table summarises Hazard Group 4 haemorrhagic fever viruses, their diseases, geographies and transmission routes.

Virus	Disease	Geographical distribution	Transmission routes/vectors	Further information
ARENAVIRIDAE				
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	Details of the outbreak and genetic analysis are available here.
Guanarito	Venezuelan haemorrhagic fever	**Central Venezuela**		
Junín	Argentine haemorrhagic fever	**Argentina** **Pampas region**		
Machupo	Bolivian haemorrhagic fever	**North eastern Bolivia** **Beni department**		

Virus	Disease	Geographical distribution	Transmission routes/vectors	Further information
Sabiá	Brazilian haemorrhagic fever	**Brazil** One case to date	only: Contact with **blood** or **body fluids** from infected patients.	
BUNYAVIRIDAE				
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	**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	http://www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/CCHF/

Virus	Disease	Geographical distribution	Transmission routes/vectors	Further information
		and South Africa	**livestock**.	
FILOVIRIDAE				
Ebola - Ebola Zaïre - Ebola Sudan - Ebola Côte d'Ivoire - Ebola Bundibugyo - Ebola Reston and Siena	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/
Marburg	Marburg haemorrhagic fever	**Central and Eastern Africa** Outbreaks have occurred in Angola, the Democratic Republic of Congo, Kenya, Uganda and South Africa	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/

Virus	Disease	Geographical distribution	Transmission routes/vectors	Further information
		(ex-Zimbabwe)		
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

Microbiology Services Division – Porton
Health Protection Agency
Porton Down
Salisbury Wiltshire
SP4 0JG
Tel: +44 (0)1980 612100 (24 hour)

Microbiology Services Division – Colindale
61 Colindale Avenue
Colindale
London
NW9 5HT
Tel: +44 (0)208 200 4400 or +44 (0)208 200 6868 (24 hour)

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

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

2. 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, as described in this Appendix.

3. 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.

4. In exceptional circumstances it may not be possible to transfer patients to an HSIDU. In this case, the infectious diseases unit where the patient will be held must provide as near as possible complete containment by following the practical guidance at the end of this Appendix. It is also recommended that advice is sought from HSIDU specialist staff. Restrictions on access as set out in paragraph 14 must be applied.

Structural requirements of HSIDUs

5. The unit should be part of a specialist infectious disease unit, sited in an area away from general circulation or form part of a separate isolation building. The aim is to:

- Achieve complete physical separation of VHF patients to mitigate against disease spread;
- Provide direct access for VHF patients to specialist infectious diseases clinical expertise;
- Ensure security against disruption and crime;
- Allow for secure and direct transfer of patients from ambulance to unit;
- Allow for building systems monitoring for the HSIDU as a whole;
- Construct so as to avoid having walls adjacent to the outside for rooms in which care is provided or contaminated material is stored i.e. have walls that are internal to the main building to avoid accidental release.

6. The unit must be kept at negative pressure relative to the surrounding area, and patient isolation suites within the unit must also be at negative pressure relative to the rest of the unit. The direction of air circulating within the unit should follow a gradation of increased negative pressure and flow from clean through to contaminated areas, and be HEPA filtered before discharge to the atmosphere.

7. There must be clear segregation of clean and potentially contaminated areas of the unit. Clearly delineated and separate pathways through the unit for staff, patients, visitors, supplies and waste should be integrated into the structural design.

8. Changing rooms and showers for staff are required within the unit. Negative pressure ventilation is required within the changing rooms and showers relative to the surrounding area and must form part of the gradation of negative pressure within the suite.

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

10. An autoclave should be installed within the unit.

Operational requirements

11. The unit should have in place detailed written operational policies covering all activities in the unit. These should include:
    - Unit activation and deactivation;
    - Roles and responsibilities of staff;
    - Patient admittance and discharge;
    - Staff entry and exit;
    - Personal Protective Equipment (PPE) and Respiratory Protective Equipment (RPE) use, disposal and storage;
    - Management of spillages;
    - Taking of specimens and subsequent handling;
    - Ambulance and ambulance crew decontamination;
    - Disinfection, decontamination and terminal cleaning of the unit (see Appendix 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.

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

13. 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.

14. Access must be restricted to authorised personnel – the general public, including patients, relatives and visitors, should be excluded from the area when the unit is in use. A register of all personnel including clinical, non-

clinical and maintenance staff entering the unit must be kept as a means of tracking potential exposure to infection.

