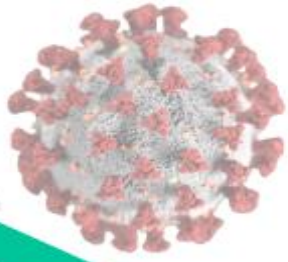
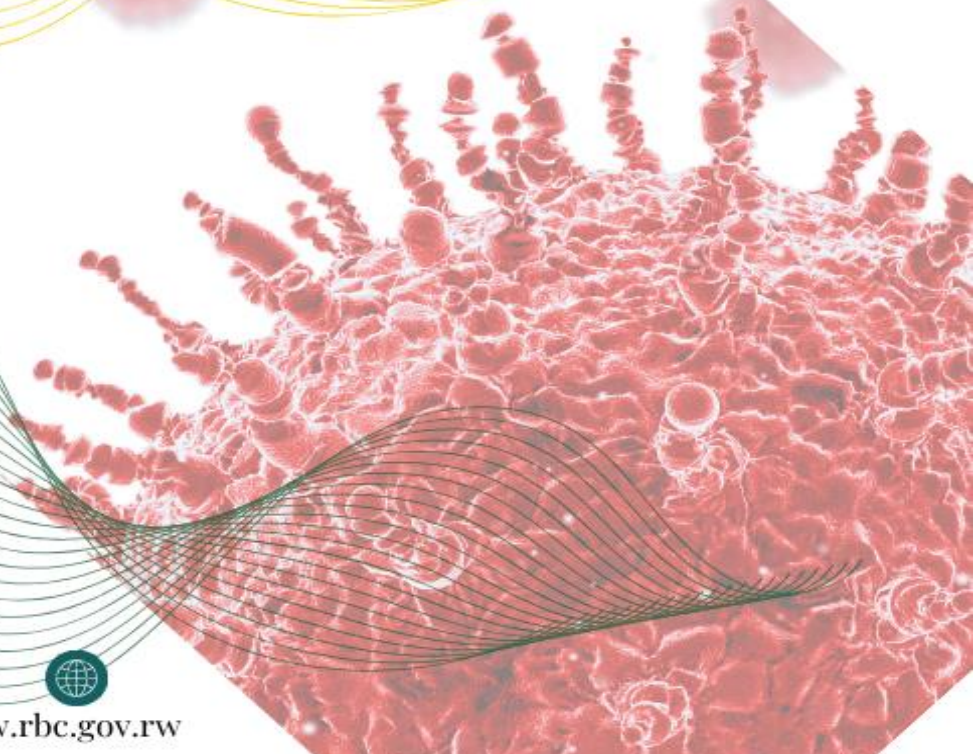
Rwanda Biomedical Centre

Healthy People, Wealthy Nation

RWANDA NATIONAL GUIDELINE FOR DETECTION AND MANAGEMENT OF VIRAL HEMORRHAGIC FEVERS





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These guidelines were developed based on the following documents:

1. https://www.cdc.gov/viral-hemorrhagic-fevers/hcp/infection-control/index.html
2. https://rbc.gov.rw/IMG/pdf/cdc_ebola_handbook.pdf
3. https://iris.who.int/bitstream/handle/10665/205570/9789241549608_eng.pdf?sequence=1
4. https://africacdc.org/download/africa-cdc-event-based-surveillance-framework-2/
5. IDSR guideline - third edition: https://iris.who.int/bitstream/handle/10665/325015/WHO-AF-WHE-CPI-05.2019-eng.pdf?sequence=1

Foreword

Viral haemorrhagic fevers (VHF) are emerging and re-emerging at an increased frequency across Africa for various reasons not limited to unplanned urbanisation, climate change, spread of vectors, increase movement/travel of potentially infected hosts, limited number of vaccines against VHF pathogens, etc. The Republic of Rwanda is not an exception, especially being at risk and vulnerable to cross-border transmission of VHFs occurring in neighbouring countries (who are also facing multiple outbreaks). It is therefore critical to equip health workers with the right knowledge, skills, and practice principles, needed to prevent, prepare and respond safely to VHF disease outbreaks in health facilities and the community.

The Rwanda Ministry of Health through the Rwanda Biomedical Centre, (the nation's central health implementation agency) has led the development of this comprehensive VHF guideline. The cumulative practice experiences gained from the country's past RVF outbreak provided the driving force for the development of this first 2024 edition of the national VHF guidelines. Seven VHFs which are Rift Valley Fever (RVF), Ebola disease, Marburg, Yellow Fever, Crimean-Congo Hemorrhagic Fever (CCHF), Dengue fever and Chikungunya have been prioritised for efforts towards prevention, control and response in healthcare facilities and during outbreak response within communities.

The guideline provides guidance on improved surveillance (including through sentinel surveillance) and response, case management and infection prevention and control (IPC) practice, and risk communication and community engagement (RCCE). The guideline provides details of not only the tenets of infection prevention and control in VHF contexts, but also the epidemiological, laboratory and clinical backgrounds for various VHFs, linking them up appropriately to the expected IPC actions, that ensure safety of health workers and best patient outcomes.

This document represents the outcome of robust stakeholder discussions, deliberations, research, observations and expert reviews. The outputs of these processes were birthed through validation by experts in alignment with the current World Health Organization requirements and consistency with global best practices.

I encourage health facility heads, all healthcare workers across all cadres and all stakeholders to deliberate on and act on the content of this document by adopting its guidance for use in all surveillance and outbreak response, in clinical and public health settings where suspected and confirmed VHF cases are to be managed.

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Acknowledgements

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We are grateful for the financial support from US CDC and TFGH for the establishment of seven VHF sentinel sites across the country.

A full list of contributors is provided in the annex.

1. INTRODUCTION

1.1. Background

Viral hemorrhagic fevers (VHFs) refer to a group of epidemic prone diseases that are caused by several distinct families of highly infectious RNA viruses. These viruses are a major concern to global public health because of their potential as bioweapons and the possibility to cause outbreaks with high fatality rates. Global travel, trade, climate change, and changes in human behaviour have contributed to an increase in VHF outbreaks and emergence in new areas. As a result of climate change and shifting vector ranges, VHFs are spreading to new environments while threatening rural livelihoods and health. The emergence and re-emergence of VHFs pose a grave threat to human health due to their high mortality rates. Over the past century, more than 20 Ebola outbreaks have occurred globally, with the 2014-2016 outbreak in Western Africa that lasted 28 months, the outbreak resulted in 28 652 cases and 11 325 deaths. Of the dead, 518 (5%) were health-care workers. This highlights the need for robust public health systems and standardised data collection methods to track VHF trends, especially within seasonal contexts. In the East African region, VHFs like yellow fever, Rift Valley Fever (RVF), Marburg, Crimean-Congo hemorrhagic fever or Congo River (CCHF) and Ebola disease have caused significant outbreaks.A large RVF country-wide outbreak occurred in Rwanda in the year 2022, especially in the eastern and southern Provinces, affecting both human (cases:125, deaths: 22) and animal (cases: 1339, deaths: 516),

1.1.1. Rationale

Rwanda has experienced a range of hazards including outbreaks of VHFs such as the 2022 RVF outbreak, resulting in a total of 125 confirmed human cases and 22 deaths with case fatality of 17.6 %. A national all hazards risk assessment was conducted in January 2023 using the WHO Strategic Tool for Assessing Risks (STAR), to identify hazards facing the Rwandan population and ranked them according to the likelihood of occurrence and their impact. This assessment identified 26 hazards which included VHFs such as RVF which was ranked as ‘very high’, Ebola disease as ‘high’ and Marburg as moderate. Additionally, the risk of regional transmission of VHFs is high due to strong trade and travel links among regional member states. Rwanda is situated amidst neighbouring countries experiencing VHF outbreaks, hence faces an elevated risk of VHF importation.

VHFs are of public health importance because they can spread rapidly especially within a hospital setting, with high case-fatality rate (CFR) and are difficult to detect and diagnose due to the ability to mimic common infections such as malaria and typhoid. Therefore, enhancing VHFs surveillance and testing capabilities for multiple VHFs is crucial in ensuring proactive and timely responses to outbreaks. Strengthening laboratory capacities, improving healthcare provider training, and fostering collaboration with neighbouring countries are imperative steps to mitigate the risks associated with VHFs in Rwanda and the broader East African region. Hence, this guideline is developed to provide guidance on prevention, preparedness and response to VHFs cases in Rwanda. The Rwanda Biomedical Centre (RBC) in collaboration with its partners - United State



Centers for Disease Control (US CDC) and Task Force for Global Health (TFGH) are establishing VHF sentinel sites to improve early detection, response, and control of VHF outbreaks and build laboratory capacity for VHF surveillance in Rwanda.

1.1.2. Scope and objective

This VHF guideline provides guidance on proposed interventions that should be adopted for VHF surveillance prevention, preparedness, and response in Rwanda. It covers areas in surveillance (including sentinel surveillance), investigation and response; Laboratory; Case management; Infection Prevention and Control (IPC); and Risk Communication.

1.1.3. Target audience

This document is targeted for use by health care providers and other VHF stakeholders involved in the VHF sentinel surveillance to ensure that the day-to-day operations are carried out correctly (quality) and systematically across all sentinel sites.

1.2. Overview of Viral Haemorrhagic Fevers

Viral hemorrhagic fevers (VHFs) refer to a group of epidemic prone diseases that are caused by several distinct families of viruses. In general, the term "viral hemorrhagic fever" is used to describe a severe multi-system syndrome (multiple organ systems in the body are affected). Characteristically, the overall vascular system is damaged, and the body's ability to regulate itself is weakened. While some types of hemorrhagic fever viruses can cause relatively mild illnesses, many of these viruses cause severe life-threatening diseases. Patients of severe cases of VHF often show signs of bleeding. Most VHFs fall into one of the families of viruses:

- *Arenaviridae*: Lassa fever, Junín (Argentine HF), Chapare HF, Lujo HF, Machupo (Bolivian HF), Sabiá (Brazilian HF) Guanarito (Venezuelan HF)
- *Bunyaviridae:* Crimean-Congo hemorrhagic fever and Rift Valley fever, Dobrava HF, Hantaan HF, Saaremaa HF, Puumala HF, Seoul HF
- *Filoviridae*: Ebola disease and Marburg viruses disease
- *Flaviviridae:* Yellow fever, Dengue fever, Alkhurma HF, Omsk HF, Kyasanur Forest Disease
- *Togaviridae*: Chikungunya Virus disease

1.2.1. Characteristics of Viral Hemorrhagic Fevers (VHFs)

- They are RNA viruses, meaning viruses that have ribonucleic acid (RNA) as their genetic material. These viruses are the most common cause of emerging disease in people because RNA viruses change over time at a high rate.
- They are covered, or enveloped, in a lipoprotein outer layer, making it easier to destroy these viruses with physical (heat, sunlight, gamma rays) and chemical (bleach, detergents, solvents) methods.
- They naturally exist in animal or insect populations, referred to as *host populations*, and are generally restricted to the geographical areas where the host species live.

- They spread to people when a person encounters an infected animal or insect host. After the initial spread into the human population, some VHF viruses can continue to spread from person-to-person.
- Outbreaks of VHFs in people can be difficult to prevent since they can occur sporadically and cannot be easily predicted.

1.2.2. Description of illness

Though signs and symptoms vary, VHF is usually characterised by onset of high fever, muscle aches, and fatigue. The duration of illness ranges from a few days to weeks. As the disease progresses, symptoms may include petechiae, bruising, swelling around the eyes, flushing, shock, sustained fever, and sweats. Bleeding occurs from mucous membranes and may present as nosebleeds, bleeding gums, bloody vomit, bloody urine, and blood in stools or sputum. Patients often go into shock, with multiorgan dysfunction. Encephalopathy, hepatitis, tremors, and reduced white blood cell and platelet levels are frequently seen. Renal failure may develop. The differential diagnosis includes a variety of viral and bacterial diseases, influenza, hepatitis, staphylococcal or other bacterial sepsis, toxic shock syndrome, rubella, measles, and hemorrhagic smallpox, among others. Non-infectious diseases that present with bleeding also must be excluded (e.g., hemolytic uremic syndrome and leukaemia). Mortality rates for VHFs vary depending on the agent and strain and can range from 10%to 90%. In Lassa, VHF, sensorineural hearing loss affects about one third of patients, with only half recovering hearing after 1–3 months.

1.2.3. Reservoirs

Many wild and domestic animals, ticks and mosquitoes are known to carry viruses that cause VHF, although the reservoirs have not been identified for all VHF agents. Rodents are known to be carriers of OMSK HF, VHF-associated arenaviruses, and most VHF-associated bunyaviruses. Some ticks harbour Alkhurma, Crimean-Congo HF, and Kyasanur Forest Disease viruses. Livestock (cattle, sheep, goats, and camels) can carry bunyaviruses that cause VHF (Rift Valley, Crimean-Congo HF). Primates are the only non-human animals known to have been affected by Ebola and Marburg disease. However, these infections are associated with rapid and often fatal disease in these animals, they are not considered reservoirs. Fruit bats, on the other hand, are likely reservoirs for Ebola and Marburg.

1.2.4. Sources and Routes of Transmission

Depending on the virus, initial human cases in VHF outbreaks typically involve exposure to affected reservoir rodents or their spoor (arenaviruses, Omsk HF, Lassa HF), reservoir bats or infected bushmeat (Ebola, Marburg), infected livestock (Rift Valley Fever, Crimean-Congo HF), ticks (Alkhurma, Omsk HF, Crimean-Congo HF) or mosquitoes (yellow fever, dengue, Rift Valley Fever). Several VHF infections can subsequently be transmitted via person-to-person contact (Ebola, Marburg, Lassa, Lujo and other arenaviruses, Crimean-Congo HF). In these situations, infection can result from direct contact with infectious body fluids or contaminated fomites. Sexual

transmission of Ebola and Lassa fever has been documented. Unsterilized medical equipment has been implicated in the spread of several communicable VHFs. In rare cases, laboratory workers have been infected through handling of specimens. Airborne spread has never been documented.

