1 Infection Control outside the VHF Treatment Facility

This section deals with implementing and improving infection control practices in hospitals, health centres and other health services in the outbreak area. It explains the need for, and implementation of, effective triage procedures, and basic requirements for infection control and supporting activities. Further guidance can be found in the MSF Infection Control Guideline.

Primary audience: Medical, WHS, and infection control staff.

Secondary audience: Coordinators.

1.1 Introduction

- It is necessary to implement an Infection Control programme in order to:
    - Transfer skills and responsibilities to local professionals for responding to an outbreak.
    - Reinforce health workers' capacity to correctly identify, manage, and refer suspect Ebola and Marburg cases.
    - Create a safe working environment in the health structures.
- Large outbreaks are often associated with nosocomial spread in the formal health care system, and it is common for large hospitals to become involved.
- Outbreaks occur in poor countries with a high burden of disease; it is likely that the epidemic will not be the main cause of death in the community, with diseases like malaria continuing to have a high death toll. It is therefore advisable that the essential (emergency) health services remain operational during an epidemic. Other services, like vaccination, should continue to run if they can be provided safely.
- Infection control procedures in hospitals and health structures in less developed countries are often very poor, and put patients and staff at risk. It is recommended that procedures are assessed and that interventions are undertaken to improve deficiencies.
- In hospitals, a triage system needs to be set up, so that suspect and probable patients are identified and isolated from the others to avoid the spread of the disease.
- The triage and infection control activities in health facilities should be done in a manner that minimises fears within the community; the community should be reassured that they can safely continue to access essential services and receive treatment for serious diseases.
- Unsafe injection practices in health centres (and elsewhere) can be a cause of nosocomial transmission, therefore consider this when planning the district-wide infection control strategy.

1.2 Assessment and Intervention Criteria

The successful implementation of infection control improvements may be expensive and require the inputs of many staff. MSF should only take responsibility if adequate control is possible and the hospital management gives the necessary authority to act. It is therefore essential to involve the relevant authorities in planning any assessment and intervention. The co-operation of those responsible for the health structures is essential for a successful intervention. Ensure agreements are clear about the amount of authority and supervision that MSF can assume.

In principle, all established health structures should be assessed. A priority list should be prepared of facilities to be assessed first.

- Facilities that conduct invasive procedures and curative services have the highest priority.
- Hospitals have a high risk because severely ill patients are admitted to them, and this is very likely to include Ebola and Marburg cases.
- Health centres (both public and private), especially those with inpatient and minor surgical services.
- Dentists, laboratories, pharmacies.
- Vaccination services should be assessed.

1.2.1 Assessment Procedure

An MSF team comprising an experienced medic (doctor or nurse) and a person experienced in water, hygiene, sanitation (and preferably isolation and infection control) should carry out the assessments.

The following should be assessed:

- General structure, and activity of the facility:
    - Architecture, layout, and state of repair.
    - Services offered (surgery, maternity, laboratory, EPI, etc.)
    - Attendance rate, number of patients, number of beds, etc.
- Triage procedures for the identification of VHF patients.
- Existing infection control procedures, adherence to standard precautions, hand washing facilities and practice, etc.
- Sharps and waste management procedures, excreta disposal, wastewater management, etc.
- Cleaning and laundry procedures.
- Water supply.
- Staff organisation and numbers: qualifications, job profiles, schedules, etc.
- Availability and management of equipment and materials (gloves, protective equipment, etc.).
- Flow of patients, staff, and visitors.

Discuss findings and recommendations with the relevant local authorities.

Criteria for MSF involvement in infection control include:

- A risk of nosocomial spread identified in the facility examined.
- Clarity on where and how MSF can improve current infection control procedures (e.g. triage, standard precautions, distribution of clean needles etc.).
- Lack of local capacity to make the necessary improvements (also lack of other NGOs working in the area who are willing and capable of making these improvements).
- Clear agreement with the relevant authorities regarding power to act and the use of donated materials.

1.3 Hospital Infection Control and Triage

1.3.1 Rationale

The aim of the intervention is to:

1. Prevent the spread of filovirus infections within the health structure.
2. Minimise disruption to the normal hospital functioning.
3. Maintain the population's good access to health care.

The hospitals involved are unlikely to be under direct MSF control or supervision, so diplomacy and tact are necessary to create and maintain good relations with the hospital authorities at national and local level, and the independent organisations that manage the private and religious hospitals. To assist in the development of these relations:

- The hospital authorities must be involved in the planning of activities.
- Set up an Infection Control Committee comprising members of the hospital management, health and support staff and MSF. They should meet regularly to discuss the planning and implementation of activities.
- MSF must be flexible in its approach.

It is vital for effective implementation to maintain good relations with the hospital staff. Demonstrate respect for local knowledge, skills, and practices, while giving clear explanations about interventions and objectives. General principles include:

- Be clear about the objectives; only try to change local protocols when it is relevant to achieving those objectives.
- Work in a collaborative manner with local staff, and be respectful of their opinions.

Interventions to improve infection control will involve the following issues.

1) Organisation
    a) Infection Control Committee and Teams.
    b) Reduction of hospital activities.
    c) Supervision and training.
2) Early case detection
    a) At admission (Triage).
    b) Active search of in-patient wards.
    c) Mortality review.
3) Disinfection and transfer of suspect cases.
4) Standard and additional precautions.
    a) Hand washing.
    b) Hand gloving.
    c) Use of personal protection equipment.
    d) Safe Use and processing of patients care equipment.
    e) Cleaning.
    f) Safe linen handling, transport and processing.
    g) Safe working practices:
        i) Safe injection procedures.
        ii) Safe handling and disposal of needles and sharps.
        iii) Safe handling and disposal of medical wastes.
5) Patient placement.
6) Patient transport.
7) Visitor access and precautions for family members providing care to patients.