Patient containment requirements

15. Experts agree that there is no circumstantial or epidemiological evidence of an aerosol transmission risk from VHF patients. A theoretical risk has been postulated. Evidence from outbreaks strongly indicates that the main routes of transmission of VHF infection are direct contact (through broken skin or mucous membrane) with blood or body fluids, and indirect contact with environments contaminated with splashes or droplets of blood or body fluids.

16. Avoiding contact with a patient's body fluids, minimising contamination of the environment, and safely containing contaminated fluids and materials, is paramount to protecting staff and the wider public against infection risks.

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

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

19. **Option 2:** VHF patients can be isolated within a negative pressure isolation suite that has an appropriately designed ventilation system **without** utilising a Trexler isolator. Due to the potential for greater exposure to blood and body fluids, staff protection must be provided through the use of enhanced PPE, **including RPE,** as follows:
    - FFP3 respirator or EN certified equivalent (whilst inhalation is not strongly linked to transmissibility of VHF, as a precaution RPE must be included, see Appendix 7);
    - Face visor;
    - Waterproof clothing;
    - Waterproof boots;
    - Double gloves.

20. Correct protocols for putting on and removing PPE and RPE must be strictly adhered to maintain staff protection. More information on PPE, including RPE, is included in Appendix 7.

Design considerations for negative pressure ventilation

21. Negative pressure ventilation is used to control the direction of airflow between the patient isolation suite and adjacent areas. Its aim is to prevent contaminated air from escaping from the isolation suite into other areas of the unit or beyond. Negative pressure ventilation needs to be carefully and specifically designed in order to achieve the desired protective effect.

22. Research studies demonstrate that:
    - Room sealing (air tightness) must be effective and should be designed into the construction of the HSIDU environment through a clear specification for ventilation performance. Poor room sealing results in unpredictable airflow and failure in containment, even if large negative pressure differentials are used;
    - Effective sealing of doors is necessary, and door self-closing devices and interlock arrangements are required to prevent both loss of negative pressure and containment, and unintended airflow;

- All internal and external windows and viewing panels should be sealed and unopenable;
- A stepped negative pressure approach is recommended with the highest negative pressure in the patient isolation room, with progressive decrease in nominal pressures extending outwards to the periphery of the unit. A well designed stable system could operate on a 3-step basis at, for example, -40Pa, -25Pa and -15Pa relative to the outside atmosphere in line with movement from the isolation suite out to the staff circulation and changing facilities within the unit;
- An air change rate of at least 25 air changes/hour should be provided in those areas where dispersal of contamination is likely to be the greatest in order to dilute and remove contaminants. This would apply whether or not a Trexler isolator is used;
- Heat from equipment and personnel can adversely affect the air flow pattern within the room and must be taken into account.

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

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

Managing a VHF positive patient in a non-HSIDU environment

25. The patient must be housed in a single occupation infectious disease unit side room ('enhanced single room'), preferably with a ventilated lobby (isolation suite), with en-suite sanitary facilities and where complete physical separation from other patients can be achieved. See Department of Health guidance HBN4 Supplement 1 - Isolation Facilities in Acute Settings (http://microtrainees.bham.ac.uk/lib/exe/fetch.php?media=hbn4.pdf; this guidance was withdrawn in May 2010 pending revision but is still available

at the aforementioned link and continues to provide useful information until superseded).

26. Enhanced single rooms will have extract ventilation and operate at negative pressure relative to the rest of the unit. In isolation suites with a ventilated lobby, the lobby will be at positive pressure to ensure that air from the corridor does not enter the isolation room, and that air from the room does not escape into the corridor. This design enables these suites to be used for both source and protective isolation. Although this does not adhere to the stepped negative pressure approach applied in HSIDUs, it provides acceptable containment under exceptional circumstances.

27. There must be a clear segregation and gradation of clean and potentially contaminated areas in the room, with PPE changing in the lobby of isolation suites or nearest the door in enhanced single rooms without a lobby.

28. An operational policy following the principles described in paragraph 11 must be created, documented and agreed with all staff involved.

29. A segregated holding area for contaminated material must be designated as near as possible to the side room, with procedures in place for transfer of material to that area with minimum potential for cross-contamination.

30. Procedures must also be put in place for safe transfer of waste from the holding area to where it will be inactivated. See further details in Appendix 10.

31. Procedures must be put in place for disinfection, decontamination and terminal cleaning as soon as possible following transfer of the patient out of the isolation suite. See further details in Appendix 9.