1.2.5. Incubation Period

The incubation periods for various VHFs range from 2 to 21 days, with an average of 3 to 10 days

1.2.6. Period of Communicability or Infectious period

No VHF infection has been reported in persons who had contact with a case only during the incubation period (that is, before onset of fever). Risk for transmission appears greatest during the later stages of illness. It seems prudent, however, to assume that individuals suspected or confirmed to be ill with VHF are infectious throughout the clinical course. Anyone, including healthcare and laboratory personnel, who has had close contact with a symptomatic case's secretions (or with body fluids of a high-risk symptomatic contact of a case) in the absence of appropriate infection control precautions should be placed under medical surveillance with fever watch for 21 days after last exposure. Viruses may remain in the blood and secretions for months after an individual recovers. WHO currently recommends that male Ebola disease survivors refrain from unprotected sexual activity for at least 12 months after symptom onset or until their semen has twice tested negative for Ebola. Contaminated bedding, clothing, and medical equipment may remain infectious for several days.

1.2.7. Epidemiology

Globally, VHFs are a significant public health concern due to their severe and life-threatening nature, high case fatality rates of up to 90% for some viruses, and lack of specific treatments and vaccines, except for yellow fever. These zoonotic diseases caused by distinct virus families have varying epidemiological patterns and clinical manifestations, often with overlapping symptoms. VHFs are epidemic-prone and unpredictable, making them challenging to control. Outbreaks have occurred in various regions, including remote areas and healthcare settings, leading to nosocomial transmissions.

In Africa, outbreaks of Ebola, Marburg, Lassa, Crimean-Congo haemorrhagic fever (CCHF), and Rift Valley fever (RVF) viruses have been reported. West Africa experienced the largest Ebola outbreak between 2014-2016, primarily affecting Guinea, Liberia, and Sierra Leone, with over 28,000 cases and 11,000 deaths. The Marburg virus caused outbreaks in Angola, Democratic Republic of the Congo, Kenya, and Uganda, with case fatality rates up to 88%. Lassa fever is endemic in West African countries like Nigeria, Liberia, and Sierra Leone, with case fatality rates of 1-2%. Nigeria in 2024, From 1 January 2024 to 11 February 2024 there were 411 confirmed cases, including 72 deaths with 2122 suspected cases reported.

In East Africa, Ebola outbreaks occurred in Uganda, Sudan, and the Democratic Republic of the Congo, with the 2018-2020 outbreak in the Democratic Republic of Congo (DRC) being the second largest, causing over 3,400 cases and 2,200 deaths. The Marburg virus caused outbreaks in

Uganda and Kenya. CCHF outbreaks were reported in Uganda, with case fatality rates up to 40%. RVF outbreaks affected countries like Kenya, Somalia, Tanzania, and Sudan, with case fatality rates ranging from 10-30%.

The first RVF outbreak in Rwanda was recorded in 2018 along the Akagera - Nyabarongo - Akanyaru rivers and Muhazi Lake. This was followed by a much larger countrywide outbreak which occurred in 2022, especially in the eastern and southern provinces, affecting both humans (cases:125, deaths: 22) and animals (cases: 1339, deaths: 516).

1.2.8. VHFs of importance in Rwanda

Seven VHFs have been prioritised for sentinel surveillance in Rwanda. These VHFs were prioritised based on evidence of complexity, severity, spread, and magnitude of past outbreaks in the region, potential for cross-border transmission and the findings of the hazard risk assessment in the country. Additionally, in the region, multiple outbreaks of some of these VHFs have been recorded in the past while some are endemic.

A. Rift Valley Fever (RVF)

Rift Valley fever (RVF) is a viral zoonosis that primarily affects animals but also has the capacity to infect humans. It is a mosquito-borne virus disease, member of the *Bunyaviridae* (genus Phlebovirus) family, and causes outbreaks of abortions and deaths of young livestock (predominantly sheep, goats, and cattle). Transmission of RVF to humans can be through contact with the blood, body fluids, or tissues of infected animals or through bites from infected mosquitoes. The incubation period is generally 2-6 days following exposure. Typically, illness is asymptomatic or mild in the vast majority of infected persons, with a small proportion (8-10%) experiencing severe disease.

RVF is a major human, agricultural, and economic threat in Africa and the Middle East, posing major constraints on trade in animals and animal products. Owing that Rwanda is a country with extensive cattle production, cattle have great cultural and economic significance in the country while sheep and goats are widespread and have potential to advance to livestock sector development. Eleven percent of Rwanda's gross domestic product (GDP) came from the livestock subsector in 2019.

The 2018 RVF outbreak in East Africa (Kenya, Rwanda and Uganda) was reported to be closely linked with excessive rainfall associated with El Niño-Southern Oscillation (ENSO) which flooded the mosquito vector dambo habitats. This is a great indication of the impact of climate change on shifting mosquito ranges which favours RVF spread to new environments causing threats to rural livelihoods and health.

The country has recorded several RVF outbreaks in animals and humans. Clusters of RVF cases and antibodies have been periodically detected in Rwanda since 2012 with confirmed cases of morbidity and mortality in livestock. In 2018, RVF outbreak resulted in xxx. Additionally, throughout 2020 outbreak among livestock, with many occurring in the Eastern Province, signified

a continuing challenge. In 2022, an outbreak of RVF occurred, affecting both humans (cases:125, deaths: 22) and animals (cases: 1339, deaths: 516).

B. Ebola

Ebola disease is an acute, often fatal illness caused by infection with a group of viruses within the family *Filoviridae*, genus Ebolavirus. The average case fatality rate of Ebola disease is around 50% (varying from 25%-90%). Ebola disease most commonly affects people and nonhuman primates such as monkeys, gorillas, and chimpanzees. Fruits bats of the *Pteropodidae* family are thought to be the natural Ebola virus reservoirs. Humans are initially infected through contact with an infected animal such as a fruit bat or non-human primates such as chimpanzees, gorillas, monkeys, etc. (whether ill or dead). After that, the virus spreads from person to person via direct contact with blood or body fluids. The incubation period is generally 7-10 days (range 2-21 days). Symptoms include fever, headache, muscle and joint pain, fatigue, sore throat, vomiting, diarrhoea, and internal or external haemorrhage.

The Eastern Africa Region, politically known as the East-African Community, is home to a dynamic population of 470,540,090 people across seven states; Uganda, Tanzania, Kenya, Burundi, Rwanda, Democratic Republic of the Congo (DRC), and South Sudan.

Following official announcements by the World Health Organization (WHO), two East-African states have recently reported Ebola disease outbreaks. On August 21, 2022, Health authorities in DRC announced an outbreak of Ebola disease in North Kivu Province. This outbreak emerged just 4 months after the fourteenth outbreak was declared in the country on April 23, 2022, bringing the total to fifteen outbreaks. On September 20, 2022, Uganda's health body declared an outbreak of Sudan ebolavirus following a confirmed case in Mubende district.

Considering the geography and how the region is characterised by high mobility, cross-border intense trade activities and a high volume of population movement, porous border movement of people and goods has to be taken into consideration making it very difficult to implement effective disease control measures which poses a substantial risk to border communities and to the public health in the broader region.

C. Marburg

Marburg Virus Disease (MVD) is a rare but severe hemorrhagic fever that is often fatal in humans and non-human primates. Similar to Ebola viruses, Marburg viruses are in the virus family Filoviridae. The average case fatality rate of MVD can vary from 23% to 90%. The natural reservoirs of Marburg viruses are known to be African fruit bats, *Rousettus aegyptiacus*. Symptoms include high fever, severe headache, severe malaise, myalgia, nausea, vomiting, chest pain, sore throat, abdominal pain, and diarrhoea. Symptoms become increasingly severe and can include jaundice, inflammation of the pancreas, severe weight loss, delirium, shock, liver failure, massive haemorrhaging, and multi-organ dysfunction.

Since its discovery, the region has experienced several outbreaks, notably in Uganda(2007, 2012,2014,2017), the Democratic Republic of Congo (1998,2000) and the latest in Tanzania 2003)

D. Yellow Fever

Yellow fever is a well-known mosquito-borne virus which is endemic in tropical and subtropical areas of Africa and Central and South America. In the East Africa region, countries such as Uganda, Kenya, Ethiopia and Sudan have experienced several outbreaks in recent years. Rwanda's proximity to countries with higher incidence rates increases the risk of introduction and the spread of the virus. The fact that a very effective vaccine is available tends to limit the potential for the spread of YF infections. Transmission of yellow fever virus to people is primarily through the bite of infected *Aedes* or *Haemagogus* species mosquitoes. Mosquitoes acquire the virus by feeding on infected primates (human or non-human) and then can transmit the virus to other primates (human or non-human). The incubation period is generally 3-6 days post the bite of an infected mosquito. The majority of the patients are asymptomatic; however, patients may develop symptoms such as fever, chills with prominent backache and headache. Most people who develop symptoms improve within one week, however, a small percentage of patients may enter a more complicated stage and present with symptoms such as the return of high fevers, jaundice (yellow) skin or eyes, shock, dark urine, abdominal pain with vomiting mostly related to hepatic and renal damage. There is also a possibility of bleeding from the mouth, nose, eyes, or stomach. 50% of the patients who enter the complicated stage die within 7-10 days.

E. Crimean-Congo Hemorrhagic Fever (CCHF)

Crimean-Congo hemorrhagic fever (CCHF) is a widespread disease caused by a tick-borne virus (Nairovirus) of the *Bunyaviridae* family, with an approximate case fatality rate of 30%. Ticks, especially those of the genus Hyalomma, are both the reservoir and vector of the CCHF virus. Numerous wild and domestic animals such as cattle, goats, sheep, and hares serve as amplifying hosts for the virus. Transmission to humans occurs through contact with infected ticks or through contact with infected animal blood or tissues. CCHF can also be transmitted from one infected human to another by contact with infectious blood or body fluids.

Although CCHF outbreaks are relatively rare compared to other VHFs. Rwanda and the East African region agriculture practices, livestock farming and trade coupled with the presence of hylomma ticks heightens the risk of transmission and the economic impact can be devastating to the region.

F. Dengue Fever

Dengue fever is an arbovirus transmitted by Aedes mosquitoes (both *A. aegypti* and *A. albopictus*). Dengue is caused by four serologically distinct but closely related viruses: dengue virus (DENV) 1, 2, 3, and 4 of the Flaviviridae family. Dengue fever is a severe influenza-like illness that affects infants, young children, and adults but seldom causes death. There is no specific treatment for dengue, but appropriate medical care frequently saves the lives of patients with dengue hemorrhagic fever.

Dengue fever has affected particularly countries like Somalia, Kenya, Tanzania and Uganda which experienced multiple outbreaks in recent years, for instance between 2014-2020 there have been at least five significant outbreaks reported across these countries. Aedes mosquitoes thrive in tropical and subtropical climates of east africa. High population density, rapid urbanisation, and inadequate water management contribute to the proliferation of mosquito breeding sites, exacerbating the spread of the virus.

G. Chikungunya

Chikungunya(CHIKV) is a virus that spreads through mosquito bites, specifically through the *Aedes aegypti* mosquito and *Aedes albopictus* mosquito. The disease resembles dengue fever and is characterised by severe, sometimes persistent joint pain (arthritis), as well as fever and rash. It is rarely life-threatening. The word "Chikungunya" is Makonde for "that which bends up" in reference to the stooped posture of patients afflicted with the severe joint pain associated with the disease.

CHIKV is considered endemic in Africa but only DRC and Kenya have experienced recorded outbreaks which underscore the region's vulnerability due to factors such as high mosquito density and population mobility. The burden of chikungunya affects the most local communities with acute symptoms of arthritis and fever.

2. SURVEILLANCE OF VIRAL HEMORRHAGIC FEVERS

Surveillance of VHFs in Rwanda is conducted through the indicator based surveillance (IBS) and event based surveillance (EBS) as components of the early warning and response system (EWAR). These complementary surveillance approaches enable rapid detection of signals that can potentially constitute acute public health events, to enable prompt verification, investigation and response thereby minimising spread of VHF viruses in the community (Fig. 1).

2.1. Event based surveillance

For EBS, suspected VHF cases can be identified through regular surveillance activities in the community, at Points of Entry (POEs), among patients presenting at the health facilities, through media scanning, and hotlines. Proper management of VHF signals, alerts, and events in Rwanda is ensured through signal verification to differentiate genuine cases from false alarms and risk assessment to characterise the nature and severity of the situation. This helps to reduce false alarms; determine if a public health response is warranted; and guides the appropriate scale and type of intervention required to mitigate the impact of a VHFs outbreak effectively. (see annex xxx for EBS consideration for VHF surveillance in Rwanda)

2.1.1. Signal detection

Unusual public health events, illnesses, or deaths that might signal an outbreak are detected at the community, PoE or health facility by community health workers (CHWs) also known as "Lookouts", community animal health workers (CAHWs) and PoE screeners, using the

community case definition for VHFs (see table xx below). The EIOS Media scanning platform monitors online information about VHF cases in Rwanda, neighbouring regions, and globally. The Hotline EBS operates via the toll-free number 114, serving as a helpline for community members to report unusual events or diseases including VHFs. These signals are reported immediately to the district Integrated Disease Surveillance and Response (IDSR) focal persons and Provincial PHEOC through the electronic community-based surveillance platform (eCBS) or impuruza system which is hosted on the electronic Integrated Disease Surveillance and Response (e-IDSR), for triage and verification.

2.1.2. Triage and Verification of signals

All identified signals are triaged and verified within 24 hours of reporting to ensure that hoaxes, false rumours, and artefacts are eliminated from further consideration and to confirm whether they constitute an actual event or should be discarded. It is performed through a structured process by contacting the primary source or involving additional sources or conducting field investigations. Verification can be done by phone or by visiting the person who reported the case. A signal log is used to review information about the origin and nature of the VHF event and establish a basic epidemiological description.

Important questions to guide verification are:

- Where, when, who is affected?
- Does the description suggest a potential event?
- How valid is the information?" regarding the event reported.

2.1.3. Risk assessment of events

With the support of the PHEOC or RBC central level, risk assessment of true VHF events is conducted within 24 hours of verification, by the District PHEMC, using the risk assessment algorithm (see figxx below), to rapidly understand and assign the level of risk posed by the event, determine the level of response and inform decisions on how to manage and reduce the negative consequences of the VHF event. The VHF event is managed according to the assigned response level, by the district RRT or with the support of the national RRT.