8) Medical protocols and reduction of invasive procedures.
9) Water supply.

1.3.2 Organisation

Infection Control Committee and Teams

In large health facilities and hospitals, it is advisable to create an Infection Control Committee (ICC) with Infection Control Teams (ICT) if not already existing. In smaller health facilities, a person with experience and training should be appointed to carry out the main tasks of the committee and the infection control team.

The Infection Control Committee is responsible for the elaboration, implementation, and follow up of protocols and recommendations. They should meet weekly or more often to address particular problems that may arise.

MSF should be part of the ICC and depending on needs and circumstances can be in charge of triage, patient flow, infection control and isolation procedures, including logistics, stock management, and water and sanitation activities in all hospital services. Regardless of MSF presence, the hospital manager is ultimately responsible to ensure the good functioning of the infection control programme.

The ICC should include:

- The hospital director.
- The medical director.
- The head nurse.
- The head of technical services.
- The head cleaner.
- Representatives from the various hospital departments.

In addition, potentially:

- The administrator / financial controller.
- A health authority representative.
- A local authority representative.
- A community representative.

The infection control team comprises:

- One Triage Supervisor.
- One Standard Precautions Supervisor.
- One Hygiene Supervisor.

They are responsible for day-to-day supervision and decisions on infection control as well as long term planning. This team should inform the committee about the situation in terms of infection control in each department. They should meet several times a week or daily if possible.

1.3.3 Reinforcement of Standard & Additional Precautions in Health Structures

Introduce or reinforce standard precautions in all health facilities in the area (including private). This is a priority to avoid further nosocomial amplification in the health facilities. This can be started while awaiting confirmatory lab results.

Investigate the level of risk for the different hospital activities, and temporarily reduce or stop non-lifesaving surgical interventions and lab tests.

Standard Precautions

Standard Precautions (also called Universal Precautions) are basic infection control measures, and are a minimum standard in every health structure. Standard precautions require that health care workers assume that the blood and body substances of all patients are potential sources of infection, regardless of the diagnosis, or presumed infectious status.

1. Wash hands
    - Before and after touching a patient.
    - After any contact with body fluids.
    - Prepare container of clean water, basin, soap-dish, waste bin, and disposable towel (or air-dry hands).
2. Wear gloves
    - If there is contact with body fluids, broken skin or mucous membranes.
    - Remove gloves, discard in waste bucket, and wash hands after each use.
3. Routine cleaning with soap or detergent
    - Of beds, bedside tables, examination tables.
    - Of floors, latrines and bathing areas, etc.
4. Handle needles and sharps safely.
    - Avoid separating needles from syringes.
    - Put needles and sharps in puncture resistant sharps container.
    - Do not re-cap needles.
    - Do not re-use needles or syringes.
    - Dispose of sharps container in sharps pit.
5. Safe disposal of spills and waste
    - Remove with cloth.
    - Wash area with soap and water or detergent or chlorine solution and leave to dry.
6. Wear mask & goggles
    - The eyes, nose, and mouth are the most vulnerable part of the body; therefore, protection is necessary especially if a splash is likely.

Additional precautions are required for diseases transmitted by air, droplets, and contact. These are termed "additional (transmission-based) precautions", and specific precautions to reduce VHF transmission are described below.

Additional (transmission-based) Precautions to Reduce VHF Transmission in Health Structures

Precautions to reduce VHF transmission in health structures must be applied in all regular health facilities within the suspected epidemic area as soon as VHF is confirmed.

In the isolation unit, complete barrier nursing and infection control techniques will be used. These are explained in Chapter 6 Hygiene & Infection Control in Outbreak Control Activities.

Additional precautions required for dealing with VHFs are as follows.

1. Isolate the VHF patient:
    - Limit patient movement and restrict access to one trained patient attendant.
    - Cover mattress with reusable plastic sheet.
    - Instruct attendant to avoid touching patient, and provide protective gear and training to attendant.
2. Avoid giving injections or taking blood.
3. Wear protective gear when touching/examining patient
4. Wear mask and goggles
    - Especially if splash is anticipated or patient is coughing.
5. Safely dispose of contaminated materials:
    - Use plastic bag receptacle for contaminated materials such as used latex gloves, or other disposable materials used by patient.
    - Discard and burn contaminated materials.
6. Use disinfection procedures:
    - Prepare 0.5% and 0.05% chlorine solutions.
    - Disinfect the following items in 0.05% chlorine solution:
        i. Household gloves, aprons, goggles;
        ii. Medical equipment such as thermometers
        iii. Cups and dishes
    - Disinfect gloved hands after contact with patient in 0.5% chlorine
    - Disinfect patients excreta, vomit, urine:
        i. Add 0.5% chlorine to the container to cover contents and discard in latrine.

ii. Wash container with soapy water and discard in latrine.

iii. Rinse container with 0.5% chlorine (container may then be re-used).

- Disinfect spills of body fluids
  i. Cover completely with 0.5% chlorine solution
  ii. Let stand for 15 minutes.
  iii. Remove with rag or paper towels.
  iv. Discard rag in plastic bag for infected waste
  v. Wash area with soap and water.
- Disinfect patient clothing and bedding before laundering:
  i. Soak soiled clothing in 0.05% chlorine for at least 30 minutes.
  ii. Remove and place in a container of soapy water overnight, rinse thoroughly and dry on line.

7. Close laboratories and operating theatres to non-essential surgery until safe working is guaranteed.

An infection control programme will only be effective if all the health staff play their part in the process and the implementation. To encourage this, provide regular feedback to the staff in charge of each hospital department.