APPENDIX 4: TRANSFER OF A PATIENT

Transfer of a patient with high possibility or confirmed VHF infection within the UK

1. Transfer of a patient within the UK to an HSIDU will be necessary when either:
    - the patient has been categorised as 'high possibility of VHF' and has bruising or bleeding or uncontrolled diarrhoea or uncontrolled vomiting; 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 in England, Scotland, Wales and Northern Ireland. Thus all transfer by ambulance in the UK will need to be carried out at Ambulance Category 4.

4. There are two Ambulance Trusts in the UK who will carry out transfer of a VHF patient – the North East Ambulance Service and the London Ambulance Service.

5. Ambulance Trusts should follow the guidance in the Institute of Healthcare Development Category 4 Infection Measures document (IHCD), which provides clear operational procedures for the transfer of a VHF patient in the UK. 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. Female staff can decline to transfer patients at Category 4 if they are pregnant.

6. Patients categorised as 'possibility of VHF' may be transported by standard means provided that there are no other high risk factors.

7. Transportation by Ambulance Category 4 will need to 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

8. 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.

9. 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

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

11. 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

12. 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).

13. 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

14. 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

15. 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

16. All ambulance staff and crew who have been in the ambulance whilst the patient is being transferred should be identified as contacts and followed up if the patient is confirmed to have a VHF infection. A contact is defined as a person who has been exposed to an infected person or their blood and body fluids, excretions or tissues following the onset of their illness. Guidance on the management of contacts is available in Section 6 of this guidance.

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

18. 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 are trained to undertake an Ambulance Category 4 transfer;
- ✓ that you have received full information about the condition of the patient and the possibility of sudden deterioration during the journey, and that you give this information to the receiving clinical team;
- ✓ the specific arrangements for the journey, including possible escort for long road journeys – 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

19. 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 crew suitably trained for this level of transport.

APPENDIX 5: SPECIMEN COLLECTION AND HANDLING

Specimens from patients categorised as 'possibility of VHF'

1. 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. It is not necessary for the managing doctors to inform the laboratory, as the risk to laboratory staff is extremely low.

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

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

3. There are potential risks of infection to the healthcare worker associated with collecting and handling specimens from patients categorised as high possibility of having a VHF infection, or those with a positive VHF screen. The main risk of infection when collecting and handling specimens is direct contact with blood or body fluids from the patient, for example by accidental inoculation (needlestick) or contact with broken skin or mucous membranes.

4. In patients categorised as high possibility of having a VHF infection or those with a positive VHF screen, specimens taken for laboratory analysis should be kept to the minimum necessary for patient management and diagnostic evaluation. Specimens should be discussed in advance between clinicians and the appropriate specialist for each laboratory area. During specimen collection, universal infection control principles and practices should always be adopted. In addition, staff must select PPE in accordance with the risk category of the patient – see the

patient risk assessment algorithm, Sections 3 and 4 of this guidance and Appendix 7.

5. Healthcare waste generated as a result of specimen collection from patients categorised as 'high possibility of VHF' and those with a positive VHF screen must be treated as Category A infectious waste. Waste should be dealt with according to the guidance set out in "Safe management of healthcare waste" Version 1.0 (SMHW 1.0) i.e. autoclaved on site or incinerated (see Appendix 10).

6. The following principles should be followed to ensure safe transfer of these specimens to the laboratory:
   - Laboratory staff should be notified prior to receipt of all specimens from patients with a 'high possibility of VHF' or with a positive VHF screen;
   - Specimens should be transported in person i.e. not be sent on automatic transport systems (e.g. pneumatic transport systems) nor in standard mail;
   - Specimens should be transported to the laboratory using appropriate precautions i.e. specimens should be carried in suitably sealed containers;
   - 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 patient. Patients suspected of VHF infection are clinically assessed as one of the following categories:
    - Possibility of VHF infection;
    - High possibility of VHF infection;
    - Confirmed;
    - Highly unlikely.

2. For specimens from all patients in whom VHF is being considered, specific risk assessments must 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. These control measures should include where possible a method for inactivating a specimen i.e. a validated heat or chemical treatment step in order that any pathogens present no longer pose a health risk.

Specimens from a patient categorised as 'possibility of VHF'

3. The majority of patients who are categorised as 'possibility of VHF' are unlikely to have a VHF; 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).

