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**RECOMMENDATIONS FOR MANAGEMENT OF VIRAL  
HAEMORRHAGIC FEVERS IN AFRICA**

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RECOMMENDATIONS FOR MANAGEMENT OF VIRAL  
HAEMORRHAGIC FEVERS IN AFRICA

Viral haemorrhagic fever should be suspected in any patient living in or with a history of recent travel to a known or possible endemic area, who presents with unexplained high fever unresponsive to appropriate antimalarial drugs.

Since previous hospital outbreaks have invariably been associated with unsuspected cases, it is essential that there is general awareness by all medical personnel of the possibility of viral haemorrhagic fevers (VHFs). In endemic areas any unexplained high fever, especially with a bleeding tendency, should be handled as suspected VHF.

1. Isolation of suspected cases and decontamination procedures

Patients suspected of having a transmissible viral haemorrhagic fever (Lassa fever, Ebola and Marburg haemorrhagic fevers, Congo Crimean haemorrhagic fever) should be isolated in a single room. If this is not possible, they should be isolated from other patients by use of a screen or barrier.

Strict barrier nursing techniques should be practised by trained staff. All hospital personnel should be briefed on the nature of the disease with emphasis on the routes of transmission. Particular emphasis should be placed on high risk nursing procedures such as placing intravenous lines, handling of blood and secretions, catheters and suction.

Ideally the isolation room should have an adjoining room where hospital staff may put on the gowns, gloves and masks necessary for strict barrier nursing, and where containers of decontaminating solution may be kept. If a single room or barrier nursing on a ward are used, then a table with containers for clean gloves and clean masks are placed in front of the room or in front of the barrier. Also on the table are placed discard containers with a suitable disinfectant, e.g. hypochlorite or phenolic solutions, for decontaminating used gloves and masks. A means to hang reusable gowns will also be needed.

Gloves and masks must not be reused unless disinfected. Normally gloves and masks are soaked in a disinfectant solution before washing. Gowns are used for a period of 1-2 days before decontamination and washing, depending on the number of patients and the frequency of use. As gowns are reused, the preferred order for donning the protective clothing is as follows:

- 1) clean gloves
- 2) clean mask
- 3) gown (which may have already been used).

After leaving the patient, the gloved hands should be rinsed in disinfectant solution and the gown removed and hung up. Gloves should then be removed and placed in the disinfectant and hands washed in soap and water. Containers of used gloves and masks must be removed daily and their contents washed. New solutions of disinfectant will be needed daily.

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All medical diagnostic procedures, with the exception of mouth to mouth resuscitation, may be carried out safely provided staff members are fully trained both in the procedures and safety precautions. In the event of spills of blood or secretions, disinfectant solution should be placed liberally on contaminated areas and allowed to stand for 30 minutes before being cleaned up. Blood or other infected fluids on skin or clothing should be rinsed immediately with disinfectant solution.

After discharge or the death of the patient, the room or ward area should be decontaminated by thorough washing, preferably with 0.1% aqueous solution of sodium hypochlorite (as 5.25% available chlorine or with 2% aqueous phenolic solution with detergent.)

In cases of death, the body must be wrapped in cloth or plastic before being transported for burial. Family members must be cautioned, however, that direct contact with the body in preparation for burial is extremely hazardous. In the event of epidemic situations such burials may need to be supervised by a public health authority in order to reduce the risk of secondary contamination of family members and continued spread of disease.

## 2. Laboratory procedures

(a) Blood collection Gloves, gowns and masks should be worn at all times. Freshly prepared disinfectants and swabs or other absorbant material for any spills should be available (see (c) below). Staff should be reminded of the special precautions necessary when needles are used. The patient should be placed in adequate light and where there is space to carry out procedures. After use, needles should be immediately discarded into disinfectant and on no account should they be recapped, nor left on the ward. All spills should be immediately covered with swabs soaked in fresh disinfectant, and gloves should be wiped to ensure they are free of blood. After removal, gloves and mask should be placed in disinfectant and hands washed in soap and water.

(b) Specimen handling Care should be taken to stopper securely all tubes and to wipe the tops with disinfectant. If samples need to be transported they should be placed in unbreakable containers with securely fitting lids. Never transport specimens in glass containers. Label all specimens carefully with a water-resistant marker.