The most important activities to ensure adequate infection control practices are:

- Provide equipment that enables the staff to maintain good infection control practices (protection equipment, waste disposal materials, cleaning and disinfection materials).
- Provide protocols for procedures used within the health care setting (safe injection practices, invasive procedures, etc.)
- Implement training programmes for all staff including on the job training and formal training sessions.
- Establish surveillance systems that identify problem areas (monitoring checklists).
- Produce guidelines for cleaning, disinfection, and waste disposal, and ensure adherence to those guidelines.

1.4 Restriction of Hospital Services and Closure of Departments

Closure of hospitals or hospital departments reduces the risk of nosocomial transmission of Ebola or Marburg. However, these viruses are not the sole causes of mortality and morbidity during an outbreak; it is important that the population have access to essential life saving procedures. Furthermore, if hospital services are closed, patients are likely to seek treatment elsewhere. The options open to such patients will probably be limited to the informal health sector that is more difficult to monitor and supervise. Clearly, the decision to restrict or close hospital services must be

carefully considered; closure of hospital services risks increasing transmission of infections in the informal health structures and services.

Therefore:

- Every effort should be made to improve infection control and hygiene practices in the hospital so that essential life-saving services can remain open.
- If the risk of contamination and transmission in any particular service remains at unacceptable levels, consider temporarily closing that service.
- If essential services are closed, prioritise improving the infection control and hygiene precautions so that the closure can be as short as possible. Provide alternative services and/or facilities during the closure period.
- As a general principle, it is better to maintain as many hospital services as possible, so that patients can be treated in a controlled environment where contamination risks can be minimised.
- Planning must always take into account the general public health situation, and not concentrate solely on the outbreak.

Services that should be regarded as essential include:

- Maternity.
- Emergency.
- Paediatric acute medicine.
- Adult acute medicine.
- Essential surgery.
- Trauma.

Other services that should be considered include:

- Laboratory services (other than for VHF diagnosis).
- Treatment of chronic diseases such as TB and HIV. This should be done at home where possible.

An alternative to complete closure is an appropriate reduction or adjustment of the service provided; this can include giving treatment at home where appropriate.

1.5 Triage and Early Detection of VHF Patients

Early detection and isolation of VHF patients is essential to reduce the risk of hospital transmission, and is a key point in the infection control process. Start this as early as possible, and follow up closely in order to minimise the spread of the disease. This must be done in a manner that minimises the impact on the normal functioning of the hospital, and takes account of psychological and social factors that may result in the hospital becoming less acceptable to the host population.

Implement case detection at three levels:

1) Admission: screening based on the application of a suspect case definition to every patient that arrives at the hospital.
2) Inpatient departments: active searching for cases presenting with fever or sudden worsening of their general status after admission.
3) Mortality review: review of all deaths in the hospital before proceeding to burial.

1.5.1 Admission Triage

- This service must operate 24 hours per day.
- The suspect case definition is useful as a screening tool to detect patients who need further assessment.
- The screening is carried out by health staff upon admission to the health facility according to a standard triage form based on the suspect case definition (see Annex 12.1 Triage Form).
- The triage form includes axilar temperature measurement. All patients should be screened. Only cases verified in the community by specific alert teams will be sent directly to the Treatment Unit.
- All patients meeting the suspect case definition are referred for further assessment. While awaiting this assessment they must be separated from other patients, and no invasive procedures should be attempted until their status is determined and safety is ensured. Should the patient fulfil the suspect criteria, he/she will be transported to the Treatment Unit for further assessment, testing, and treatment. The admission area must be disinfected immediately afterwards.
- If VHF is discarded, health staff will evaluate the severity of the patient and send him or her to the most suitable health facility (peripheral health structure or a specific hospital department).

If MSF is leading the activity, a medical expatriate should supervise the triage and assess suspect patients

1.5.2 Organisation of Admission Triage Activities

All patients should go through triage before being treated by the relevant service. There are three basic strategies available:

- **One triage point.** All patients entering the hospital pass through one common point for screening.
    - This has the advantage of being easier to supervise, and fewer expatriate staff are required for supervision.
    - A high quality triage can be achieved, and suspect patients can be taken directly to the Treatment Unit without entering other departments.
    - However, there may be detrimental effects on the functioning of the hospital and on acceptance by the community.
    - Maternity may pose special problems (see below).
- **Triage points in each hospital service.** This may be more acceptable to the local community, as it will be similar to the systems to which they are accustomed. Other considerations include:
    - Obstetric patients may not want to queue with sick people at a common point, as they do not regard themselves as being ill.
    - The general effects on the hospital functioning may be less.
    - Existing nursing staff in these departments perform the triage activities.
    - It may be difficult to organise the normal assessment of patients and triage for suspect VHF cases.
    - Suspect patients enter the departments before referral to the Treatment Unit (with the subsequent need for disinfection).

- **A combination of the two systems.** The two systems may be combined, for example, a triage point in maternity, and one other point for all the other services. This allows some of the advantages (and disadvantages) of the two systems to be combined.

The choice between these options depends on a number of local factors, and the decision should be made with the local authorities. Some relevant factors to decision making are:

- Cultural factors and the acceptability to the local population; having all patients passing through one triage point may increase fear and reduce hospital attendance, or conversely it may improve confidence and attendance.
- The number of trained and experienced staff available to do supervision.
- The wishes of the health authority.
- The size of the health structure, the services provided, and the existing circuits within the structure.