<u>Box 1</u> - 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. Few patients will be 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) will need to 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 will need to 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 should be kept to a minimum
• Where possible, specimens should be inactivated before they are tested. Where this is not possible or appropriate, the additional controls listed below are necessary
• If not inactivated, specimens should be processed in a segregated area using a dedicated blood/gas analyser or similar standalone machine. Protocols will need to 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 must be in place, including those for automated systems
• If specimens not inactivated, for centrifugation procedures a sealed centrifuge bucket or rotor must be used

Specimens from a patient with a positive VHF screen

5. The number of patients with a positive VHF screen in the UK is very low (~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, which will require enhanced precautions**, may undertake analysis of specimens for **emergency testing only**. The requirements outlined in Box 3 will need to 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.

6. All work must be conducted in an enhanced **containment level 3** facility with the following enhanced precautions:

Box 3 - Specimens from a patient with a positive VHF screen
• Appropriate laboratory staff members should 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 for the duration of handling and testing the patient's samples
• Specimen handling and storage should 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 must be assessed and, where appropriate, carried out in a microbiological safety cabinet (MSC, class 1, 2 or 3) or other equipment providing a similar level of protection
• 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 will need to 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 should remain within the laboratory throughout patient management testing
• For centrifugation procedures, a sealed centrifuge bucket or rotor must be used
• Patient material that is not for immediate disposal 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, must be in place, including those for automated systems

• All waste must be treated as Category A waste and inactivated by autoclave
• A list of all authorised personnel specifically trained and experienced to work at this containment level must be maintained and a register should be kept of all those who use the laboratory
• When the laboratory is in use, negative pressure must be maintained whilst work is in progress
• Negative pressure differentials should 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 should 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

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

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

9. 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

10. 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 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*."

11. While following standard protocols, the **following additional precautions are recommended at enhanced containment level 2** ('high possibility of VHF' specimens):
    - Immediate and appropriate disposal of blood film slides is important as some infective virus may remain (see Appendix 10);
    - After use, the work surfaces should be treated with 10,000ppm available chlorine (this should be left for at least two minutes before drying off, see Appendix 9).

VHF screen

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

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

1. Control and containment when managing patients who may have VHF infection, or a positive VHF screen, is important to protect staff and the wider community. The isolation of the patient in either a single side room or a negative pressure isolation room, supplemented by appropriate PPE including RPE, or a physical barrier are key risk control measures. To ensure the effectiveness of PPE and RPE, care will need to be taken in its initial selection and subsequent maintenance, storage and use, as described in this Appendix.

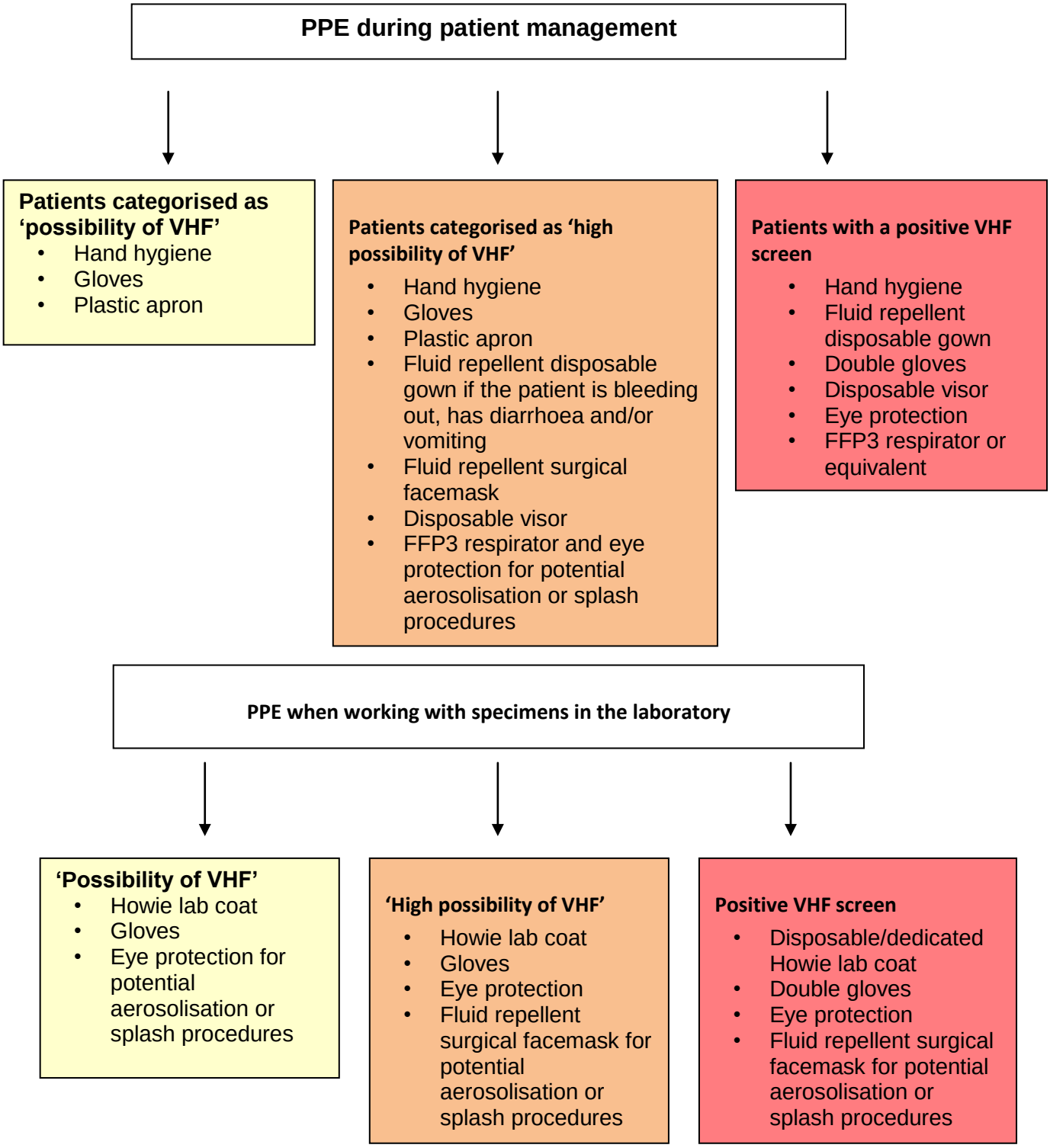
Criteria for appropriate selection of PPE