(c) Laboratory techniques All basic haematological and biological tests required for patient management may be carried out provided all staff are fully trained. Care must be taken above all to prevent subcutaneous inoculation or contamination of abrasions or mucosae. In no circumstances should any smoking, eating, drinking or mouth pipetting be allowed in the laboratory. Gloves should be worn at all times and frequently rinsed with disinfectant. They should be discarded if there is any suspicion of a tear. Hand washing facilities must be used. A clear, open, well lit space for work should be provided with a container of fresh disinfectant on the bench for discard and for dealing with spills, and a large discard with fresh disinfectant on the floor for larger items. Glass apparatus (especially Pasteur pipettes) should never be used unless absolutely necessary (e.g. microscope slides). Animal inoculation is particularly hazardous and should not be undertaken without special containment facilities.

All major spills of infected material should be covered liberally with disinfectant and left to inactivate for at least 30 minutes before cleaning up. Any contaminated clothing should similarly be disinfected. At the end of each working day discarded material, including non-reusable items soaked in disinfectant, should be removed by a trained staff member wearing gloves, gown and mask, and should be incinerated, taking care to ensure that all the materials are burnt. (Stoppered tubes tend to explode in the heat unless the tops are removed before burning.) Ideally, incineration should take place in a pit or container to hold any loose material.

(d) Viral diagnosis Upon suspicion of VHF, specimens should be taken for virus isolation and for serology. Whole blood, citrated or heparinised blood are all suitable and may be separated in a bench centrifuge with the tubes securely capped. Centrifuges

should be situated away from work stations and staff advised not to stand close to them whilst they are in operation. If available, centrifuges with sealed buckets should be used. Serum or plasma for virus isolation should be separated as soon as possible and be kept cool (+4°C). Materials destined for virus isolation should be transported in liquid nitrogen or dry ice. Similarly, if there are anticipated delays in transport to a reference laboratory, specimens should be frozen in liquid nitrogen or dry ice. Serum or plasma for antibody testing may be stored at -20°C.

Specific diagnosis may be made by virus isolation or detection of specific antibodies. Virus isolation requires tissue culture and relatively sophisticated laboratory facilities and results are unlikely to be immediately available. It is essential, however, that specimens from the suspected case be taken and properly stored. Until suitable rapid methods for antigen detection are available, immunofluorescent antibody assays for detection of IgG and IgM are the method of choice.

(e) Transport of specimens Specimens for transport should be in plastic or polycarbonate tubes with snug caps and should not be overfilled. Glass should never be used. Caps should be taped and the vials enclosed in a wrapping of absorbant material, placed in a larger capped container and enclosed in a box or other container for transport.

### 3. Disinfectants

Lassa and Marburg/Ebola viruses are highly stable viruses, even in dried blood or secretions. All VHF viruses are enveloped viruses and are particularly susceptible to detergents and are all acid labile. They are relatively resistant to heat, requiring at least 1 hour at 60°C to be sure of complete inactivation. All common disinfectants such as formalin, glutaraldehyde, phenolics and hypochlorite are effective provided they are freshly and correctly prepared and are not contaminated with excess organic material. Ultraviolet light (for example, sunlight) is effective for superficial surfaces only.

### 4. Therapy

(a) Supportive therapy All patients with viral haemorrhagic fever require good medical care and severe cases require intensive care. If trained staff are available all procedures required by the patient may be carried out provided careful attention is paid to good barrier techniques, especially during establishment and maintenance of intravenous lines, catheters and airways. Special care needs to be taken when performing techniques using needles and scalpel blades and aspiration apparatus, especially if bleeding is profuse.

Patients with viral haemorrhagic fever are frequently dehydrated and need intravenous fluids. If they develop oedema, oliguria and hypotension, accurate fluid balance is extremely difficult and overload may aggravate pulmonary oedema. Facilities for electrolytes and blood gases and blood biochemistry will help in management. Evidence suggests most patients develop hyponatraemia and hypokalaemia and may require electrolyte replacement. Salt-free albumin may be used to maintain blood volumes but fluid overload remains a serious problem. Blood loss does not usually require transfusion, except in severe cases of Marburg/Ebola and Congo Crimean haemorrhagic fevers. Vasopressive drugs and heparin have not been shown to be of benefit and may be harmful. Respiratory distress due to laryngeal oedema or interstitial pneumonitis may require oxygen, intubation and ventilation.

(b) Specific therapy There is no evidence that plasma\* from convalescent patients has an effect on the course of haemorrhagic fevers, except for Argentinian haemorrhagic fever. Interferon has not been shown to be of benefit.

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\*If plasma is to be used at all, it has to be screened for hepatitis B and AIDS.

Effective antiviral therapy is available only for Lassa fever. Patient trials in Sierra Leone have shown that if treatment is initiated with intravenous ribavirin within seven days of onset, the prognosis is greatly improved.