Note: Three components of risk assessment (hazard assessment, exposure assessment and context assessment) should be considered during an assessment of a VHF event. (see annex xx)

Phases of a risk assessment for VHF event

The level of risk may change over time therefore, risk assessment should be repeated as new information on the events becomes available (e.g., new cases, new areas affected) until the end of the response. A risk assessment involves one or several phases, including the following:

- Initially designate the level of risk to VHF event, in terms of potential impact and likelihood, and raise an alert accordingly (Annex 3: Risk Assessment matrix for VHF)

- Once the alert is raised and more epidemiological information is received, conduct an in-depth outbreak investigation of the alert to better characterise the agent, populations at risk, and ongoing morbidity and Mortality.

2.1.4. VHF surveillance at Point-of-Entry Surveillance

Point-of-entry (PoE) surveillance is a crucial aspect of public health measures aimed at preventing the spread of VHFs across international borders as recommended by IHR. This surveillance strategy primarily focuses on temperature screening for individuals entering the country through different points of entry, including the Kigali International Airport (KIA) and various land borders. Travellers are routinely screening for identification of sick travellers with symptoms and referral to designated healthcare facilities.

Primary screening is conducted by trained PoE health or non-health personnel only, using the thermoflash or thermoscan. Travellers who seem to be sick and/ or have temperature ≥ 38°C are separated from the crowd and allowed to rest in the holding area for 20 minutes.

Secondary screening is conducted by trained health personnel workers who reassess the traveller after that time and details are recorded in the PoE health assessment tool (see annex) for further evaluation at the health facility. If the traveller still appears sick and/or temperature remains ≥ 38°C, the PoE Health Notification and verification forms are filled and the IDRS focal person at the nearest health facility is notified immediately for proper referral.

The POE health personnel should list and record potential contacts and all persons travelling with the suspected case using the Contact listing (see annex) and attach the manifest when available.

2.2. Indicator Based Surveillance

IBS data for VHFs is reported through the electronic Integrated Disease Surveillance and Response (e-IDSR) and utilises various strategies, including existing routine surveillance in health facilities and enhanced model employing active surveillance in selected sentinel sites across the country. Suspected VHF cases are detected by IDSR focal person/health care workers or sentinel site VHF focal person (for sentinel sites), using the sentinel site/health facility case definitions and reported immediately for investigation, sample collection and testing.

2.2.1. Routine VHF surveillance in health facilities

VHf related data are systematically collected, analysed, and interpreted by trained health facility surveillance/IDSR focal persons. All trained healthcare providers (nurses and doctors) that encounter patients are required to identify and immediately report suspected cases of VHF that meet the case definition to the surveillance officers (IDSR Focal Person).

Key points for health facility VHF surveillance

- Prompt detection and notification of VHF cases. To be promptly notified are:
  - the Health Facility Head
  - the IDSR Focal Person

- PHEOC Manager
- VHF Sentinel Site Focal Person
- PHS & EPR Division
- NRL Division

- Sample collection as per SOPs*: To be conducted by a trained lab technician following all IPC measures.
- Complete case investigation form*: To be conducted by the district hospital's RRT with the supervision PHEOC's officer.
- Complete contact listing form*: To be conducted by the district hospital's RRT with the supervision PHEOC's officer.
- Basic symptom management*: To be conducted by a trained clinician.

All suspected VHF cases are reported immediately in the e-IDSR system within 24 hours by surveillance officers after completing the case investigation form (see Annex 1)

2.2.2. Enhanced VHF Surveillance through Sentinel Sites

Enhanced surveillance of VHF is established in selected sentinel sites strategically distributed across the country through the collection and analysis of individual patient-related information to monitor trends in VHF. By reducing the number of sites actively collecting case-based data and focusing on key locations, such as healthcare facilities, where VHFs are likely to be detected, this approach minimises resource requirements while maximising the depth of data collected.

a. VHF sentinel surveillance sites selection and selection criteria

Seven VHF sentinel sites were selected based on their location and accessibility. Hence, these sites are all situated in regions with higher risk of VHF transmission and are accessible to other health facilities to receive and test VHF samples. The seven VHF sentinel sites set also established as satellite laboratories include:

1. Gihundwe DH
2. Gisenyi DH
3. Kibuye PH
4. Ruhengeri RH
5. Nyagatare DH
6. Kibungo PH
7. CHUB

Map of Rwanda showing the sentinel sites

Table showing the sites name, location, date health facility was established

b. Population under surveillance

Inpatients and outpatients who meet the VHF case definition for sentinel sites will be isolated, samples collected for laboratory confirmation and will be managed according to the case management guideline.

c. Sentinel surveillance functions

Active surveillance methods which include regular visits by trained surveillance officers in departments such as internal medicine and paediatrics wards are conducted. Community engagement and targeted case finding are implemented to detect and respond to potential VHF cases promptly.

d. Staff at sentinel sites and their responsibilities

For efficient surveillance at the designated sentinel sites, there must be trained staff with assigned responsibilities.

Staff	Responsibilities
Medical Focal Point (MFP)	Patient identification Completion of case investigation forms in e-IDSR
Other dedicated healthcare providers	
Surveillance Officer (SO)	Patient identification
	Completion of case investigation forms in e-IDSR
	Aggregation of data
	Reporting outcomes
	Training other healthcare providers
	Disseminating feedback within the local community
	Specimen collection
	Sample storage according to established laboratory procedures
	Maintain records
	Monitor the stock of sampling materials and consumables to ensure seamless surveillance operations

Laboratory testing for the prioritised seven VHFs will be conducted at the sentinel sites. The RBC/BIOS/national reference laboratory (NRL) will reconfirm all positive samples (including VHF characterization) as outlined in the laboratory component part.

The VHF sentinel surveillance system is coordinated and monitored by the RBC/HDPC/ Public Health Surveillance & Epidemic Preparedness and Response (PHS&EPR) division. This division is responsible for:

- Data collection, collation and analysis.
- Data reporting/feedback.
- Dissemination of information
- Training
- Supervision of sentinel sites
- Communication with other involved partners.
- Funding

Fig: Surveillance data flow

2.3. Case definition

Surveillance for VHFs is a collective responsibility of the community, healthcare workers, District IDSR Focal Persons, and the Central surveillance officers at the RBC. Cases should be identified according to the case definitions and reported to the appropriate level immediately.

Surveillance Points	Case definition



Sentinel site and Health facility (including laboratory)	**Suspected case:** Any person who has an unexplained sudden onset of acute fever of ≥37°C and with two or more of the following: · headache · fatigue · sore throat · loss of appetite · vomiting · diarrhoea · nausea · hiccups · Skin rash · difficulty swallowing · difficulty breathing · abdominal pain · muscle or joint pain · unexplained bleeding not related to injury · conjunctivitis · Unexplained visual loss · acute flu-like illness OR Any person alive or dead suffering or having suffered from a sudden onset of fever (≥38°C) AND having had contact with one or more of the following within 3 weeks before onset of symptoms: ● A suspected, probable, or confirmed VHF case (alive or dead) ● A dead or sick animal (such as bats, monkey, rodents, ticks, livestock animals) ● Having travelled to a VHF endemic area or area with active transmission OR Any person with inexplicable bleeding OR Any sudden, inexplicable death OR Unexplained death following sudden onset of acute flu-like illness with haemorrhage, meningo-encephalitis, or visual loss **Probable case:**



	Any deceased suspected case (where it has not been possible to collect specimens for laboratory confirmation) having an epidemiological link with a confirmed VHF case. **Note:** if laboratory specimens are collected in due time during the illness, the preceding categories are reclassified as "laboratory confirmed" cases and "non-case". **Confirmed:** Any suspected or probable case with a positive laboratory result. Laboratory confirmed cases must test positive for VHF viral antigens, either by: · Detection of virus RNA by reverse transcriptase-polymerase chain reaction (RT- PCR) · Detection of VHF viral antigens in blood by enzyme-linked immunosorbent assay (ELISA). · VHF viral isolation in cell culture for blood or tissues. OR epidemiologic link to VHF confirmed cases or outbreak



EBS (Community, Media scan, Hotlines) **Alert case**	Any person who has fever (verbal) with or without bleeding OR Intensely sick OR Any person who has fever with no response to treatment AND with one or more of the following: • Bleeding (from the nose or any other part of the body) • headache • fatigue • sore throat • loss of appetite • vomiting • diarrhoea • nausea • hiccups • skin rash • difficulty swallowing • difficulty breathing • abdominal pain • muscle or joint pain • unexplained bleeding not related to injury • conjunctivitis • unexplained visual loss • acute flu-like illness OR Any person who died suddenly or after an unexplained severe illness with fever and bleeding

PoE	**Alert case:** Any person who has fever of ≥38oC and with three or more of the following: • headache • fatigue • sore throat • loss of appetite • vomiting • diarrhoea • nausea • hiccups • Skin rash • difficulty swallowing • difficulty breathing • abdominal pain • muscle or joint pain • unexplained bleeding not related to injury • conjunctivitis • Unexplained visual loss • acute flu-like illness
Note: *During an outbreak, case definitions may be changed to correspond to the local event. It is important to note that during outbreaks, most cases might not show hemorrhagic manifestation, a proper history taking is crucial* ***Non-case*** *Any suspected or probable case with a negative laboratory result within the appropriate time frame. "Non-case" showed no specific RNA (see Laboratory Algorithm for Interpreting Initial RT-PCR Testing for VHF Virus).*	
Signal	A data and/or other information detected as a potential VHF case
Events	A VHF signal that has been verified and confirmed as an event/
Alert	An event that has been risk assessed, and requires an intervention (an investigation, response or communication with partners or the public)
Alert threshold	A single case



Epidemic threshold	A single confirmed case

2.4. Data management

2.4.1. Data Collection and reporting

All cases of VHF identified through the IBS or EBS should be reported within 24 hours of detection using the data tool. The collection and reporting of cases/outbreaks of VHF should be based on standard case definitions as outlined in this document and should follow the Rwanda reporting system /flow.

Cases can be identified from sources such as:

- Health facilities
- Laboratories
- Community
- The media through media scanning

The information that needs to be gathered include patient demographics, clinical symptoms, laboratory test results, geographical location, outbreak timeline, total number of cases and deaths registered at both the health facility and occurring in the community by age group etc. Data should be captured in the line list and reported using a reporting tool through the disease surveillance information flow as shown in Figure xx above.

During outbreaks, the number of cases and deaths both registered at the health facility and community should be reported daily to monitor the occurrence of disease, mortality, case fatality ratio, in order to adjust prevention and case management interventions. The laboratories should also report the number of samples received, number of samples tested and the positive samples by location. Additionally, information regarding the antimicrobial susceptibility profile should also be reported to guide the case management and treatment of the patients.

2.4.2. Data management tool

The eCBS or Inpurunza tool is used for reporting of VHF cases identified through the EBS while cases identified through the IBS are reported in the e-IDSR. The eCBS or impurunza is integrated into the e-IDSR, hence enables real-time data transmission into the e-IDSR. The e-IDSR system serves as a primary tool for EWAR systems for detection, monitoring, and response to potential outbreaks, including VHFs. Both IBs and EBS data are reported real-time on the eIDSR and analysed to facilitate the timely detection and response to outbreaks. The e-IDSR is crucial for early detection and reporting, data collection and analysis, and rapid response.

Log of signals, events, and alerts.

- All VHFs signals, regardless of the source, should be systematically documented using the eCBS/impurunza and managed in the same standardised manner. This is done immediately,

as signals or alerts are reported. Note that the triage of EBS information occurs before the logging of signals/alerts.

- Enter all VHFs events, and alerts immediately after verification and risk assessment in the eCBS/impurunza.
- monitor the progress of verification, risk assessment and characterization, and the response for each signal.
- identify type of VHF causing most alert over time and geographical area for situational analyses
- monitor performance of the EWAR system in terms of timeliness and completeness of signal management, and usefulness and validity of data source.

The district surveillance officers are responsible for recording and ensuring all VHFs signals, events and alerts are being followed.

The signal log should be regularly analysed, and a summary of information on the number of signals, events and alerts detected, and of the actions taken, should be shared in the weekly epidemiological report.

Table 2: Signal/alert logbook

Category	Variables
Identification	• Unique identifier
Origin of signal	• Date of reporting • Source (e.g., e-IDSR, Impuruza, Lab, EIOS, VHF hotline...) • Location (province, district, sector, cell, village) • Contact information of the person reporting (telephone number, address)
Nature of event	• Suspected VHF from the point of view of the person reporting: • Number of suspected VHF cases (by age and sex) • Number of suspected VHF deaths (by age and sex) • Date of symptom onset for the index VHF case (or only case) • Date of symptom onset for the last reported suspected VHF case. • Suspected exposures or risk factors for VHF from the point of view of the person reporting • Similar VHF signals in the past • Other relevant information

Actions taken	• **Verification of signal:**
	  • start date of verification process
	  • outcome (verified, further monitoring required, discarded)
	  • If verified or discarded, why was this decision taken? (e.g., discarded because irrelevant information collected)

	• if further monitoring is required, anticipated date of new verification. • if discarded: actions and documentation stop here. • end date of verification process • **Risk assessment of event:** • yes/no • if no, why was risk assessment not conducted? • start date of the risk assessment process • risk characterization. • end date of the risk assessment process • **Response to alert:** • yes/no • if no, why was the response not conducted? • start date of response • the type of response (Mention it) • institutions involved in the response. • end date of response
Outstanding actions	• Any outstanding actions? • Alert closed? yes/no

Reporting Forms/Tools (See annex for copies)

- Log of signals, events, and alerts
- IDSR 001A Form – For immediate reporting of a suspected VHF outbreak
- IDSR 001B Form – For Laboratory investigation
- IDSR 001C Form - For line listing of all cases seen during the outbreak
- IDSR 002 - For routine weekly reporting, including Zero reporting
- IDSR 003 – For routine monthly reporting of all priority diseases including VHFs

2.4.3. Data Cleaning and Preprocessing

Data cleaning and processing is conducted regularly at the central level by the central data analyst to eliminate errors, inconsistencies, and missing values from the collected data. Discrepancies should be discussed with the originating point to prevent subsequent errors.

2.4.4. Data Analysis

EBS and IBS data are analysed weekly and when needed by District IDSR focal person and the national surveillance officer to understand the different VHFs disease dynamics, monitor trends, identify populations at risk, and initiate or adjust response interventions. Basic and/or advanced analysis should be performed to summarise the characteristics of VHF cases. In cases of suspected or confirmed outbreak an immediate reporting to the next level using telephone or the fastest means possible should be done.