2. When selecting appropriate and practical PPE controls the infection risk, the tasks to be undertaken, the environment in which the PPE is being used and the person using the PPE must be considered.

3. When selecting PPE for protection of healthcare and laboratory staff the potential exposure routes to be considered are **direct contact** (through broken skin or mucous membrane) with blood or body fluids, and **indirect contact** with environments contaminated with splashes or droplets of blood or body fluids. Regarding VHF infection risk:
    - transmission has usually been associated with patient care in the absence of appropriate barrier precautions to prevent exposure to blood and other body fluids;
    - most staff acquiring infection in past outbreaks had multiple contacts with multiple body fluids;
    - the risk for person-to-person transmission of VHF viruses is highest during the latter stages of illness, when vomiting, diarrhoea, and often haemorrhage, may lead to splash and droplet generation.

PPE selection – general

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



5. Ergonomic factors should 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 should be tested to fit the wearer. Some types of RPE e.g. disposable respirators and half-masks, are not suitable for staff with beards or facial hair as they will not seal to the wearer's face, and achieving a good face fit can be a particular problem for a person with a small face (see also below).

6. The PPE selected should be of suitable quality and construction to provide the required level of protection in the working conditions and must bear a "CE" mark that signifies compliance with the Personal Protective Equipment Regulations 2002. This implements the European PPE Directive concerning design and manufacture and demonstrates conformance with European (EN) or International (ISO) standards.

7. Further guidance on the selection 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 will need to be maintained throughout all clinical/nursing procedures, and when following appropriate procedures for the removal and disposal or decontamination of potentially contaminated equipment by the wearer.

9. The PPE/RPE combination has to establish a barrier against contact with contaminated surfaces, splash, spray, bulk fluids and aerosol particles as follows:

- Should provide 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 should resist penetration of relevant liquids/suspensions and aerosols;
- The various components (body clothing, footwear, gloves, respiratory/face/eye protection) should be designed to interface sufficiently well to maintain a barrier, e.g. sleeves long enough to be adequately overlapped by glove cuffs.

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) is considered appropriate. This would normally be achieved by the use of a disposable filtering face-piece (FFP) respirator type EN 149 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 as required under the Control of Substances Hazardous to Health (CoSHH) 2002 as amended. While disposable RPE may be more practical to avoid the need for decontamination of re-usable RPE, facial hair (a beard or stubble) may prevent a good seal being achieved with a disposable respirator. In this instance a powered hood type respirator given a classification of TH2 according to European Standard EN 12941 may be necessary. Likewise, certain face shapes may prevent a good seal being achieved with a disposable respirator, but in this case a half mask re-usable respirator with P3 filter may be a practical solution.