1.5.3 Organisation of Triage Points

- Triage points must be open, well lit, well ventilated, spacious, and easy to disinfect.
- Where a single triage point has been installed, separate queues for children, adults, and maternity may be helpful.
- Arrange an entrance for ambulances; patients arriving by ambulance must also be triaged.
- Consider the route and access to the VHF Treatment Unit for ambulances.
- Fencing the entire health facility may help stream all patients through triage.
- Access to the hospital should be restricted; limit access to identified staff and patients, and limit the number of visitors. Organise guards to control crowds, and to guide and control the flow of patients and visitors.

1.5.4 Other Considerations

Transfer of Suspect Cases from Hospital Triage

When a suspect case is detected in the Hospital triage, they must be referred directly to the Suspect Area of the Treatment Unit. However, there is a possibility that the patient will refuse to go directly to the Unit, as they may be afraid of having the disease confirmed. Counselling and a clear explanation of the subsequent procedures should be provided.

Safety Room in the Hospital

Where there are serious problems with patients refusing referral to the VHF Treatment Unit for further assessment, the installation of a Safety Room can be considered. This is a room set aside in the hospital for the evaluation of suspect patients. Blood can be drawn and symptomatic treatment provided. Infection control and the use of personal protective equipment must be implemented to the same standard as in the Treatment Unit.

However, this approach can be problematic. It is recommended to refer the cases from triage directly to the Suspect Area of the Unit and avoid the use of a Safety Room for the follow reasons:

- To avoid creating an infection point in the hospital.
- Extra medical staff trained in VHF case management are required outside the VHF Treatment Unit.
- Extra supervision is necessary to ensure infection control, and use of PPE, etc is implemented correctly.
- The workload is increased, (disinfecting the room after each use, transfer of patients, etc.).

Maternity Patients

Maternity patients may pose special problems for the triage system. These include:

- A large number of maternity patients present with bleeding. This means that many will meet the VHF case definition when in fact they have other conditions. It may not be appropriate to assess all these patients in the VHF Treatment Unit.
- The VHF Treatment Wards are likely to be poorly equipped to do deliveries. Therefore, it may be damaging to non-VHF patients to be assessed in the Treatment Unit.
- Maternity patients may not regard themselves as being ill, and could object to being assessed with other patients.
- Bleeding maternity patients may cause extra anxiety to other patients in a common triage area.

For these reasons, special planning is necessary. If maternity patients are assessed with other patients, a combination of cultural factors and unnecessary admissions to the Treatment Unit may cause a rejection of maternity services, resulting in non-VHF patients avoiding life-saving services, and VHF patients staying at home.

However:

- Ebola and Marburg patients may present with miscarriage. In populations where many women are pregnant, it can be anticipated that there will be women presenting with miscarriage.
- Normal births have a much lower chance of being VHF cases than miscarriages or abortions.

Depending on the circumstances of the hospital, it may be appropriate to triage these patients in maternity and have a special holding area or mini-isolation unit in maternity for suspect patients. In the absence of a laboratory, this approach will be difficult, as patients will not receive a rapid formal diagnosis.

Evaluate the possibility and pertinence to install a Holding Area or Safety Room for suspect cases in the maternity service.

If a holding-area is to be set up in maternity:

- A changing area is required.
- A delivery room should be installed within the holding area, respecting all the safety and disinfection procedures.

- The staff of the maternity ward must be willing to be trained, and they must be willing to provide care to the patients isolated there. If the midwives refuse to provide care, the system will not work.
- Careful training of the midwives must be provided in the use of PPE, barrier nursing, infection control, and disinfection techniques. The midwives working in the holding area should not work with other patients during the same shift.
- Equipment should be provided as required.
- Testing should be done, and the patient should stay until the result is known.

1.6 Detection of Patients after Admission

All VHF fever patients should be detected by the triage system. However, this may not always be the case. A system of checking patients admitted to the wards is advised; fever control should be done for all in-patients.

1.6.1 Procedure

All patients, irrespective of diagnosis, should have their temperature taken at least twice, and preferably three times, per day by the health staff of the inpatient department. If this cannot be arranged, a specific team can be organised to carry out this task under the responsibility of the infection control team.

- MSF expatriates should pass through the wards and talk to the nursing staff. They should review patients who are of concern to the nursing staff. If the patient has a possibility of VHF, they should be referred to the Treatment Unit. If they are thought not to have VHF, this should be communicated to the nursing staff.
- Fever patients should be reviewed, including all patients who develop fever unexpectedly. Any patient presenting sudden worsening or fever (tª > 37.5°) must be immediately re-evaluated to determine whether referral to the Treatment Unit is required.
    - If not thought to be a suspect case, the evolution of the treatment should be followed.
    - If thought to be a suspect case, they must be referred to the Unit for evaluation and testing. Transfer of the patient must be done safely and the room must be disinfected.

1.7 Transfer of Suspect Cases to the VHF Treatment Unit

When a suspect case is identified in one of the triage points or in a ward, they must be transferred to the VHF Treatment Unit. To prevent contamination and spreading of infection an ambulance/disinfection team should do the transfer, and disinfect the area where the patient was accommodated. In the maternity, special care has to be taken; it may not be culturally acceptable for male staff to attend to these patients.

1.8 Deaths Occurring in the Hospital

Taking care of dead bodies that are present in public or hospital morgues is one of the very first priorities. Burying the bodies and disinfecting the morgue are essential, and should be done as quickly as possible; this is an integral part of setting up the infection control and triage systems. The handling and preparation of corpses for burial is one of the highest risk activities for the spread of the epidemic, therefore great care is necessary.

The corpses of people who have died of Ebola or Marburg contain very high levels of virus. The VHF status of dead bodies may be difficult to determine, therefore a cautious approach must be taken. Full protection must be used and rigorous infection control must be done. If there is a VHF laboratory on site, it may be possible to test bodies; those testing negative should be disinfected and can be returned to the relatives for normal burials.