2.4.5. Communication of Findings

Results of data analysis should be communicated through the weekly surveillance bulletin. to stakeholders including public health authorities, policymakers, healthcare providers, partners and the general public in clear and accessible formats such as reports, presentations, and interactive visualisations.

2.4.6. Data Protection

Safeguarding the confidentiality and privacy of individuals' health data is crucial. Data is stored in the e-IDSR and data access is restricted to authorised personnel only who are assigned roles on the platform. Unauthorised access attempts are also monitored.

a. Data Sharing Protocols

Data sharing with authorised parties such as researchers, public health agencies, and collaborating institutions must conform with the data sharing protocols of the RBC/MoH. Anonymization techniques and data sharing agreements should be used to protect confidentiality during data exchange.

2.4.7. Training, Supervision and Feedback

Surveillance personnel will receive regular training and mentorship on VHF surveillance, detection, reporting, case isolation as well as data protection policies and procedures. Training will be conducted for laboratory staff on specimen handling, processing and biosafety measures. Data collection and reporting will be strengthened through regular monitoring and supervision, to motivate staff. Feedback should be provided to staff in health facilities to acknowledge receipt of their reports. Epidemiological bulletins should also be shared back with staff at health facility level, in order to provide feedback on system performance and to provide key analysis.

2.4.8. Monitoring and Evaluation

Surveillance of VHFs will be evaluated/assessed using a mixed method approach (qualitative and quantitative). Case detection and reporting, laboratory performance/findings, final case classification VHF cases by quarter and year. Monitoring and evaluation visits to the sentinel sites shall be conducted at least bi-annually, each sentinel site updated reports will be generated and shared quarterly as part of the supervision process. A section on functionality of the surveillance system capacity will be added to the report. All relevant stakeholders will review the data and request additional data (where necessary) to measure the effectiveness of the VHF sentinel surveillance in curbing outbreaks. An annual (end of year) review meeting coordinated by RBC, with support from partners will be held presenting in-depth analysis and review of VHF data. Stakeholders will evaluate, review, and provide feedback.

See annex xxx for Monitoring & Evaluation Indicators for VHF

Indicators that shall be used to measure the quality of VHF sentinel site surveillance Include:

- Data quality
- Case concurrence
- Application of case definition
- Data completeness
- Timeliness of data submission
- Acceptability or willingness of case reporting at sentinel sites.

3. Viral Hemorrhagic Fever Preparedness and Response

A single case of VHF signifies an outbreak which calls for an immediate response and requires the rapid mobilisation of resources. Preparation and rapid/effective response to VHF outbreaks is an essential role at the district, provincial, and central levels as a core capacity required by International Health Regulations (IHR 2005).

3.1. Preparation for VHF outbreaks response

Preparedness activities will include prepositioning of case management supplies and equipment, as well as identifying treatment facilities or isolation wards in the sentinel sites and other health facilities (if need be), in advance of any VHF outbreak. Consequently, advance planning, coordinating and preparing for a VHF outbreak response should take place at all governing levels.

Preparatory activities specific to each administrative level include:

a. Central level

- Provide VHF risk assessment tool that includes agreed mechanisms for collecting data addressing risk factors (e.g. age, gender, social and economic status), case-mapping (location and existing public health and sanitation practices), and environmental mapping
- Provide specific guidelines/tools to districts on surveillance and epidemic activities (e.g. case definition and reporting forms/methods) in accordance with the national guidance
- Develop and distribute treatment protocols to Districts and health facilities
- Develop and distribute rapid assessment tool for VHF that can be readily deployed
- Assist Provinces and Districts in adopting and exercising the rapid assessment tool to ensure adequate technical capacity, supplies and equipment are readily available to support a rapid assessment of suspected cases/outbreaks
- Assist Districts in monitoring and evaluating preparedness and response activities, such as providing an external evaluation to determine any gaps in response activities or an after-action review during the early-recovery phase of an outbreak
- Conduct nation-wide, response capacity and risk assessment in collaboration with Provinces/Districts and share the findings and recommendations accordingly.
- Assess resource availability (i.e. healthcare workers, laboratory supplies, and equipment) based on the outcome of the risk assessment.

- Map out resources on geographical basis (including assistance that may be provided by external partners in coordinating response activities and responding to VHF outbreaks) and share information with the Provincial and District levels
- Stockpile supplies and equipment necessary for response
- Assist Province/Districts in planning the strengthening and coordination of activities supporting surveillance/epidemiology, laboratory diagnosis, case management pillars
- Identify and establish roles and responsibilities of other line ministries to support response activities
- Develop a model incident action plan for activating EOC and the deployment of IMS team or Rapid Response Team (RRT) personnel
- Regularly conduct exercises in accordance with the incident action plan to identify areas for improvement or sustainment
- Coordinate a consortium of external partners/NGOs that have the requisite resources and expertise in supporting VHF outbreak preparedness and response activities
- Assist Districts in identifying possible isolation wards and treatment centres, in addition to the sentinel sites in collaboration with external partners/NGOs, if necessary
- Coordinate with partners to conduct nation-wide disease surveillance training for frontline healthcare workers and advance epidemiology training to develop IDSR workforce capacity at all levels
- Develop training for frontline healthcare workers and laboratory technicians on IPC, waste management, case management, and identification and confirmation of VHF cases
- Identify and train key members of Public Health Emergency Management Teams and Public Health Emergency Rapid Response Teams (PHERRT).
- Develop a coordinated, multimedia platform for public education campaigns with key messages prevention and control of VHFs

b. Provincial and District levels

- Adopt and implement specific VHF guidance (e.g., case definition and reporting forms/methods) District and health facility-level on surveillance and epidemic activities in accordance with the national IDSR guidance.
- Review and adapt the national incident action plan to suit peculiarities and regularly exercise the plan to identify areas for improvement or sustainment
- Implement outbreak prevention and control strategies with identified multi-sectoral partners
- Coordinate with the Central level on conducting risk assessment routinely and communicating the findings and recommendations as appropriate
- Implement recommendations from the routine risk assessment with a multi-disciplinary and multi-sectoral approach
- Identify and designate appropriate isolation wards and treatment centres within the sentinel sites and at other identified health facilities (if needed), with capacities reflective of the outcome of a risk assessment

- Conduct inventory (i.e., resource mapping) of VHFoutbreak response resources (e.g., personnel, supplies and equipment) and maintain sufficient stockpiles of response resources
- Map out resources (including assistance that may be provided by external partners in coordinating response activities and responding to VHF outbreaks) to capture geographical distribution of resources
- Identify resources (i.e., healthcare workers, lab, supplies, and equipment) availability to response to a suspected case, as well as a confirmed outbreak
- Work with the Central level and PHEOC in implementing logistical plans, such as, dispatching pillar teams/personnel, maintaining stockpiles, MOUs for emergency procurement, transportation of contingency stockpiles to the affected areas, to reach affected LGAs as soon as possible upon notification
- Participate in joint exercises with Central level to ensure timely sharing of information and executing of response activities
- Collaborate with external partners in order to leverage resources and expertise to supplement District level activities.
- Conduct training regularly for frontline healthcare workers and laboratory technicians on IPC, waste management, case management, and identification and confirmation of VHF cases
- Conduct local communication preemptively targeting hotspots and their neighbouring at-risk areas with public health messaging on prevention and control of VHFs.
- Develop mutual assistance compacts, with bordering Districts, if necessary and conduct joint exercise to ensure timely sharing of information and resources
- Conduct simulation exercises to test systems.

c. Health facility

- Adopt and implement VHF specific guidance (e.g., case definition and reporting forms/methods) at the healthcare facility on surveillance and epidemic activities in accordance with the national guidance
- Build the capacity of staff to respond to outbreaks
- Conduct training regularly for frontline healthcare workers and lab technicians on IPC, waste management, case management, and identification and confirmation of VHF cases.
- Preposition and identify resources (i.e. healthcare workers, laboratory supplies, and equipment) available to response to a suspected case, as well as a confirmed outbreak
- Promote and practise proper IPC measures

3.2. Response to VHF outbreaks

The Rwanda Biomedical Center/MOH coordinates activities in collaboration with other relevant ministries, agencies and development partners to ensure a multi-sectoral response to VHF outbreaks. However, Response should begin/take place at the lowest jurisdictional level for the

affected areas. This means that an outbreak occurring at a District should lead to an immediate response by the District Rapid Response Team. At the sub-national level, the Mayor of the District in consultation with the provincial PHEOC and district PHEMC coordinates emergency response at district level. Depending on the severity of the outbreak, the response effort may be scaled up to include direct involvement, technical assistance or resource support from the Provincial and/or Central Level.

Most importantly, the Incident Management System (IMS) should be implemented at all levels to coordinate the much-needed multi-sectoral preparedness and response when outbreaks happen. The IMS is led by an assigned Incident Manager (IM) who oversees the preparation, planning, resource management, and overall operation of an emergency response. The IM should be vested with appropriate legal and policy authorities to respond to the emergency, as well as financial and other resource support from the State government. The IMS staff should conduct its preparedness and response activities from the Public Health Emergency Operation Centre (PHEOC). The PHEOC can be any available structure where meetings can be held, and decisions made. Appropriate technical staff for investigation and response should be organised and in place for all pillars.

The key pillars within the IMS structure include:

- Coordination and logistics
- Surveillance
- Laboratory
- Case management
- Infection Prevention Control (IPC)
- Environmental health and sanitation
- Risk Communication and Community Engagement
- Animal health (as applicable)

Specific level response activities include:

a. Central level

- Provide technical or/and other assistance to affected Districts during an outbreak (e.g. technical or direct assistance in the areas of surveillance/ epidemiology, laboratory diagnosis, case management, RCCE and IPC)
- Assist Districts in strengthening surveillance and reporting from affected areas Nigeria Centre for Disease Control,
- Analyse case information from Districts; distribute data and analysis and maintain information exchange with Districts and other stakeholders
- Assist the affected Districts with emergency procurement and mobilisation of resources during an outbreak

- Assist Districts in monitoring and evaluating response activities, such as providing situation awareness assessment, or an after-action review during the early-recovery phase of an outbreak
- Assist Districts in analysing data to improve understanding of VHFS sources and deploying effective interventions
- Disseminate VHF outbreak or case information among Districts and stakeholders with coordination with the affected or reporting Districts
- Assist Districts in coordinating with external partners for technical, resources or direct assistance to Districts
- Assist Districts in improving linkage of laboratory data to epidemiologic data, as well as translating such data for decision making to support response activities
- The RBC will regularly produce national surveillance updates and disseminate to stakeholders
- Activate the Public Health Emergency Management Committee (PHEMC), (National Epidemic Preparedness and Response Coordination Committee (NEPRCC) at the national and district levels.
- Activate functional National and Provincial level Public Health Emergency Operating Centres (PHEOC), which act as command-and-control centres for coordination of public health emergencies or events/incidents.
- Discussions are conducted with technical, communication, and political partners about the occurrence of the investigation to ensure a coordinated and well-supported effort.
- Discussions are conducted with security staff regarding any security concerns and mitigation plans before travel.
- Support the District level to develop specific outbreak case definitions.
- Confirm VHFs to further define the agents of VHFs and provide other laboratory support to Districts sentinel sites laboratories through the NRL.

b. Provincial and District Levels

- Ensure protocol is in place for immediate reporting to the National level
- Activate District Rapid Response Team (RRT) and Provincial PHEOC to assist in conducting rapid assessments to verify reported cases and investigated outbreaks
- Collaborate with healthcare facilities, RBC and/or external partners/NGOs in establishing isolation wards or treatment centres. Ensure functionality of treatment centres at sentinel sites and other health facilities
- Formulate and disseminate key messages to encourage early health-seeking behaviour at health facilities and the communities
- Support the activation of PHEOC with necessary IMS pillars to assist the response to the VHF outbreak
- Coordinate the receipt of technical support and resources in key areas with external partners.

- Conduct rapid assessments of suspected cases in order to verify if a VHF outbreak is indeed in progress; report findings immediately Central level
- Systemically find cases and contacts and collect individual data from healthcare facilities and communities, using standardised case investigation forms and a line list, and report at a frequency that depends on the severity of the outbreak (e.g. daily, weekly, etc.) to the central level, and maintain information exchange the RBC and other stakeholders
- Map the pattern of the epidemic, with disaggregated data to capture geographic distribution of cases, at-risk population or high-risk areas, case fatality rate and/or weekly incident rate, demographic data, case dispersal pattern, and routes of transmission
- Implement IPC at points of care to eliminate nosocomial transmission
- Identify the point-source of transmission and deploy intervention strategies for decontamination and to eliminate person-to-person transmission
- Assist healthcare facilities in sample collection, handling, accessing and transporting specimens to the network of laboratories with capacity for sample testing.
- Engage affected communities, civil and religious organisations in prevention measures
- Develop a case definition for the VHF outbreak.
- Conduct descriptive epidemiological analyses, describing time, place, and person characteristics.
- Develop hypotheses for the exposure, source, and mode of transmission. Update the case definition, as appropriate.

c. Health facility

- Immediately activate case management protocol and utilise standardised case definition for identification, treatment and reporting
- Report suspected cases that meet the case definition to the health facility and district IDSR focal persons and maintain information exchange with the IDSR focal points
- Conduct active case monitoring to include taking samples (e.g. rectal swabs) from suspected cases
- Refer and transport samples to the nearest, designated laboratory for confirmation VHFs
- Segregate suspected cases in an isolation ward or treatment centre
- Deploy IPC activities (e.g. soap, chlorinated handwashing stations, etc.) and Personal Protective Equipment (PPE) for healthcare workers, utilise sanitation measures to ensure proper waste segregation and safe disposal (e.g. burying or burn pit)
- Implement IPC at points of care to eliminate nosocomial transmission
- Implement community IPC District RRT and community gate keepers
- Deploy contingency VHF medical stockpile as needed; request additional support from the central level, as needed
- Work with the Central and District levels in setting up treatment centres as needed
- Conduct laboratory investigations in designated laboratories to further define the agents

The Minister of Health declares the outbreaks and activates the Incident Management Structure (IMS). Activation will be based on the results of preliminary and gradual assessments. The Minister of Health will immediately appoint the IM.

During the VHF outbreak the goal is to detect cases in the community as quickly as possible to facilitate case management, understand epidemiological dynamics, and reduce transmission.