Putting on and taking off PPE

12. As described above, PPE should be chosen to ensure an adequate barrier to exposure is created and maintained. This will need to be taken into consideration when putting on the various items of PPE. After use, it should be assumed that PPE may be contaminated and an

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, in an HSIDU an anteroom is likely to be present and PPE should be put on and removed in there. Where an anteroom is not present, PPE should be put on and removed as far away from the source as possible.

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 will need to 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 should 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 must 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 must also receive clear instructions on when it is to be used and how it is to be disposed of or, as appropriate, decontaminated, maintained and stored. This training should be held regularly.

Summary of good practice in the use of PPE/RPE

- PPE must be appropriate, fit for purpose and suitable for the person using/wearing it. A scheme for periodical repetition of face fit testing (either annually, due to change of facial features, or alteration to respiratory function) should be developed and implemented;
- Training must be provided with consideration of susceptibility to human error;
- 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 should not be performed while wearing gloves, nor products such as alcohol based hand rub used to clean gloves as it may increase glove permeability;
- PPE should not be a source of further contamination e.g., by being removed and left on environmental surfaces, or by being removed inappropriately thus contaminating the wearers hands;
- The use of PPE such as gloves does not negate the need for hand hygiene;
- The integrity of PPE should not be compromised during nursing procedures. It might otherwise potentially lead to exposure to blood or body fluids. For example solvents or certain products such as hand creams, can affect integrity;
- There should be validated procedures for the disinfection of re-useable PPE;
- Stocks of PPE should be stored off the floor, e.g., on appropriate shelving in a designated, clean and dry storage area to ensure that they are not contaminated prior to use.

APPENDIX 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 high possibility or confirmed cases of VHF.

2. Accidental exposures that need to be dealt with promptly are:

   - **percutaneous injury e.g. needlesticks:**

   Immediately wash the affected part with soap and water. Encourage bleeding via squeezing.

   - **contact with broken skin:**

   Immediately wash the affected part with soap and water.

   - **contact with mucous membranes (eyes, nose, or mouth):**

   Immediately irrigate the area with emergency wash bottles, which should be accessible in case of such an emergency.

3. In all cases, the incident will need to be reported and the individual referred urgently to the local Clinical Virologist, Clinical Microbiologist or Infectious Disease Physician, and their occupational health provider.

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

APPENDIX 9: DECONTAMINATION, INCLUDING TREATMENT OF LAUNDRY

1. For patients categorised as possibility of VHF, standard precautions, cleaning and decontaminating procedures apply, including the treatment of laundry. All procedures should be in keeping with those used when caring for a patient with malaria.

2. The information in this Appendix applies to those patients who have been categorised as high possibility of VHF or have been confirmed with VHF infection.

3. Staff should ensure that areas and equipment used for the care of patients who have been categorised as high possibility of VHF or have been confirmed with VHF infection are decontaminated and cleaned following the procedures in this Appendix. Decontamination and cleaning must be conducted wearing appropriate PPE (see Appendix 7). For information on decontamination of ambulance vehicles see IHCD guidance.

4. 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 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.
- Typical in-use concentrations are 10,000ppm for the disinfection of blood-spills and 1,000ppm for general environmental cleaning.
- Sodium dichloroisocyanurate (NaDCC) may be used as an alternative to NaOCl. This is also available in granule form, which may be practical to absorb, contain and disinfect spills. Refer to suppliers' instructions for in-use concentrations.
- Note that there is a minimum contact time for chlorine-based absorbent granules. This contact time is usually 2 minutes, but may vary from product to product.
- Gloves should be suitable for use and inspected before they are put on to ensure that they are intact. Where the task involves using chemicals such as chlorine-based products, the gloves should be certified as suitable for chemical resistance and comply with the PPE directive (refer to the healthcare cleaning manual).
- Ensure adequate ventilation when disinfecting areas with chlorine-based products i.e. open windows or doors where necessary.

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

5. 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 <u>contamination</u> by blood and/or body fluids

6. VHF viruses have been known to survive for two weeks or even longer on contaminated fabrics and equipment. Persons carrying out decontamination and cleaning procedures must wear appropriate PPE and use suitable disinfectant products determined by a robust risk assessment.

Crockery and cutlery

7. Disposable crockery and cutlery should be used where possible for those patients categorised as high possibility or confirmed VHF. These items should be disposed of as category A waste.