It can happen that people will be scared to collect the bodies of their relatives from the hospital or morgue, even if they have not died of Ebola or Marburg. Burials must be organised, and relatives should be informed when and where the burials will take place, and they should be encouraged to attend.

While the morgue is being cleared of bodies and disinfected, an alternative temporary morgue area should be prepared to store the bodies of the non-VHF deceased.

Analysis of mortality in the hospital is important in order to detect contacts (non-admitted caregivers, other patients, and health staff) and to guarantee safe burials of VHF suspect cases.

Once the infection control and triage system is put in place, all deceased patients should be reported to the Infection Control Team before the body is sent to the normal mortuary or given to the family. This may prove difficult with children, who are commonly carried away by the family shortly after death. The triage procedures described above can be used to screen the body to see if there is a risk of VHF (review the clinical history and decide). The infection control team will evaluate every case and decide if it is a suspect case or not. All cases, whether suspect or not, must be recorded.

If there is no suspicion of VHF, a declaration form will be given to the family certifying that the patient was evaluated and VHF was ruled out.

Any case with suspicion of VHF should be safely transported to the VHF mortuary by a burial team and the patient's room disinfected. If a family member is present, they must be informed of the procedures that will be followed and the reasons why they are necessary. Sensitive and clear communication with the family is vital, and it is essential that someone with good communication skills explain the process to them.

Once in the mortuary the body should be tested if a laboratory is available. An oral swab is normally the most appropriate test available. Testing the body helps ensure:

- That bodies testing negative can be returned to the family for normal burial (although if there is any doubt about the diagnosis they should be treated as positive). A negative test result form should accompany bodies that have tested negative, this will ease any further investigation by epidemiologic surveillance teams
- Bodies that have tested positive can be handled and buried safely.
- Disinfection of the ward/house (if the patient was at home recently) can be done.
- Contact tracing can be done for family members.
- The family is left in no doubt as to the VHF status of the patient.

Burial protocols are described in Annex 11.3 Guideline for Safe Burial Practices.

1.9 Standard Precautions and Training of Staff

Application of standard hygiene precautions should be normal procedure in all hospitals and health structures. The implementation of Standard Precautions is the primary strategy for achieving nosocomial infection control by reducing the risk of transmission between healthcare workers, patients, attendants, visitors, etc. Standard Precautions are necessary for the care of all patients in health structures regardless of their diagnosis or presumed infection status.

Additional precautions are required to reduce the risk of transmission of VHFs. See Section 1.3.3 Reinforcement of Standard & Additional Precautions in Health Structures

Specific information concerning many infection control topics can be found in the MSF infection control manual. If agreed by hospital authorities, training and supervision of these topics could be provided by MSF nursing staff.

Specific points include the following.

1.9.1 Wearing of gloves

This helps to protect the person wearing the gloves, but the gloves need to be changed or disinfected (in 0.5% chorine) after each patient to prevent the transfer of infection between patients. Gloves should also be changed after contact with blood, body fluids, secretions, excretions and contaminated material or in case there is any damage to the glove. Hands must be washed with 0.05% chlorine solution each time gloves are removed. During outbreaks, double gloving is adopted

1.9.2 Hand Washing

This is very important for the prevention of transmission of infection between patients.

- Gloved hands are washed in 0.5% chlorine solution, un-gloved hands in 0.05% chlorine.
- Wash hands immediately with 0.05% chlorine solution after gloves are removed, and when otherwise indicated.
- Remember that gloves do not substitute for hand washing.

- Multiple hand washing stations with 0.5% and 0.05% chlorine solution must be conveniently located in all patient care areas.

1.9.3 Personal Protection Equipment (PPE)

Gloves, face shields or goggles, masks, gowns, heavy-duty gloves, rubber boots) should be provided in adequate quantities to allow personnel to change gloves and gowns regularly. Equipment used should be appropriate to the risk and the task being done. This equipment should be removed upon leaving the work area.

- All staff must be trained in the use of the PPE, and dressing and undressing procedures.
- The overuse and misuse of PPE is a risk, supervision is important to avoid this happening.
- It is very important to ensure a reliable supply of protective equipment to the whole hospital in order to implement the standard precautions and hygienic procedures.
- An assessment of the hospital's supply of essential protection equipment (gloves, aprons etc.) should be done. If stocks are insufficient, the necessary materials and equipment must be provided. MSF could provide the necessary materials after reaching an agreement concerning their use. In order to assure a constant supply to the clinical areas, the logistics department should assess stock keeping and distribution procedures in the hospital. Advice should be given as required.

1.9.4 Cleaning and Disinfection

Cleaning

Good cleaning services are essential for infection control in hospitals. In order for good cleaning services to function, the following need to be ensured:

- An adequate water supply.
- Adequate materials (and protective clothing as appropriate).
- Training of the cleaning staff.
- The heads of each hospital service should be involved in ensuring the quality of cleaning in their service.
- A hygiene supervisor and committee should be appointed by the hospital to supervise cleaning and waste management.

Hygiene

Washed hands and sterilised medical devices can be re-contaminated by contact with surfaces due to incorrect cleaning/disinfection practices.

Inadequate or incorrect cleaning and disinfection practices can lead to an increase in:

- Transmission to patients by direct/indirect contact through contaminated hands or medical devices.
- Dispersion of virus via hand or foot carriage after contact with incorrectly cleaned and disinfected surfaces.
- Corrosion of equipment due to incorrect use of cleaning products.