3.3. Role of surveillance data during a VHF outbreak response

Key factors needed for effective surveillance include the existence of a standard case definition, simple data collection tools, clear reporting procedures, analysis plans, rapid diagnosis of suspected cases and laboratory confirmation, routine feedback of surveillance data, and appropriate coordination at all levels (i.e. community, health facility, district, province, national, and international levels). In this line, activities for strengthening and improving the surveillance of VHFs should focus on providing to health professionals clear guidance on standard case definitions, data collection and reporting procedures, ensuring laboratory capacity to detect and confirm relevant diseases, and involving all key actors and the community for effective early detection and response to outbreaks.

During a VHF outbreak, regular analysis is surveillance data is critical to:

- Identify what agent is causing the outbreak or public health emergency?
- To confirm and determine the magnitude of the outbreak by actively searching for cases.
- To characterise the outbreak in terms of time, place, and persons?
- To identify the source of infection through a collection of both animal and clinical samples.
- What control measures are needed to control the outbreak or public health emergency to substantially reduce morbidity and mortality?
- To generate and test the hypotheses of the outbreak?
- To come up with recommendations and assist the District teams to respond and control the outbreak.

3.4. Active case finding during a VHF outbreak

During a VHF outbreak, active surveillance should complement and enhance passive surveillance through systematically searching for cases among exposed communities or groups, often through community-based surveillance (CBS). This is necessary to find suspected cases in the community not yet presented at health facilities and refer them for care. These cases can be reported through health facility-based IBS or directly to EWAR through EBS of suspected clusters.

Sources of data during a VHF outbreak include:

- Routine reports of clinical cases from health facilities
- Laboratory reports

- General public/among community
- Community informants
- The media through media scanning

Specific critical VHF active case finding activities during outbreak preparation and response include:

- Train health workers, volunteers and response team on active case-finding and reporting at the preparedness phase and align with the outbreak case definition when a suspected outbreak is declared.
- Scale up community based surveillance is through implementation of active case search during outbreaks. Community health workers, community leaders and other community informants are identified to help find cases while remaining sensitive to community culture, beliefs, and behaviours.
- Systematically find cases by contacting health facilities, traditional practitioners, schools, workplaces, and other sites and scanning through relevant sources.
- Cases at communities and health facilities may also be identified during contact tracing activities.

3.5. Case investigation and contact tracing

Investigation of VHF cases is led by the District IDSR focal person. Information on all cases who meet the case definition of VHFs should be investigated using the case investigation form. (annex xxx). Information collected include patient information, signs and symptoms, epidemiological data, type of exposure(s), travel history and contact history.

A contact tracing form (see annex) is used to obtain information on all potential cases. These are further quarantined, and followed-up to ensure rapid isolation, testing, and treatment in case they develop symptoms. Policies around stay at home orders, travel restrictions are enforced.

Individuals who have been in close contact with a confirmed case of VHF are identified for proper management, and to prevent further transmission, by isolating potentially infected individuals.

A contact is an individual who has been in close contact with a confirmed case of VHF, (E.g.: household members, healthcare workers, or individuals who were near the case).

All contacts of a confirmed VHF case are immediately listed using a contact listing form (see annex). All contacts are followed up and monitored for symptoms for 21 days. The contact follow-up form (see annex) should be used to enter information.

Note: strict Infection, prevention and control (IPC) measures must be enforced among response and investigations teams.

3.6. Communication and Information Sharing During Response

Upon a VHF outbreak, the DG of RBC informs the MOH who announces the outbreak within 24 to 48 hours of its confirmation through a press briefing/statement at National Broadcasting Agencies (Radio and TV). The statement is shared also through print, social and electronic media.

The Rwanda Health Communication Centre Division Manager will be the Spokesperson of the Health Sector for communication and community engagement during health emergencies.

Other procedures for emergency communication will be done in line with the RBC/MoH protocol.

3.7. Response deactivation

When the response is declared over, the deactivation will be done by the authority that activated it or any other appointed authority.

a. Criteria for deactivation

- The data trends from the field begin to suggest that the issue being addressed is under control.
- Resources are no longer required.
- The emergency has been declared over by the designated authority.

3.8. Action reviews

a. Early action reviews

An early action review (EAR) should be conducted at the national level at the initial phase of VHF response, to review initial detection measures and response measures and implement adaptive changes in strategies and actions.

b. After action reviews

After action review (AAR) should be conducted immediately (or not more than 3 months) after a VHF outbreak is declared over, to assess actions taken in response to the outbreak as a means of identifying best practices, gaps, and lessons learned to take corrective actions to improve future response.

4. Diagnostic Laboratory activities

The RBC/PHS&EPR division in collaboration with the NRL and other relevant stakeholders has established seven sentinel sites across the country to conduct laboratory testing of the seven prioritised VHFs, based on the findings of the VHF sentinel surveillance risk and needs assessments in the country. In addition, training and mentorship are provided to the VHF sentinel site laboratory staff as well as provision of logistics required for specimen collection, packaging, and transporting at the sentinel sites.

4.1. Specific guidance for VHF sample handling and management

1. **Key guidance and safety precautions for collection, handling and testing of VHF samples**

- Specimen(s) collection procedure should be conducted by a trained healthcare provider and wearing appropriate full PPE gear including a full-face shield or goggles, masks to cover all the nose and mouth, gloves, and fluid-resistant or impermeable gowns.
- Any primary specimen container (i.e., vacutainer tubes for blood or microtubes for vectors) must be clearly labelled with identification to avoid contamination
- Carry only needed materials for specimen collection including disinfectant, alcohol swabs, labelled EDTA 4 ml vacutainer and needles in the sampling area.
- **Acute-phase specimens should be collected within 7 days of illness onset. Convalescent-phase specimens should be collected 7-20 days later, and at least 14 days after illness onset.**
- **An existing logistics plan for specimen collection and transportation must be followed before sample collection.**
- Specimens suspected of VHF should be packaged following the basic triple packaging system and appropriately labelled with biohazard signs for safe transportation including a primary specimen container wrapped with absorbent material, into a secondary container (watertight, leak-proof), and an outer shipping package (rigid or crash resistant)
- Never attempt to ship opened primary specimen container (i.e., blood vacutainer) as opening destroys the vacuum seal and increases the risk of leakage during transport
- Specimens for international shipment should be packaged by trained laboratory personnel into UN2814 certified packaging and transported according to UN602 guidance for Category A infectious substance
- Do not **USE** glass containers or heparinized tubes. Do not **separate** and **remove** serum or plasma from the primary collection container at the sampling site until reaching the testing site.
- All specimens suspected of VHF should be handled under emergency arrangements and the testing laboratory must be contacted ahead of time to inform them to prepare for specimen reception, including the number of specimen(s) on route and estimated time of arrival.
- All received specimens for VHF testing should be processed and kept in designated areas with restricted access and general maximum physical security.
- **All VHF suspected samples that tested negative at the designated testing laboratory should be handled following approved standard protocol or seek necessary approvals from NRL to retain for long-term according to relevant specimen retention policy and biosafety and biosecurity measures.**
- A well-established specimen inventory and repository system must be established at the testing laboratory and maintained up to date to account for any samples retrieved and returned in storage including but not limited to primary or sample derivative(s) type,

quantity, dates of retrieval/ returned and personnel who accessed them from specimen repository.

2. Key guidance and safety precautions for waste management at VHF Sentinel Site

- **All laboratory generated waste should be considered highly infectious and handled safely including contaminated sharps, swabs, used PPEs, contaminated adhesive tapes, contaminated syringes and needles, contaminated absorbents, primary specimen containers, tips and others.**
- All primary specimen containers and other testing materials are highly infectious materials
- **All waste must be segregated, decontaminated, stored and disposed depending on the nature, type and location where they are generated. For further details on actual waste disposal, refer to SOP waste management.**
- **Testing laboratory should ensure the waste has been segregated and decontaminated before it's handed to the infection control team for appropriate disposal**
- All wastes generated during VHF sample processing should be inactivated and autoclaved before disposal within the testing laboratory facility
- After autoclaving, waste is no longer considered as infectious, it should be processed for incineration.

3. Key guidance and safety precautions for specimen storage and disposal at testing sites

1. In case the sample is being tested at the sentinel site, the remaining specimens should be kept inside the glove-box while waiting for the results.
2. All VHF suspected samples that tested positive will be stored at NRL only but those tested negative will be stored according to the sample retention policy of outbreak samples at testing sites.
3. If sample(s) were referred to collaborating laboratories for VHF testing, results are returned to NRL and also disseminate them using the same channels mentioned.
4. In addition, laboratory results will also be disseminated to established distribution groups as approved by PHS&EPR Division Manager or designee for further action
5. After the release and confirmation of results, the sample should be disposed of following all biosafety and biosecurity measures.

4.2. Roles and responsibilities of NRL and other laboratories in VHF testing

A. Role of National Reference Laboratory

In collaboration with RBC/PHS&EPR division and other relevant stakeholders will ensure:

1. Provision of regular training and mentorship to the VHF sentinel site laboratory staff
2. Provision of logistics required for specimen collection, packaging, and transport and technical guidance on specimen storage, disposal, and waste management
3. Provision of key guidance on VHF specimen handling at sentinel sites

4. **During an outbreak, or when the suspect cases are increasing in numbers, NRL will be the overall coordinator for testing activities.**

B. Role of other sentinel sites and other laboratories in VHF sample testing

Trained laboratory personnel in all health facilities have the capacity to collect and transport VHF samples following biosafety measures. The sentinel sites coordinate and receive samples from all health facilities for testing.

The role of the VHF sentinel sites are as follows:

1. **Sentinel sites should ensure safe collection, packaging, transportation of samples to the NRL (when applicable) and testing of all suspected VHF samples**
2. **Trained sentinel site laboratory personnel are responsible for receiving and processing VHF samples referred from its catchment health facilities, other nearby health facilities and sentinel site active cases search (OPD, and Inpatient services), under certified biosafety cabinet level 3**
3. **Sentinel sites should notify the NRL when a VHF sample tests positive and all positive samples should be referred to the NRL for confirmation before reporting in the e-IDSR.**
4. **The laboratory staff is prohibited to divulge the positive result to any other staff except the laboratory manager and the hospital's director general.**
5. **The laboratory staff in the BSL-3 testing area is responsible for verifying the identity and condition of the submitted specimen(s) and recording all specimen information.**
6. **Ensures specific good laboratory practices and appropriate PPE are followed as stipulated in the laboratory policy and procedures for handling highly infectious pathogens.**

4.3. VHF Specimen management

a. VHF sample collection

The preferred specimen for testing of all VHFs (Ebola, RVF, CCHF, Dengue, Chikungunya, Yellow fever, Marburg) is blood. Ideally, 4ml blood is required to complete the VHF analysis and must be collected in EDTA for alive patients. One (1)ml volume is also sufficient to perform essential tests where sufficient sample volume is difficult to obtain (e.g. infants and young children). For deceased patients oral swabs are collected. However, urine, semen and post-mortem tissue samples are also suitable for testing by arrangement.

VHFs are classified as Category A infectious pathogen and appropriate personal protective equipment (PPE) must be worn during specimen collection, processing, transportation, and testing until safely disposed by ONLY trained personnel

Requirements for VHF sample collection

❖ **Blood collection materials**

- Sterile EDTA vacutainer tubes
- Needle holder and needle with guard
- Tourniquet (single-use)
- 70% isopropyl alcohol or Sterile alcohol swab
- Gauze pads and adhesive bandage
- Tray for assembling blood collection tools and rack for holding blood tubes
- Zip lock bag
- Disposable (paper) towels
- 0.5 % chlorine solution

❖ **Oral swab collection materials**

- Sterile flocked swabs
- Viral transport medium (VTM)
- Zip lock bag
- Disposable (paper) towels
- 0.5% chlorine solution

b. VHF Specimen labelling

- Labels attached directly to the primary specimen containers (e.g. blood tubes) should be marked clearly with the name of the patient, IDSR code and the date of collection of the sample.
- The staff collecting samples should also complete the laboratory information part in the VHF case investigation form.
- Sample labelling information should match the e-IDSR patient information

c. VHF Specimen packaging and transport

- All samples to be transported must be triple packaged according to UN602 guidance (see fig xxx) following regulations regarding packaging and transport of Category A infectious substances.Specimens must be labelled appropriately with biohazard signs.
- Specimens collected for VHF testing should be packed and shipped without attempting to open collection tubes or aliquot specimens. Opening the tubes destroys the vacuum seal and thus increases the risk of leakage during transport.
- Specimens should be packaged and transported on dry ice/ at room temperature immediately to the final VHF testing destination.
- Drivers should not handle packaged specimens; only trained healthcare workers or laboratory technicians should place and retrieve the specimens from the vehicle.
- Specimens must be accompanied by a well completed VHF laboratory investigation request form.

❖ **Triple packaging**

This is a system that ensures safe transport of infectious materials/samples from the point of collection to the laboratory where it is utilised or stored.

1. The system consists of three layers as follows:

a. Primary receptacle/specimen bottle: A labelled primary watertight, leak-proof, receptacle containing the specimen. The receptacle is wrapped in enough absorbent material (e.g., cotton wool) to absorb all fluid in case of breakage
b. Secondary receptacle: A second durable, watertight, leak-proof receptacle to enclose and protect the primary receptacle(s)

Note: Several wrapped primary receptacles or specimen bottles or containers may be placed in one secondary receptacle (e.g., samples from multiple patients can be put together in one secondary receptacle). Sufficient additional absorbent material must be used to cushion multiple primary receptacles. A watertight rigid plastic container e.g., universal bottle may be used and this will then be placed in a Ziploc bag.
c. The Outer shipping package protects contents from outside influences such as physical damage and water while in transit. The secondary receptacle is placed in the outer shipping package.