Toilets

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

Treatment of Laundry

<u>Use and treatment of disposable linen</u>

9. 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 must be treated and disposed of as category A waste.

Use and treatment of non-disposable linen

10. All re-useable linen from patients with a ‘high possibility’ or ‘confirmed’ for VHF infection should not be returned to a laundry and must therefore be treated and disposed of a category A infectious waste as set out by SMHW 1.0.

Terminal disinfection of HSIDU or IDU wards

11. Following VHF positive patient discharge, HSIDU wards will be decontaminated by fumigation. Rooms used to house VHF positive patients 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 will be established in consultation with HSDIU staff.

Spillages of blood or body fluids

For small spots of blood or small spills:

- Gloves should be worn and lesions on exposed skin covered with waterproof dressings;
- Contamination should be mopped up with absorbent material (e.g. disposable paper towels), 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 and detergent;
- All waste, including gloves and paper towels, should be autoclaved or incinerated.

For larger spills:

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

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 should 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 Workplace Exposure Limit (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 before re-entry. 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;
- Post fumigation, rooms should be cleaned following locally established protocols.

APPENDIX 10: WASTE TREATMENT AND DISPOSAL

1. The Department of Health (DoH) SMHW 1.0 contains comprehensive, best practice guidance on the management of all types of healthcare waste in the UK, including waste that is highly infectious. The DoH are currently updating and reviewing their list of publications and transferring these into web-based documents. The latest information is available from http://www.spaceforhealth.nhs.uk/.

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 SMHW 1.0, i.e. autoclaved on site or sent for incineration.

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 should 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 must be appropriately validated to ensure that the required temperature and pressure conditions are reached for the appropriate length of time. Autoclaves must comply with British Standard BS 2646-1:1993 (Autoclaves for sterilization in laboratories. Specifications for design, construction, safety and performance) and must be maintained according to the Pressure Systems Safety Regulations 2000.

7. After autoclaving, waste is no longer considered to be infectious and should be classed as EWC Non-hazardous 18.01.04 “offensive waste”, which can be disposed of via landfill or municipal incineration/energy from waste as described in SMHW 1.0.

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 SMHW 1.0.

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 SMHW 1.0.

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) must be placed in appropriate yellow UN-approved packages for transport.

12. A reputable and licensed waste contractor must 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 The European Agreement concerning the International Carriage of Dangerous Goods by Road (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:

ADR Class 6.2: Infectious substances

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

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

Bulk transport

16. Special provisions under ADR allow for the carriage of Category B infectious waste in bulk in specially equipped vehicles and containers "in a manner which avoids risks to humans, animal and the environment, e.g., by loading the waste in bags or by airtight connections".

17. If unavoidable circumstances require Category A infectious waste to be transported in bulk, then authorisation must be sought from the Dangerous Goods Division at the Department for Transport (**England**, **Wales** and **Scotland**) or from HSENI (**Northern Ireland**).

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

19. Prior to transport the detailed requirements of ADR and SMHW 1.0 should be discussed with the waste contractor and then implemented in full and regularly monitored throughout the operation.

APPENDIX 11: AFTER DEATH CARE

Post-mortem examination

1. A post-mortem examination on a person known to have died of VHF exposes staff to unwarranted risk and **should not be performed**.

2. Where a patient suspected of having VHF dies prior to a definitive diagnosis, it may be necessary on public health grounds to undertake some diagnostic tests to either establish or eliminate the diagnosis of VHF or to provide an alternative diagnosis including e.g. malaria. Consultation with appropriate specialists may help to determine the extent of the limited amount of sampling that will suffice such an assessment.

3. Personnel undertaking diagnostic tests must wear appropriate PPE following the guidance for safe collection and transport of specimens. Where the deceased is in a Trexler isolator, the specimens should be taken before transferring the body to a leak-proof body bag. Where the results of such tests have found the deceased to be negative for VHF then a post mortem may be required.

Disposal of the deceased

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

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

6. Where the body of a confirmed or suspected VHF patient is not in an isolator, staff wearing suitable PPE/RPE (see Appendix 7) should place the body in a double body bag. Absorbent material should be placed between each bag, and the bag sealed and disinfected with 1000ppm available chlorine or other appropriate disinfectant. The bag should be labelled as high risk of infection and placed in the coffin as described above. An infection control notification sheet should be completed in readiness for the funeral directors.

Public health and controlling the risk of exposure

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

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

contact with a body of a person who has died while suffering from a notifiable disease.