Disinfection of Materials

Only disposable needles and instruments should be used. If re-usable items like surgical instruments are in use, then they must be properly sterilised.

Disinfection of Facilities

If, upon arrival of the team, the hospital is known to be a focus of infection, a thorough disinfection of all wards should be conducted. However, it may not be necessary to close the affected units or departments.

- A triage of the patients present should first be done to reduce the risk of recontamination of the premises.
- Patients could then be transferred into another ward while their room is disinfected.
- All floors, walls, surfaces, and items (beds, tables, chairs, etc.) must be sprayed with 0.5% chlorine solution. Mattresses should be rinsed with clean water.
- Portable material should be taken outside to dry in the sun after spraying.
- Patients can be transferred back into their ward the following day and disinfection can continue in other parts of the hospital.

Patient transfer to the VHF Treatment Unit must be followed by room disinfection even if there is only a suspicion of VHF.

In order to allow good disinfection, 0.5% and 0.05% chlorine solutions are necessary; MSF should help provide these.

1.9.5 Safe Linen Handling, Transport and Processing

- Hospital linen and patients' laundry should not be taken out of the facility. Laundry and drying areas must be provided to avoid this practice.
- The disinfection teams according to established protocols must handle the linen that has been in contact with suspect VHF cases.
- The linen from hospital wards will be handed according to hospital policy.
- Caregivers must be trained by nursing staff in appropriate laundry practices (use of soap and water can be adequate). Drying on a clothesline in sunlight must be recommended.
- Staff doing the laundry must wear adequate PPE.
- Both machine and hand washing are acceptable if properly done.

1.9.6 Safe Working Practices

a) Safe Handling and Disposal of Needles and Sharps

This needs to be carefully taught, including such themes as not re-sheathing needles, only using single use needles, carrying sharps boxes to the area where the injection is done etc. It must be ensured that single use items are properly discarded and not re-used.

b) Safe Management, Handling and Disposal of Other Medical Waste

Safe and effective management of hospital waste is essential for preventing the spread of VHFs or other diseases. This is especially important for organic waste and sharps. Contaminated waste poses a risk to doctors and nurses; patients, visitors and families; people involved in the collection and disposal of waste (in many situations these are the people at most risk), and people living near to areas used for the unsafe disposal of waste.

All health workers (both medical and non-medical staff) in contact with health care waste must be involved in its correct management and promotion:

- Medical staff are responsible for segregation according to the waste categories.
- Cleaners or ideally waste managers are responsible for collection.
- One or two waste managers must be responsible for collection, storage, treatment, and final disposal.

Safe waste management requires:

- A waste management area appropriate to the needs of the facility
- Adequate water supply and drainage
- Supply of personal protective equipment, and training in its use.
- Supply of waste material (puncture-proof containers, buckets, plastic bags, etc.)
- Identification of a team in charge of supervision of waste management procedures.
- Involvement of the chief of each department in the supervision of waste handling and disposal; and the correct use of PPE.
- Training staff in waste management procedures and standard precautions.

The hospital should appoint a hygiene committee and supervisor to ensure safe and reliable waste management procedures. Heads of individual departments should be involved in the supervision and ensuring training in waste management procedures.

c) The Collection and Disposal of Medical Waste

Installing a temporary waste zone specifically for the hospital is a good option. It should allow for the disposal of the three types of waste (soft, organic and sharps). The waste zone should be in the hospital compound in a convenient location but out of the busiest traffic areas.

Materials and equipment to allow segregation, safe collection, and transport of the waste to the waste zone must be provided:

- Sharps containers for needles, plastic bags for dry burnable waste and most organics.
- Discard organic waste such as placentas directly into a bucket containing 2cm of 0.5% chlorine solution, cover the waste with more chlorine solution. Disinfect the inside and outside of the bucket, cover and transport to the organic pit.
- Chlorine solution must be available in the waste zone to disinfect buckets, etc.

Staff must be trained to manage the waste collection and disposal. Including:

- Safe handling and disposal of medical waste.
- Safe handling of blood/body fluid specimens.
- Safe removal of blood/body fluid spills.
- Safe personal habits and working practices.
- Specific precautions in obstetric care, in operating theatre, in laboratory.
- Precautions for cleaning and laundry staff.

1.10 Patient Placement

Overcrowding should be avoided, with adequate spacing (2m) between beds and no more than one patient per bed. In order to avoid overcrowding, discharge procedures must be efficient; a daily discharge programme including weekends is advisable.

1.11 Visitor Access and Precautions for Patients' Attendants

- Access to the hospital should be limited to hospital staff, patients, and attendants.
- Fence the hospital and position guards to organise and control the flow of visitors and attendants.
- Visitor access must be limited to as few as possible. One family member should be selected to provide care to the patient. This family member should be trained by the nursing staff in the correct handling of the patient's equipment (cups, plates, etc.) and in good laundry methods.
- Good hand washing practice must be taught to care givers.
- Family members must be supervised by the nursing staff to ensure safe practice.
- Water should be accessible to patients, staff, and visitors/caregivers. Water points, sanitary facilities, laundry areas must be available and easily accessible.
- It may be necessary to provide shelters for visitors and caregivers.

1.12 Medical Protocols and Reduction of Invasive Procedures

Injections and unnecessary invasive procedures should be minimised in order to reduce risk; only critical procedures should be performed. However, this may be difficult to achieve as medical practices may be entrenched and populations may expect or demand injections. The objective of reducing such interventions must be agreed with local medical staff, as attempts to change practices may cause resentment and reduce co-operation in other areas. Revising existing medical protocols in collaboration with the local medical staff can help to improve the adoption of oral treatments.