2. Specimen data forms, letters and other types of information that identify or describe the specimen and also identify the shipper and receiver should be taped to the outside of the outer shipping package.
Figure xxx triple packaging

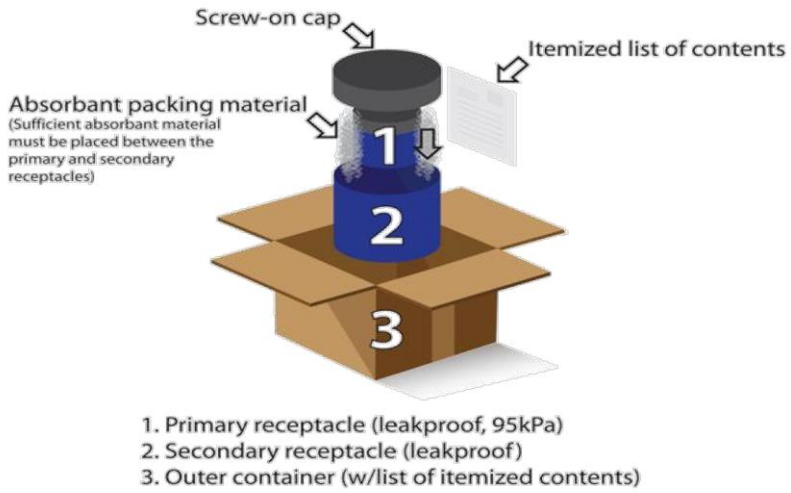

Figure 9: Triple Packing System 2

d. VHF sample reception, processing, testing, and reporting

1. Treat all specimens as highly infectious
2. Handle all samples adhering to appropriate personal protective precautions.
3. Coordinate with the sample senders to receive advance notification of the VHF sample.
4. Always follow proper donning and doffing of PPE(when applicable) and laboratory safety practices in the specific standard operating procedures (SOPs) to avoid contact with contaminated surfaces
5. Any spills or splashes of sample or contaminated materials including workstation surfaces should be cleaned up immediately with soaked absorbent material containing 0.5% chlorine solution or other recommended disinfectant available
6. Freshly prepared 0.5% chlorine or other recommended ready to use disinfectant for effective decontamination and must be available at all workstations before and after any specimen collection and handling procedures
7. Check sample integrity and decide if the sample is accepted or rejected. Check for:
    a. Correct packaging of the sample (triple packaging)
    b. Package is free from leakages.
    c. Sample was transported under the proper conditions.
    d. Sample was transported within the time frame necessary.
    e. Checking if sample material is of good quality (e.g. blood is not clotted)
    f. Sample is of adequate volume.
    g. The laboratory request form is correctly filled and that the information matches one on the packaging.
8. Establish a designated area for the reception and initial processing of VHF samples, separate from other sample reception areas.
9. Decontaminate the outer packaging using an appropriate disinfectant before bringing it into the laboratory
10. Register accepted samples in the laboratory register and rejected in the sample rejection register.
11. Label sample accordingly:
    - IDSR unique ID
    - Contact details of the patient(when applicable)
    - Type of sample
    - Date of sample collection
    - Name of the health facility where the sample was collected
12. Handle all samples within a certified Class II or higher Biosafety Cabinet to contain aerosols and prevent exposure.
13. Diagnosis by RT-PCR detection of viral RNA/DNA or gene Xpert
14. If the VHF screen is negative, then the possibility of the patient having a VHF infection should be maintained until an alternative diagnosis is confirmed. Infection control precautions should also be maintained.

Sample testing diagram at VHF testing site

e. VHF results Reporting

- Timely reporting of results is critical to facilitate appropriate management of the suspected cases at the treatment centers.
- When the testing is completed and results available, they will be validated by testing laboratory management and reported into the electronic reporting system (e-IDSR) only for **Negative** unless **Positive** will require central level referral and confirmation.
- If the system is not available or not operating, the results will be reported by email from Sentinel testing laboratory management to its surveillance officer and notify NRL management.

❖ **Reporting of results and turn around time of VHF suspected sample**

- Preliminary and VHF negative test results will be available to the requesting clinician within 24 hours of receipt of specimen at the sentinel site.
- Reactive samples are urgently referred to NRL for confirmation.
- Test results of VHF confirmed positive will be reported to the DM of PHSEPR.
- The MOH will also inform the IHR National Focal point.

5. Case management of Viral Hemorrhagic fevers

Viral hemorrhagic fevers (VHFs) are a group of severe and life-threatening viral diseases that can cause bleeding and multi-organ failure. Case management of VHFs requires a comprehensive approach due to the high risk of transmission and the potential for severe complications.

5.1. General considerations for all patients with a suspected or confirmed Viral Hemorrhagic Fever (VHF)

5.1.1. Primary Survey and emergency resuscitation

While managing a patient with signs a viral hemorrhagic fever, it is important to assess and manage danger signs and life-threatening conditions, using ABCDE approach.

- ABCs (Airways, Breathing, and Circulation) and check for emergency signs.
- Altered level consciousness/convulsing (coma, convulsions)
- For children, also evaluate signs of severe dehydration (any two of these is suggestive: lethargy, sunken eyes, very slow return after pinching the skin).

5.1.2. Mild and moderate cases

Despite symptoms such as fever, headache, and/or fatigue, these patients may be: ambulating, not vomiting or having large-volume diarrhea, eating, and drinking.

- These patients should be rehydrated orally with Oral rehydration salts (ORS) and encouraged to take frequent sips.
- In children, especially <2 years of age, a nasogastric (NG) tube should be provided if the fluid intake is low. Liquid feeds (F-75) can also be administered through the NG tube. Before feeding, aspiration or flushing with 10 ml normal saline without the child coughing ensures that the tube is in place.
- Provide symptomatic management of fever with Paracetamol, nausea with antiemetics like Ondansetron, and pain depending on the pain scale
- Monitor every shift to detect the development of severe illness.
- If there is no fever for 72 hours, send a new PCR and plan for discharge.

When the patient is too weak to lift the container, has very low input, can't get out of bed and walk, or is a child with no caregiver available, administer IV fluids (Crystalloids) aggressively to keep up with losses, adhering rigorously to infection prevention and control (IPC) precautions to avoid needle stick injury and exposure to pathogens. It is important not to wait for signs of dehydration before beginning or increasing IV fluids. Patients often have poor oral intake and can deteriorate rapidly. However, the adequacy of fluid resuscitation should be monitored to avoid under or over-hydration.

5.1.3. A case with emergency signs

i) Emergency respiratory signs

In adults: Tachypnoea (RR > 20/min abnormal, > 30/min severe), Use of accessory muscles (neck, intercostal, abdominal), Wheezing/stridor, inability to speak in complete sentences, eat and/or drink, altered mental status (agitation, confusion, lethargy), ineffective respiratory effort (this is a peri-arrest situation), central cyanosis of the lips/tongue, paradoxical respiration.

In children: Signs of airway obstruction (cannot swallow saliva/hypersalivation, wheezing/stridor), increased respiratory effort (tachypnoea for age-specific normal ranges, intercostal and subcostal retraction, nasal flaring, chest indrawing), altered state of consciousness (lethargy, drowsiness, restlessness), difficulty drinking and or feeding, or cyanosis.

Oxygen therapy: After securing an airway, provide immediate oxygen support is SpO2 < 90% and hemodynamically stable, SpO2 < 94% with emergency signs with or without respiratory distress, SpO2 < 92–95% if pregnant.

ii) Shock

General signs of shock (poor perfusion) include: fast and weak pulse, pallor or cold extremities, capillary refill >3 seconds in children, dizziness or inability to stand, decreased urine output (<30 ml/hour), difficulty breathing, impaired consciousness, low blood pressure

Note:

- Assessment of pulse and BP should be taken in the context of the patient's premorbid state, pregnancy, age, and medication. Some pregnant women, patients with chronic illnesses, and others may normally have an SBP <90 mmHg and have normal mental status, capillary refill, and urine output; they do not have a shock.
- Call for help from the most experienced clinician available when a VHF patient develops shock.
- VHF patients can be in shock from hypovolemia, GI loss (most common in the 2014-2015 West African Ebola outbreak), septic shock, hemorrhagic shock (uncommon), or any combination of these.

Fluid Resuscitation: Emergency re-perfusion is done through fluid boluses

In adults: give a 1-liter IV over 30 minutes or faster. Reassess as soon as the liter has run in. If signs of shock persist following the initial fluid bolus, repeat the crystalloid bolus. If shock is resolved, fluid administration may be reduced to maintenance levels of 2–3 liters of maintenance fluids per day. In children: follow the ETAT protocol

A maintenance rate can also be calculated for adults using 2 mg/kg of total body weight or using the same formula as for children: 4 ml/kg/hr for the first 10 kg, plus 2 ml/kg/hr for the next 10 kg, plus 1 ml/kg/hr for each additional kg.

Stop the IV infusion if the patient is walking and taking oral fluids well, check every 8 hours to see if an IV infusion is needed

Best practices:

- Avoid antecubital fossa (elbow crease) if another site is available due to frequent interruption of flow with bending of the elbow
- In addition to fluids, in all cases of diarrhea, it is important that the patient continue eating and be offered ORS even when on IV fluids.
- Dedicated trips through the ward to replenish IV bags
- Use a one-liter bag of Lactated Ringer's or normal saline
- Hang 2 bags simultaneously using a "Y" connection.
- To avoid hemorrhage from the patient pulling out the IV line when unattended at night, cap off or use a 1-way valve (for example, Clave®) on the IV catheter when the team leaves, and wrap the arm with a gauze dressing.

ii) Electrolyte and glucose abnormalities

Electrolyte abnormalities (from GI losses) can be serious and may be the proximate cause of death (arrhythmia, cardiac arrest, seizure) in some patients. To avoid serious electrolyte abnormalities:

- Where possible, use point-of-care testing for electrolytes and correct abnormalities. If hypokalemia is documented, add 20 mEq KCl to each liter of IV fluids.
- If electrolyte and creatinine measurements are not possible, empirically add 10 mEq KCl to each liter of IV fluids when there is large vomiting and diarrheal loss.
- Give oral potassium supplements (40 mEq/day), in addition to IV supplementation, for patients who can tolerate oral intake.
- ORS contains 20 mEq/L of potassium. Patients can continue sipping ORS while receiving supplemental IV fluids. Additional drinks and foods may be good sources of potassium (for example; there are approximately 10mEq/banana).
- Concomitant correction of hypomagnesemia, common with Ebola, assists correction of hypokalemia. Oral magnesium supplementation may exacerbate diarrhea; instead, intravenous magnesium (2–4 g/IV over 1 hour) may facilitate the correction of hypokalemia.

Although not commonly seen among adult patients, hypoglycemia may accompany dehydration and may result in seizures, coma, and death. Small children, critically ill adults, and elderly or severely malnourished patients are especially at risk.

- When hypoglycemia is suspected, check glucose with a bedside glucometer. Replete as needed.
- Ampoules of D50 can be added to bags of Lactated Ringer's or Normal saline to provide some glucose.
- If measurement is not possible, give glucose empirically if the patient develops lethargy, seizures, or coma.

Note: Patients with acute kidney injury from pre-renal failure (shock) may have hyperkalemia and acidosis. Whenever possible, give oral rehydration salts rather than plain water.

iii) Monitoring a severely ill patient

It is important to regularly:

- Reassess for emergency clinical signs. Use the triage/severity score and the ETAT for children. Monitor input and output (whenever possible), record at the bedside, and train staff to measure waste volumes before discarding. If not able to quantify urine output, attempt to document the frequency per shift.

- Document clinical data daily on a patient monitoring form.
- Update white board or other system inside/outside the ward after each shift

Priority laboratory testing: Electrolytes, Arterial Blood Gases (ABGs), Glucose, RFTs, FBC, and clotting profiles (INR and PTT).

5.1.4. Chemotherapy

Patients with viral hemorrhagic fever are febrile. The differential diagnosis of fever should consider co-morbidities like pneumonia, typhoid fever, HIV, TB, sickle cell disease, malnutrition, and tropical infections endemic in Africa.

Antimalarial treatment: all patients get a malaria RDT if available, and treatment is initiated if positive. If an RDT is unavailable or results are delayed, give antimalarials empirically to all patients with fever or a history of fever.

- Treat with injectable artesunate rather than oral ACT if there are signs of severe malaria. Give a minimum of 24 hours of artesunate, then complete a full 3-day course of ACT.
- An RDT can be performed at the bedside using blood from an IV line, thereby eliminating the risks associated with an additional needle stick.
- Take note of whether the patient has already received antimalarial treatment and the number of doses in a holding center, community care center, or before referral from a non-Ebola health facility.

Antibiotics: Empirical oral antibiotics or IV antibiotics should be given to all patients suspected or confirmed to have a VHF.

- All children less than 5 years have non-specific signs and symptoms of sepsis. So, it is recommended that they receive broad-spectrum antibiotics IV or IM. Options include: Ceftriaxone 80 mg/kg IV/IM once daily for those >1 week old, maximum 2 grams for 5-10 days. When aged under 1 week, give 150 mg IV/IM. An alternative is to give ceftriaxone 50 mg/kg twice daily for all age groups.
- In a patient receiving IV Lactated Ringer's, flush with 10 ml 0.9% saline before using the line to administer ceftriaxone to avoid calcium deposition.
- Oral route should always be preferred. Options include: ciprofloxacine, cefixime, or amoxicillin-clavulanate.
- When to stop antibiotics: evaluate the need for and efficacy of the antibiotic, limiting treatment courses to the shortest duration possible. If Ebola PCR is positive and not severely ill, consider discontinuing antibiotics.
- Consider addition of metronidazole for worsening abdominal pain or bloody diarrhea.

Proton pump (PPI) or H2 receptor inhibitor: In critically ill Ebola patients at high risk of bleeding, to prevent gastro-intestinal hemorrhage. Adults: 80 mg IV pantoprazole over 60 minutes,

then 8 mg/hour for 72 hours of continuous infusion, or omeprazole 40 mg IV, twice daily. Alternatively: Ranitidine: 150 mg PO, 2 times daily, or 50 mg IV, 3 times daily. For children, give 0.5-3 mg/kg IV per day, in 1 or 2 divided doses (max. 80 mg per day).

Tranexamic acid: In critically ill VHF patients at high risk of bleeding, or with active hemorrhage. Adults: 1 g IV (in 100 mL 0.9% NaCl) in 10 min, then 1g every 8 hours. Children: 15 mg/kg IV loading dose (max 1 g), then 10-15 mg/kg (max 1 g) every 8 hours.

5.2. Antiviral therapy

Some viral hemorrhagic fevers require specific antiviral therapy that has been proven efficient.
Zaire Ebola Virus: Strong recommendation for monoclonal antibodies: REGN EB3 and mAb114 (Ebanga™). Any patient with RT PCR confirmed Ebola disease caused by the Ebola Zaire virus, including children, pregnant women, breastfeeding women, and elderly persons. Neonate <7 days, without RT PCR Ebola disease confirmation, born to a mother with RT PCR confirmed Ebola disease.