#### 5. Special problems of patient management

(a) Management of VHFs in pregnancy Lassa fever is common in pregnancy. The prognosis in the third trimester is poor with high maternal mortality and foetal loss up to 85%. Since the condition of the mother improves after foetus and placenta are removed, there should be no delay in evacuating retained products of conception (ERCP) after abortion or inducing labour if the patient is near term. No data is available on other VHFs in pregnancy but it is reasonable to follow the same recommendations. Special care must be taken during these procedures to avoid contamination of staff, to disinfect all spills and dispose of waste by incineration.

(b) Surgery in VHF Life-saving surgical intervention may be carried out in patients with VHF by staff well trained in the risks of infection. The minimum number of staff required for safe surgical intervention should be used. However, it is essential that expert advice be sought before surgery, with particular attention to the likelihood of severe bleeding. Risk to all theatre staff is high and special care needs to be taken with all needles, scalpels and other contaminated instruments.

All reported infections of surgical staff during surgery have occurred while operating on undiagnosed, indeed unsuspected, cases. This emphasises the need for general medical awareness of the hazards in endemic areas.

#### (c) Transportation of a patient with VHF in Africa

The primary reason for transporting a patient suspected of having a VHF is to improve the care of the patient. Lack of isolation facilities alone will rarely warrant moving a patient to another hospital since it is possible to contain the nosocomial transmission of VHF virus by well trained staff utilizing strict isolation or barrier nursing techniques. Unless the hospital of destination is capable of providing substantially better medical care, the patient should not be moved. A very careful medical evaluation of the patient's ability to withstand transportation should be made prior to moving him/her. The most perilous situation which may arise during transportation would be deterioration of the patient's condition.

When the attendant physician deems it necessary, however, patients suspected of having a VHF may be transported, provided the necessary precautions are taken to prevent any transmission of the virus to attendant personnel. Any vehicle which will accommodate a stretcher, and at least one attendant in addition to the driver, will be satisfactory. Further attendants may be necessary if the patient is seriously ill. The attendants should wear two pairs of surgical gloves, a gown, shoe covers and a surgical mask. The driver need not don any protective clothing as long as he/she does not attend to or otherwise have physical contact with the patient. Where possible, emergency drugs and equipment should be available during transportation. If the patient requires intravenous fluids or other similar care during travel, a second attendant may be necessary. A disinfectant solution should be carried during transportation and any blood, vomitus or other secretions should be decontaminated immediately.

Following transportation, the part of the interior of the vehicle which housed the patient should be washed with disinfectant. Fumigation of the entire vehicle is not necessary.

#### 6. Epidemiological investigations and control

All occurrences of haemorrhagic fevers in non-endemic areas should be followed by an epidemiological investigation to determine the source and mode of transmission of disease as well as to establish the extent of close contacts of the suspected case. Investigations in

known endemic areas are also needed especially to determine if the source of infection was insect or animal or from another person. Careful information on travel and contact history may in fact be helpful in making a specific diagnosis.

The natural reservoir(s) of Ebola/Marburg viruses is(are) not known so that travel in an area endemic for these diseases will be the only specific exposure history.

Investigation of a single case should focus on the activities of the patient in the previous three weeks, and the contacts of that patient. Investigation of clusters of cases should be carried out using appropriate epidemiological techniques such as case control studies.

Control measures include control of vectors or rodents depending on the specific disease. They also include the isolation and barrier nursing of all cases in order to stop the spread of human to human transmission.

#### 7. Handling of contacts

The primary mode of person to person transmission of VHF is contact with contaminated blood, secretion or body fluids. Any person who has had close physical contact with patients with VHF shall be put under strict surveillance with temperature taken daily; any abnormal increase in temperature shall be reported to a health authority. Casual contacts may be placed on alert and asked to report any febrile illness. All surveillance should be continued for three weeks after the date of the last contact. Any contacts who develop fever should be regarded as a potential VHF case and handled accordingly.

Hospital contacts should be handled as are family or close contacts. Hospital personnel who come into close contact with patients or contaminated materials without barrier nursing attire must be considered exposed and put under close, supervised surveillance. Any other type of contact should be treated as a casual contact.

Persons who have no close or casual physical contact with blood or secretions from the suspected VHF patient should not be at increased risk and should not be placed under surveillance.

#### 8. Accidental exposure

If a member of the medical staff or other close contact has a clear history of subcutaneous inoculation with blood or secretions from a case of VHF, or gross contamination with blood, particularly of the face, advice should be sought from national authorities as to the advisability and availability of post-exposure prophylaxis.

The efficacy of post exposure use of immune plasma for Congo Crimean haemorrhagic fever is unproven. No vaccines are yet available for any VHF.