The intervention needs to have clear objectives, and in an epidemic, the objective within the hospital should be the control of infection. Activities implemented to achieve this objective, and the rationale must be clearly explained.

1.12.1 Surgery

Specific measures may be taken to reduce the risk of transmission during surgical procedures including the use of reinforced gloves and blunt needles.

These measures should be discussed with the surgical staff. Even if these measures are adopted, surgical procedures should be limited to life-saving situations.

- Use electric lancets.
- Do not use scissors, but only lancets, with a "hook".
- Wear additional, disposable protective sleeves, and change whenever they are contaminated with blood.
- Wear on the gown an additional disposable apron, and change whenever it is contaminated with blood.
- Use synthetic fibre gloves.
- Use blunt needles for sutures, as used for liver surgery.

1.12.2 Transfusion

Preventing the spread of infection through transfusion may be difficult. There is a risk to both the patient to receive the blood, and to the laboratory staff handling the blood. The blood cannot be easily tested for Ebola or Marburg because:

- The results will not be available for a number of hours, by which time the patient may have died.
- The PCR tests (which are the best for this purpose) are not sensitive in asymptomatic patients and during the first three days of symptoms.

The following measures are therefore recommended:

- Only life-saving transfusions should be attempted. Protocols should be discussed with the relevant hospital departments.
- The donors should be carefully screened; if they have fever or ANY symptoms or they are considered a contact they should not give blood.

1.12.3 Laboratory Services

This is discussed in Section 9.15 Laboratory Services.

1.13 Water Supply

Implementing standard precautions requires that an adequate quantity and quality of water is available. The quantities recommended in the “Minimum Requirements for Health Structures” should be adequate.

Quantity

Allow 40-60l per inpatient per day, and 5l per outpatient per day.

Quality

For preparation of chlorine solutions, the water should be clear. Turbidity should preferably be less than 5NTU. In case that turbidity is >20, water treatment should take place to reduce turbidity prior to chlorination.

For disinfection of drinking water, residual free chlorine should be 0.3-0.5 mg/l at the tap.

Storage

Depending on the reliability of the water supply, an emergency buffer stock of water should be established (a 2-day supply is advisable), and/or prior arrangements made for immediate deliveries of water should the supply fail.

Distribution

Water is required in the hospital, distribution points should not be too far from the point of use to motivate the staff to prepare the chlorine solutions in the wards and to change/ refill them as needed.

However, the existing system would have to be extremely poor to justify improving the system, or installing a new or temporary distribution system.

1.14 Peripheral Health Centres

In order to avoid the transmission of Ebola or Marburg in health facilities and to the community it is necessary to implement Infection Control measures in the peripheral health centres. Government and private health centres may pose very different problems, and require different approaches and solutions.

1.14.1 Closure of Peripheral Health Centres

The decision whether peripheral health centres should be closed depends on the importance of the service they provide and the degree of risk they may pose. It should be borne in mind that the closure of these services may cause people to seek treatment elsewhere, and they may go to places that are less safe or easy to control.

Non-essential services in these centres may be stopped. The health authorities should be consulted about the possibility of limiting procedures like injections, small surgery, laboratory services, etc. If possible, these procedures should be limited to hospitals in order to avoid multiple points in the community where transmission risk is elevated.

Assistance and interventions in private health facilities must be considered. The health authorities can order temporary closure if safe working practices cannot be guaranteed. However, an issue that may have to be taken into account is the financial ability of private health facilities to survive closure for more than a few days.

1.14.2 Infection Control in Peripheral Health Centres

The health authorities must agree to support and be involved in any interventions in the peripheral health centres.

There may be a large number of health centres working in a given area, and they may be widely dispersed. Therefore, sufficient time and resources need to be devoted to addressing infection control improvements in these health structures.

A nurse and a watsan should carry out an assessment of the health centres, and provide necessary advice and training on infection control procedures and health care waste management. If required, equipment such as sharps boxes, etc. can be provided. In every health centre, one person should be identified to be in charge of infection control.

The peripheral health centres may be useful places for the dissemination of information about the disease and the outbreak. Information and resource material should be provided, as well as advice on how to deliver the information to the community.

1.14.3 Triage and Referral System

It is important that good triage and a referral system to the VHF Treatment Unit be put in place for the detection and management of suspect cases. The referral system could link to the Alert teams (see Chapter 4: Epidemiology) or directly to ambulance teams for transfer to the hospital. The referral system must be supervised, by either WHO or MSF, or the government if able.

If patient numbers are high, it may be difficult to implement a formal triage system like the one described for hospitals (using triage forms etc). If this type of formal system is possible, it should be put in place. If not, education should be provided to the health centre staff about the disease, the symptoms, and the importance of referral. The importance of not conducting invasive procedures on suspect patients should be emphasised.

1.14.4 Water and Sanitation

To implement the changes in practices (hand washing, preparation and use of chlorine solutions, safe waste management, etc.) some assistance with basic infrastructure, materials, and equipment may be needed. It may be necessary to provide chlorine and water storage containers; the construction of a basic waste zone with facilities according to the needs should also be considered.

1.15 Laboratory Services

This section covers all normal laboratory services, but it does not cover specialised VHF laboratories.

Laboratory staff handling blood and other body fluids run the risk of exposure to VHFs. The risk varies with the sample being handled; for example, fixed malaria smears are thought to be safe, but whole blood is dangerous. Clearly, laboratory services are useful for the diagnosis of a wide range of conditions, and improve medical management. It may also be hard to re-train staff to work without a laboratory when the protocols used rely on laboratory tests. However, the value of laboratory services must be balanced against the risks to the staff, bearing in mind that many medical conditions can be adequately diagnosed and treated without relying on lab tests.