Lassa Fever: The drug of choice for the treatment of Lassa fever is intravenous Ribavirin administered over 10 days, the period may be extended if the response is not satisfactory. The outcome is more favourable if treatment is initiated within six days of the onset of symptoms. McCormick regimen is used to guide the treatment in non-pregnant and pregnant adults and children.

Beware of interactions between medicines and avoid polypharmacy, particularly giving several medicines at the same time that can lengthen the QT interval and contribute to arrhythmias (these include ondansetron, amodiaquine, lumefantrine, and ciprofloxacin). For some patients, it may be possible to avoid use of an antiemetic by reversing acidosis with IV rehydration. It is important to stop giving medicines once they are no longer needed.

5.3. Psychological Support for patient and family

Psychological support for the patient, the family, and the staff is very important in the management of VHF. Anxiety and fear are normal given the high mortality rate of some VHFs. It is important to communicate well with the patient and family, explaining the need for isolation and PPE, and to provide psychological support from the beginning of care. Make sure to do a complete mental health assessment of each patient, then look out for mental health problems developing as a result of the patient's adjustment to being ill. Psychological support to staff is essential to help them cope with the high mortality, infection among colleagues, and difficult working conditions (for example, heat stress).

5.4. Nutrition

VHFs can have a significant negative impact on the nutritional status of infected people, worsening their already compromised immune response to the virus. Symptoms like poor appetite, weakness, nausea, vomiting, sore throat, dysphagia, and diarrhea affect food consumption and/or nutrient absorption. Nutritional support adapted to the patient's needs and condition should be part of the supportive care provided to all VHF patients in the ETU in order to improve their chances of survival.

Among all the patients attending the ETU, there are two groups that should be specially considered: infants and young children who are maternal orphans on one hand, and the group of lactating women and their infants and young children on the other. Given the fact that the viruses are found in various body fluids, breast milk included, and that wet nursing should be avoided, the following is recommended for maternal orphans:

- Infants <6 months should receive RUIF (50–100 ml every 3 hours) if the recommendation is to suspend breastfeeding.
- Weighing upon admission, assessment of nutritional status, and examination of the feet for bipedal oedema are important for dosing and detection of malnutrition. When a child is identified as having severe acute malnutrition, treatment should be applied according to the national protocol for the treatment of severe acute malnutrition
- Children less than 5 years old who have not received Vitamin A supplementation in the last 6 months should be given a single dose unless they have signs of vitamin A deficiency or measles. Children with severe acute malnutrition should only receive a high dose of vitamin A if fortified foods are not given. The treatment dose for infants 6–11 months is 100 000 IU; for children 12–59 monthsmonths, 200 000 IU, on days 1, 2 & 8.
- Patients should not be force-fed (e.g. by nasogastric tube) more than their maintenance requirements for energy (100 kcal/kg/day for children and 35 kcal/kg per day for adults).

5.5. Special considerations

5.5.1. Children

If the child becomes sick and both the mother and child test positive for Ebola or Marburg disease, then the child can be returned to the mother. Negative newborns and infants of infected mothers should be handled in full PPE, even with a negative test. Testing should be repeated.

- Weighing should be done on admission for correct dosing of drugs and fluids and follow-up during admission.
- Small children are at particular risk of dehydration. Inability to drink and feed is frequent and early intervention with ORS (NG tube if needed) or IV fluids is crucial.
- Caregivers (sick family members or survivors) should be present continuously.

- Health professionals and other caregivers should take care of children while wearing full protective equipment, and they should encourage the child to comfort themselves carefully. Leaving children with “no touch” can be harmful for them.

5.5.2. Management of pregnant and postpartum women

Caution must be used during the provision of childbirth care and management of obstetric complications to avoid health worker infection. In addition to care provided in ETU, the following should be available:

- Pre-assembled delivery box/kit (plastic umbilical cord clamps, gauze, disposable scissors, absorbent drapes, menstrual pads, very absorbent pads, and misoprostol) for prevention of PPH should be immediately available in all health facilities to mitigate risks around childbirth. Pre-assembled boxes/kits should also be immediately available for management of obstetric complications such as PPH and eclampsia.
- Operative management of complications such as obstructed labor should pay attention to the risks involved and appropriate IPC measures.

Health worker exposure to blood and other bodily fluids should be minimized during any procedure:

- Plan and organize team members before performing procedures (4 trained staff are recommended, including 2 experienced in childbirth and emergency obstetric care, a cleaner to identify and decontaminate environmental spills and an observer to ensure IPC safety).
- Use full PPE for childbirth and IPC standards must be strictly maintained
- Where possible, avoid the use of sharp instruments/materials. Disposable scissors are also an option.
- Where possible, limit vaginal exams and invasive procedures.

5.5.3. Labor and childbirth

Allow the woman to go through spontaneous labor without interruption. Do not perform artificial rupture of membranes. Limit the number of vaginal examinations. If feasible, use of the photograph is recommended.

- Fetal heart rate should be measured with a Doppler on admission to the VHF treatment facility and subsequently as clinically indicated. Continuous fetal monitoring is not advised.
- A uterotonic drug should be given immediately after the baby is delivered to prevent PPH, according to the national guidelines. If a skilled birth attendant is not available, give misoprostol and wait for placental expulsion.
- If the baby is stillborn, there is no need to clamp and cut the cord.

- If the baby is born alive, wait one minute after the birth or for up to three minutes if the cord continues to pulsate, then clamp the cord with 2 disposable cord clamps and cut it with disposable scissors.
- Health worker safety and clinical outcomes should be carefully considered, using caution before undertaking any invasive procedures such as episiotomy, manual removal of placenta, or vacuum extraction. Limit exposure to sharps and excess fluids by considering safe alternative treatment approaches.

5.6. Discharge and follow-up

The discharge of a VHF-confirmed case or suspected case is based on the clinical presentation and the correct interpretation of the laboratory findings. Consider discharge when the following criteria are met:

Three or more days without fever or any significant symptoms **AND** significant improvement in clinical condition **AND** able to perform activities of daily living (independently feeding and carrying out other activities of daily life, like washing and walking, without assistance, taking into account any previous disabilities) **AND** a negative blood PCR for VHF (regardless of any other serologic tests) on the third day of being asymptomatic.

Counsel all patients on discharge and arrange for follow-up care:

The following discharge package can be considered: nutritious food items, non-food items, and a discharge certificate

Upon discharge from the ETU, provide counseling on breastfeeding, prevention of sexually transmitted infections, and the use of family planning methods

Psychological support and follow-up should be considered, including advocacy on the patients' behalf and interceding with community leaders where necessary.

Prevention of secondary sexual transmission

Male Ebola survivors and their partners should receive counselling to ensure safe sexual practices until their semen tests negative twice. They should be provided with condoms and instructions on using them for at least 3 months. Survivors should also be provided with detailed counselling on abstinence and good hygiene. Semen testing should be offered every month until the virus is tested negative. If PCR testing is unavailable, survivors should continue using condoms or practising safe sex for at least 12 months.

Breastfeeding women who are Ebola survivors

Ebola virus RNA has been detected in breast milk up to 16 months after symptoms onset, and spontaneous galactorrhea has also been reported in female survivors. To prevent virus persistence, Ebola survivors should have their breast milk tested for Ebola by PCR immediately upon discharge from the ETU.

6. INFECTION PREVENTION CONTROL IN THE MANAGEEMENT OF VHF

The primary objective of the VHF Infection Prevention and Control (IPC) element is to minimise the risk of VHF transmission to patients, healthcare workers (HCWs), and community members. The goal is achieved by enabling and assisting all categories of HCWs to adhere to comprehensive IPC practices across all levels of care, ensuring that they are consistently trained, resourced, and supported. By implementing robust IPC measures, healthcare facilities can provide safer and higher-quality care, thereby improving health outcomes and reducing morbidity and mortality rates associated with VHFs. Additionally, engaging the community and promoting adherence to VHF IPC practices are essential for controlling the spread of the disease, educating the public, and reducing transmission rates. These integrated efforts aim to enhance the safety and well-being of both healthcare environments and the broader community, establishing a comprehensive approach to VHF IPC.

6.1. IPC Strategies at Healthcare Facilities and Communities

The outlined IPC strategies span various settings, addressing both healthcare facilities and community level contexts with focus on proactive approaches and evidence-based practices. The operationalization of IPC strategies and measures in healthcare facilities and communities in the country should consider the emergency mode cycle - watch mode, alert mode and response mode, to ensure activities are maintained and remain active throughout the year.

Table 1: IPC Strategies at Healthcare Facilities and Communities

Emergency modes	Community Level	Facility Level
Watch mode	Adhere to hygiene practices (hand washing practices, respiratory precaution and environmental cleaning etc.)	Comply with all IPC standard precautions
Alert mode	IPC measures should emphasise on the following: ● Hand hygiene and avoid handshaking ● Use face mask (when applicable) ● Reinforce adherence to IPC measures PoE and communities. Ensure that the IPC policies are consistent with locally available resources. ● Reinforce standard IPC precautions and establish additional precautions if required by the specific nature of the epidemic.	●Health care workers should comply with all IPC standard precautions and especially to transmission-based precautions ●Set up screening posts at the entrance of healthcare facilities and hand hygiene facilities, holding area for a suspect case identified during screening ●Ensure proper hand hygiene facilities (hand washing, hand sanitizer) are available ●Ensure availability of adequate personal protective equipment (PPEs), disinfection products, and waste management equipment ●Improving environmental cleaning and decontamination ● Ensure the availability of IPC -VHF posters ● Refresher course on IPC with VHF practices

Response mode	The following IPC measures should be implemented: ●Ring IPC approach should be implemented ●Point of control (PoCs) should be established to facilitate screening of people ●The community should avoid contacting with the cases	●Development of IPC Incident action plan, and implementation of the plan as well as regular monitoring). ●Isolate cases: At HC/HP, the case should be put in a holding area waiting to be transferred to Hospital isolation, the confirmed case will be referred to the treatment centre. ●Strict monitoring the comprehensive all IPC precaution measures

6.2. Procedures and Practices for VHF Infection Prevention and Control

6.2.1. Standard precautions- At all times and for all patients

Standard Precautions are the minimum level of IPC measures practised by health workers and implemented to all patients, regardless of diagnosis, based on risk assessment of a procedure(s), in order to improve treatment and/or safeguard patients, healthcare personnel, visitors/community. Regardless of the patient's suspected infectious status, they are always used on all patients in all healthcare situations. The objective is to lower the danger of microbe transmission from both known and unknown sources of infection. All healthcare professionals should adopt the habit of taking standard measures as a matter of course.

The core components of standard precautions are:

- Hand hygiene
- Safe injection practices
- Respiratory hygiene/Cough Etiquette
- Appropriate use of Personal Protective Equipment (PPE)
- Waste disposal
- Environmental cleaning, disinfection and sterilisation of patients' equipment
- Safe handling of linen,
- Patient placement and physical distancing

When standard precautions are correctly implemented, the spread of infectious diseases such as the VHFs can be prevented or at least decreased. Below are some recommendations of how to implement standard precautions.

Table 2. Standard Precautions for the Care of all Patients in all Healthcare Settings

Component	Recommendations
Hand hygiene: The 5 Moments for Hand Hygiene (described in more detail below in this guideline) should be observed at all the indicated moments.	

Moments	Actions
1	Before touching a patient
2	Before performing (clean/aseptic procedures
3	After body fluid exposure risk (e.g., after handling any potentially contaminated equipment or material such as laundry, wastes, dishes, vomit and stool buckets, etc.)
4	After touching a patient
5	After touching patients' surroundings
Personal protective equipment (PPE)	
Gloves, Gowns, Boots and shoe covers, Mask, Eye-protection (goggles), Face shield	Used when there is risk of contact with blood, body fluids, secretions, excretions, contaminated items, mucous membranes and non-intact skin
	Used during procedures and patient-care activities when contact of clothing/exposed skin with blood/body fluids, secretions, and excretions are anticipated
	Used during procedures and patient-care activities when contact of clothing/exposed skin with blood/body fluids; secretions, and excretions are anticipated
	Used during procedures and patient-care activities likely to generate splashes or sprays of blood, body fluids, secretions, especially suctioning, endotracheal intubation
	During aerosol-generating procedures (AGPs) on patients with suspected or proven infections transmitted by respiratory Aerosols; a fitted N95 respirator should be worn in addition to gloves, gown and face/eye protection
Patient care equipment	
Soiled patient-care equipment	These should be handled in a manner that prevents transfer of microorganisms to others and the environment. Appropriate PPEs should be worn while handling patient-care equipment and hand hygiene should be done before and after
Safe linen Management	
Linen and laundry	Linen should be handled in a manner that prevents transfer of microorganisms to others and the environment. Appropriate PPE should be used when handling dirty and/or soiled linen and hand hygiene should be done after
Environmental control	

Cleaning of surfaces	There should be routine care, cleaning, and disinfection of environmental surfaces, especially frequently touched surfaces in patient-care areas. There should be specialised terminal cleaning done upon patient discharge
Safe Injection Practices	
Needles and other sharps	Ensure safe injection practices, appropriate collection and disposal of used needles/sharps
Patient Placement	
Ensure one patient per bed and keep bed spacing of at least 1 metre between beds	
Respiratory hygiene/cough etiquette	
Safe practices when sneezing or coughing should be adhered to in all places.	

6.2.2. Transmission-based precautions

Transmission-based precautions are critical in the management of VHFs. Due to the potential for person-to-person transmission, particularly in healthcare settings, strict adherence to infection control measures is essential. These measures typically include contact precautions, droplet precautions, and, in some cases, airborne precautions to prevent the spread of infectious agents.

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. Avoiding transmission requires strict adherence to standard precautions as well as droplet and contact precautions for health care, environmental and laboratory workers.

Additionally, although there is no documented evidence of airborne transmission of the VHF, it is recommended to minimise aerosol-generating procedures if possible. In cases where such procedures are necessary, appropriate measures should be taken to ensure the protection of health workers and other individuals from potential aerosolized microorganisms.

The following modes of transmission and appropriate transmission-based precautions should be adopted in Healthcare Facilities

6.2.2.1. Contact precautions

Contact transmission can be direct or indirect.

A. Direct transmission

This occurs when infectious agents are transferred from one person to another without a contaminated intermediate object or person. For example, blood or other body substances from an infectious person may come into contact with a mucous membrane or break in the skin of another person.