Funeral directors and embalmers

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

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

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

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

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

following will need to be avoided: religious/ritual preparation of the body, washing, dressing, viewing, touching or kissing of the deceased.

Repatriation/expatriation of the deceased's remains

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

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

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

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

16. The family of the deceased should be consulted and as far as is reasonably practicable their needs and wishes should be respected. In

principle clothing, personal effects and valuables may be returned to relatives in accordance with normal health service procedure following decontamination.

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

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

APPENDIX 12: RELEVANT HEALTH AND SAFETY LEGISLATION

The legislation framework in the UK

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

Primary Legislation	Health and Safety at Work Act 1974 Health and Safety at Work (Northern Ireland) Order 1978	
General Health and Safety Regulations	Control of Substances Hazardous to Health Regulations 2002 Control of Substances Hazardous to Health Regulations (Northern Ireland) 2003	Management of Health and Safety at Work Regulations 1999 Management of Health and Safety at Work Regulations (Northern Ireland) 2000
Specific Health and Safety Regulations	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (Northern Ireland) 1997	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 DH	Safe management of healthcare waste	

2. **The Health and Safety at Work etc. Act (HSWA) 1974** is the primary piece of legislation covering occupational health and safety in the UK.

Under HSWA, employers have a duty to provide a safe place of work and protect the health and safety of their employees and others that may be affected by their work activities. It also places duties on employees to cooperate with their employer, so far as is necessary, to enable their employer to comply with their health and safety duties as set down under HSWA and under relevant legislation.

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

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

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

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

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

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

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

Summary of responsibilities for health and safety

10. **The employer will need to:**

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

- provide proactive health surveillance for occupations where contact with known or suspected VHF infected patients, or with VHF contaminated materials, is likely.

11. Specifically for VHF this should include information on:
    - Whether employees could be exposed to VHF and how;
    - The risks posed by this exposure;
    - The main findings of any risk assessment;
    - The precautions employees should take to protect themselves and other employees, contract staff or visitors;
    - How they should use and dispose of any PPE that is provided; and
    - What procedures they should follow in the event of an emergency.

12. **The employee will need to:**
    a. comply with agreed risk assessments following the COSHH hierarchy;
    b. adhere to agreed safe systems of work, e.g., laboratory rules, sharps and waste disposal 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

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

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

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

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

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

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

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

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

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

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

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

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

Category A infectious waste: Waste that is known or suspected to be contaminated with pathogens presenting the most severe risk. A list of such pathogens can be found in SMHW 1.0: safe management of healthcare waste version 1.0.

Category B infectious waste: Waste that is known or suspected to be contaminated with pathogens not listed for inclusion into category A waste (SMHW 1.0: safe management of healthcare waste version 1.0).

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

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

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

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

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

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

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

Endemic: Occurring in a particular region or population.

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

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

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

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

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

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

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

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

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

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

Inactivated specimens: Specimens in a form that any present pathogens have been neutralised/treated such that they no longer pose a health risk.

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

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

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

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

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

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

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

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

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

Universal (standard) precautions: A set of precautions used in order to minimise the risk of infection from a patient.

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

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

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

APPENDIX 14: ABBREVIATIONS

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

NaDCC	Sodium dichloroisocyanurate
NaOCL	Sodium hypochlorite
NaTHNaC	National Travel Health Network and Centre
NHS	National Health Service
NI	Northern Ireland
N.O.S	Not Otherwise Specified
O_2	Oxygen
P3	Particle filter (filtering efficiency of at least 99.95%)
Pa	Pascals
PCR	Polymerase Chain Reaction
ppm	parts per million
PT	Prothrombin time
PPE	Personal protective equipment
PUWER	Provision and Use of Work Equipment Regulations
RAF	Royal Air Force
RIDDOR	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations
RMP	Registered medical practitioner
RPE	Respiratory protective equipment
TH2	Turbo Hood type 2 (equivalent to the protection afforded by an FFP3 respirator)
U&E	Urea and electrolytes
UK	United Kingdom
UN	United Nations
WEL	Workplace Exposure Limit
WHO	World Health Organisation
VHF	Viral haemorrhagic fever

APPENDIX 15: ACKNOWLEDGEMENT

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Health and Social Care, Northern Ireland
Healthcare Infection Society
Health Protection Agency
Health Protection Scotland
National Ambulance Service Infection Control Network
National Expert Panel on New and Emerging Infections
Newcastle upon Tyne NHS Hospitals Trust
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