If triage procedures are working well, the chance of blood being taken from VHF patients in the hospital is reduced. Therefore, laboratory services in hospitals may be safer than laboratories outside. Closing laboratories outside hospital, and in hospitals with poor patient triage, should be considered. Special caution should be taken with haematology patients.

Training on safety measures and waste disposal for the laboratory services should be considered.

1.16 Vaccination

In a large epidemic, the safety of the normal vaccination program should be considered. The risk of transmission via these injections is generally less than that of therapeutic injections, as the people receiving the vaccine are not usually sick. However, there will always be some risk.

If programs are well organised and staff work safely with gloves and single use needles, the risk is probably low. Good sharps boxes should be used, with proper disposal systems. Providing advice on safety and equipment may be required.

Suspending the vaccination program can be considered, however if children are lost from vaccine programs they may never return to receive important injections. A catch up campaign for measles should be done once vaccination programmes are resumed.

!	Vaccines should never be given to people who are unwell.

1.17 Traditional Healers and Birth Attendants

Traditional healers and birth attendants are likely to be directly affected by VHF epidemics. They have often been described as being victims of the disease rather than implicated in the spread, although if they conduct invasive procedures there will be a risk of transmission. They must be included in the programme to improve infection control practices in the community.

1.17.1 Traditional Healers

Traditional healers can be very important and respected people in the local community, and their treatments and ceremonies may be integral parts of the culture and belief systems. Although not always easy, it is important to try to reach the traditional healers and engage them in discussions about the outbreak and the disease. The risks of VHFs should be explained to them, and the fact that that the risks to them are probably greater than the risks to their patients. They should be encouraged to take precautions, like wearing gloves, and adopting safe practices. They should be advised not to work if they feel even slightly unwell.

They should be encouraged to refer possible Ebola or Marburg patients to the alert system or the Treatment Unit.

1.17.2 Traditional Birth Attendants

Traditional birth attendants are at risk during an epidemic due to their considerable exposure to body fluids. Pregnant women suffering from VHFs often abort or miscarry; therefore, there is a higher risk when attending these births than normal full term births. Likewise, there is an increased risk in attending to any woman who is ill or has fever.

Advice about the disease, the risks they are exposed to, safety procedures, waste management, and the use of basic equipment should be offered. They should be encouraged to use the alert system for patients who are unwell or have fever. They should be advised NEVER to attend births when they feel even slightly sick.

Back to Table of Contents

Annex 1 Medical and Epidemiological Forms

Annex 1.1 Triage Form

Patient name:				Date:
Sex:	m	f	Age:	Register no.:
Address/Location:				
Reason for consultation:				
Time & date illness started:				
Did they receive treatment before coming to the hospital?				Yes No
What kind of treatment?_____				
Where did they receive treatment?			Hospital	Health centre (name): _____
Traditional healer: _____				Other_____

VHF Symptoms

Fever		Yes	No	# days: Temperature: _____ºc.
Vomit		Yes	No	Bloody Yes No
Headache		Yes	No	
Diarrhoea		Yes	No	Bloody Yes No
Nausea	Yes	No		
Haemorrhagic eyes		Yes	No	
Other haemorrhage		Yes	No	Location_____
Breathlessness	Yes	No		
Bone/muscle pain		Yes	No	
Loss of appetite		Yes	No	
Asthenia/weakness		Yes	No	
Abdominal pain	Yes	No		
Jaundice		Yes	No	

Swallowing problems	Yes	No
Hiccups	Yes	No

Contact History

Is there somebody ill in the family?	Yes	No
Have you visited someone who is ill?	Yes	No
Has somebody died recently in your family	Yes	No
Have you been to a funeral recently?	Yes	No

Suspicion of VHF	**Yes**	**No**

Patient Plan

Medicine ward		Adult emergency	
Orthopaedic ward		Paediatric emergency	
Surgery ward		VHF centre	
Maternity ward		Health centre	
Paediatric ward		At home	
Remarks:			
Name of nurse/doctor:			

Annex 1.2 Health Centre Kit

This kit allows health workers temporarily to take in charge a suspect VHF case while awaiting transfer to the VHF treatment unit.

This kit should be composed locally and distributed to Peripheral Health Care facilities during medical outreach. Before distribution, training has to be given, and health centre workers need to know and understand the safety protocols for working with suspect VHF cases. If this is not the case, it can be **more dangerous to distribute this kit and give untrained health care workers a false sense of safety** because of the protection equipment in it.

Quantities and items should be adjusted according to the needs: size of health structures, number of consultations, etc.

		Quantity	
Item	Description	Health Centre	Health Post
1	20 litre bucket with cover	2	2
2	Household bleach solution	15 btls	10 btls
3	Disposable latex gloves, medium size	500	200
4	Plastic apron	2	2
5	Rubber boots	2 pairs	2 pairs
6	Household gloves	2 pairs	2 pairs
7	Disposable mask	20	10
8	Goggles	2	2
9	Head cover	4	4
10	Single use gowns	4	4
11	Plastic sheet - 2 x 2 meters for covering mattress	5	2
12	Laundry soap bars	10	5
13	Plastic garbage bags	10	10
14	Plastic basin for hand washing after consultation	1	1

15	Body bags	2	2
16	Chlorine sprayer of 1 litre capacity	1	1
17	Sponge	5	2
18	Sharps box (or modified drug pot)	2	1
Documentation Sheets			
19	Universal precautions	1	1
20	Case definitions	1	1
21	Preparation of chlorine solutions	1	1
22	Sterilisation procedure	1	1
23	Use of chlorine solutions in VHF	1	1
24	Triage forms	400	200
25	Information and sensitisation material	500	300