B. Indirect transmission

This involves the transfer of an infectious agent through a contaminated intermediate object (fomite) or person. These include:

- Hands of HCWs
- Patient cloths
- Patient-care devices that are shared between patients without cleaning and disinfection
- Environmental surfaces that are inadequately disinfected.

6.2.2.2. Droplet precautions

Droplet transmission occurs through large respiratory droplets >5 microns in size. Transmission occurs when infectious respiratory droplets are expelled by coughing, sneezing or talking, and come into contact with another person's mucosa (eyes, nose or mouth), either directly or via contaminated hands. Since these microorganisms do not travel over long distances, special air handling and ventilation are not required.

6.2.2.3. Airborne precautions

The airborne route of infection occurs through droplet nuclei of 1–5 micron that are disseminated through the air. These droplet nuclei can remain suspended in the air for varying periods of time and can travel long distances (>1 metre) and from room to room. Droplet nuclei arise from the drying of suspended droplets carrying the infectious agent.

6.3. Screening and Isolation in health facilities

During VHF screening and isolation strict IPC measures are vital. Given VHFs' high contagion, swift screening with specialised protocols and symptom assessment tools is imperative, alongside trained healthcare staff equipped with appropriate PPE. Once a suspected case is identified, it requires immediate isolation in a designated room, following strict transmission-based precautions. It is also emphasised to perform hand hygiene, environmental cleaning and further enhances other IPC efforts, safeguarding healthcare workers, patients, and the community against VHF transmission.

6.4. PPE in the Care of VHF Patients

PPE are designed to protect responders from contact with infectious agents. Basic and Full PPE are the two types of PPE used in VHF case management. Basic PPE is used by any health worker/responder who works in the areas where there is no contact with the patient, but the risk of exposure can occur. Full PPE is used by any health worker/responder who is likely to have contact with a suspect or confirmed VHF case (s) or who enters the high-risk area of the isolation unit or treatment centre. Full PPE is also used by any health worker/responder who is responsible for environmental cleaning, waste collection from the high-risk area as well as SDB team when handling a dead body.

6.5. Structural designs for VHF facilities

The VHF facilities include screening area, holding area, isolation and treatment centre**.** Any suspect case from the screening area (community, POE, HF) will be kept in a holding area (HC, POE) or isolation unit (Hospital), then referred to the treatment centre after lab confirmation.

6.5.1. Design of VHF Screening area

The physical setup for screening assures 1-metre distance between the screener and the patient at all times. A physical barrier between patient and screener should be imposed to maintain the distance of 1 metre.

6.5.2. Design of VHF holding area

The infrastructure should have at least 2 self-contained rooms(female/male) with entrance and exit. The area should have a liquid waste evacuation system. The handwashing facilities and power supply should be available.

6.5.3. Design of VHF Isolation unit

The hospital isolation unit should be located away from other departments/wards, fenced, having entry and exit points in one-way direction, clearly demarcated with a barrier and signage, and having its own restroom, available good ventilation but no fans. In addition, the building must have restricted access to others. The high and low risk areas should be clearly marked and evacuation of liquid waste systems should be in place and handwashing facilities should be available.

6.5.4. Design of VHF treatment Centre

VHF treatment centres are designed to ensure optimal IPC with clearly demarcated high and low risk areas. The facility should be fenced, having entry and exit points in one-way direction, and having the sufficient restrooms, available good handwashing facilities, incinerator and liquid waste management system, chlorination system, and ventilation but no fans.

6.5.4.1. Specific areas partitioning within a VHF treatment Centre

i. High risk zones

- Suspected cases ward (normal bed & ICUs)
- Confirmed & Convalescent cases wards (normal bed &ICUs)

ii. Low risk zones

- Staff Entry Area
- Staff Changing Room
- Coordination Area
- Administrative/Office Section

- Medical offices
- Pharmacy
- Staff Rest/Refreshment Area:
- Sterilisation
- Observation Area
- Washroom
- Kitchen
- Laundry area
- Chlorination System

iii. Border areas

- Discharge showers
- Donning & Doffing areas
- Waste consolidation area
- Incinerator
- Mortuary
- Laboratory
- Blood bank

iv. Outside zone

- Vaccination site
- Awareness activities
- Nursery, caregiver accommodations
- Canteen

Note: The blood bank can also be included in the low-risk area just like pharmacy; the laboratory may be integrated in the facility or placed in an external but easy accessible area.

6.6. Safe and Dignified Burial

The dead body is highly contagious and burial should be carried out with strict IPC measures and only trained health personnel should handle dead bodies and consider cultural and religious concerns.

The fenced burial site dedicated to VHF only should be located nearest the treatment centre and the burial should be done during the day hours.

6.7. Occupational health and safety for VHF Response Workforce

Occupational health and safety for the VHF response workforce includes several critical aspects centred around IPC. Ensuring access to appropriate PPE, alongside comprehensive training on their proper use, and infection control measures is paramount.

Occupational health and safety for the VHF response workforce includes several critical aspects centred around IPC. Ensuring access to appropriate PPE, alongside comprehensive training on their proper use is paramount.

Psychological support resources are essential for addressing the emotional toll of working in high-risk environments, ensuring the holistic well-being of the response workforce.

7. VHF Risk Communication and Community Engagement (RCCE)

According to the World Health Organization (WHO), Risk Communication is the real-time exchange of information, advice, and opinions between experts or officials and people facing a hazard or threat to their survival, health, or well-being. It involves using community engagement approaches and mass media channels like radio, television, print media, and social media to inform the public about health threats. Community engagement is the process of forming partnerships with communities to create acceptable and effective emergency response solutions. Its goal is to empower communities to lead and participate in health emergency response initiatives.

Developing a clear Risk Communication and Community Engagement (RCCE) strategy is essential to ensure timely and accurate information dissemination. For Viral Hemorrhagic Fever (VHF), a comprehensive RCCE strategy is needed to raise awareness, conduct evidence-based

social mobilization, engage the community, and provide public education to support behavior change and effective communication management. Providing timely information and engaging the community during a VHF outbreak is crucial for protecting health, achieving health security, and building resilient communities and health systems.

Objectives

Main objective

The overall objective of the RC&CE Task Team is to contribute to the national preparedness and response activities to halt the transmission of VIRAL HEMORRHAGIC FEVER in Rwanda, through general awareness and effective evidence based social mobilisation, community engagement and public education that support desired behaviour change and communication management**.**

Specific Objectives:

1. Strengthen technical capacity of RCCE Task forces at all levels and sustain a well-coordinated, multi-sectoral team of RCCE implementing partners for preparedness and responses to VHF Outbreak.
2. Guide and ensure development of evidence-based messages, communication materials and approaches for various participants groups to enable people at risk to make informed decisions to mitigate the effects of a threat.
3. Continuously inform, engage and empower the public through timely and consistent provision of key messages and tools through appropriate channels on emergency health hazards.
4. Strengthen evidence-based RCCE programming for all hazards through well-structured monitoring and evaluation system, information management, feedback collection and rumour tracking mechanisms.

7.1. Guiding principles of the RCCE Strategy

This RCCE strategy is guided by the following principles:

- Evidence based approaches: Desk review, conduct early and ongoing assessments to identify essential information about at-risk populations and other stakeholders (perceptions, knowledge, communication channels, barriers…).
- Define and prioritize key RCCE objectives and strategy based on the analysis' results.
- Human Rights Based, People Centered, Systems Oriented Approaches.

- Coordination: Build on existing coordination mechanisms and/or create new ones to engage with RCCE counterparts in partner organizations at all levels of the response: local, national, and regional.
- Develop, implement and evaluate the endorsed RCCE strategy with relevant partners to engage with identified communities, and manage the info-demic.
- Take into consideration the 4 phases of emergency namely:
  - Preparedness phase
  - Emergency start phase
  - Control phase
  - Recovery phase

Emergency phases' matrix

Source: Risk Communication and Community Engagement for Health Emergencies: Practical Aspects (Pan American Health Organization, 2020)

7.2. RCCE operational structure

During routine and emergency situations, RCCE, preparedness and response interventions is conducted at Ministerial/Sectorial levels (E.g. Human health and Animal health) and coordinated by the designated Lead Agency at the national level (RBC for human health and RAB for animal health).

All RCCE stakeholders work as a strong close-knit to achieve the RCCE objectives stakeholders must have the authority and responsibility for RCCE in their organizations to ensure that agreed interventions are implemented.

The Health sector has already established a national Health RCCE task team, composed of social cluster ministries and other public and private institutions with health interventions. Nevertheless, there is a need to bring on board institutions working on the identified hazards to establish the RCCE task team.

In that regard, the RCCE task team members shall be composed of focal persons from but not limited to the Ministry of Health/RBC/RHCC, Ministry of Education, UNICEF, WHO, Directorate of Immigration and Border Management, Ministry of Defense, Rwanda National Police, Ministry of Emergency Management, Ministry of Local Government, Ministry of infrastructures, MINIRENA, IOM, UNHCR, Rwanda Agriculture and Animal Resources Board, Academic and Research Institutions , Civil Societies Organization, Youth and Women associations, Organizations of People with Disabilities, media houses and other relevant organisations recommended by the Chair of the Task team.

Inspired by the existing structure of the National Health RCCE Task Team, currently led by the Rwanda Health Communication Center (Table below), below is the proposal for the VHF RCCE Task team structure:

Details of operationalization of the VHF RCCE strategy are guided by specific SOPs and members of the task team shall be appointed upon the request of PHEOC.

7.3. Communication mechanisms during phases of VHF emergency

According to WHO, reciprocal and multidirectional communication with affected populations help them to make informed decisions to protect themselves and their loved ones. This promotes community engagement to establish prevention and self-protection measures, which generates greater confidence and considerably contributes to slowing down diseases expansion and to preventing them. This also helps to mitigate rumours, misinformation, and disinformation situations.

Accordingly, different methods and channels shall be used:

- Hotline to get feedback,
- Daily media reviews (TVs, Radios, and newspapers and EIOS) to know if the message is being disseminated.
- Human Centred Approaches implementation (e.g. participatory research, Rapid inquiry, case/social investigation, co-creation of solutions with affected population…),
- Key informant interview with community leaders, religious people etc.

The communication materials used should be mainly in Kinyarwanda language generally to ensure maximum reach of intended audiences but otherwise, the RCCE task team can determine the appropriate language and channels. The RCCE task team will ensure that the communication materials are inclusive, gender sensitive and adapted to the literacy level of the targeted audience including those living with disabilities.

7.4. VHF RCCE strategy activity plan

The key VHF RCCE activities, outcomes in each phase are described in the table below.

Table 6. Emergency RCCE phases and activities

Phase	Activity	utcome	Responsible

Preparedness phase	● Cost Plan and coordination ● KABP survey, desk review, reports about VHF disease. ● Development of SOPs based on recommended guidelines ● Capacity building for RCCE Task forces at all levels ● Development, prepositioning and dissemination of IEC materials and key messages ● Establish/Update a roster of spokespersons, Mapping of social mobilizers, media houses and community communications structures.	● Action plan and detailed Budget developed ● Desk review, situation analysis report, Rapid KABP survey reports, ● SOPs and strategic plans developed, ● Standby communication team at all levels ● IEC materials and key messages developed ● spokespersons, social mobilizers, media houses mapped	Ministry of Health/ C/RHCC, MINAGRI, INALOC and Partners

2. **Initial phase (Emergency starts)**	● Convene Technical working groups meetings ● Conduct a rapid assessment ● Review VHF RCCE strategies, action plans and functional SOPs ● Disseminate IEC materials through different channels	● Updated RCCE strategies and action plans available ● IEC materials available and disseminated ● Functional TWGs with an operational plan	Ministry of Health/ /RHCC, MINAGRI and Partners
Crisis response and control phase	● Analyze communication channels to decide on channels to use ● Implement awareness/RCCE activities ● Strengthen coordination at all levels ● Monitor and evaluate the effectiveness of RCCE activities ● Rumor tracking and management ● RCCE Timely reports	● Emergency communication channels established ● Timely implementation of RCCE interventions ● RCCE task forces are set and active ● RCCE activities are monitored ● Rumors are tracked, addressed and timely feedback provided ● RCCE regular reports provided	Ministry of Health/ /RHCC, MINAGRI and Partners

covery phase	● Review, update and disseminate IEC materials and key messages ● Sustain the communication after the emergency depending on the nature of VHF disease. ● Evaluation of interventions (document lessons learnt, best practices, etc.)	● RCCE activities continued to prevent reoccurrence of the VHF diseases through different messages ● Evaluation reports produced, lessons learnt and challenges documented.	try of Health/ RHCC, AGRI and Partners

[1] https://www.who.int/emergencies/risk-communications#:~:text=Risk%20communication%20is%20the%20real,or%20economic%20or%20social%20wellbeing.

[2] idem

Annex

Case Investigation Form

Contact listing form

Contact follow-up form

Incident action and response plans

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2.3 Consideration for EBS

The Rwanda EBS include, community, health facility, PoE, Hotline and Media scan.

Table 1: factors to consider when deciding on the EBS strategy during the alert and response mode.

Questions to consider	Factors to consider	Examples	Where to fiund further information
Who should be reporting	EBS source of information and reporting sites in the high risk/affected areas	*Facility EBS*	- IDSR TGs 3rd edition
		- Laboratory	- EBS guidelines
		- Outpatient and inpatient health facilities (public, private health facilities),	- EIOS User Guide
		- Pharmacies	- Hotline SOP
		- Points of Entry (POE)	
		Community EBS	
		- SAMU (ambulance services)	
		- CHWs, CAHWs,	
		- Other community members with specific functions (e.g: local leaders/ head of village), traditional healers, schools leaders/teachers, heads of faith-based congregations, Government agencies, humanitarian NGO, partners, large employers, hotels, local markets representatives, managers of restaurants, butchers managers, livestock keepers) etc…	
		Hotline	
		114	
		Media scan	
		Epidemic Intelligence from Open Sources (EIOS)	
What should be reported	VHF Event definition	*Outpatient and inpatient health facilities report*:	- EBS Guideline
		– Occurrence of one or more cases or deaths of VHF likely disease, based on clinician's professional judgement.	
		– One or more health care worker(s) with VHF likely disease or death after exposure to patients or	

		other health facility staff (s) exposed and presenting similar symptoms.	
		- Unexpected increase in admissions to healthcare facilities of persons with similar VHF likely symptoms	
		- One or more cases of VHF likely disease from the same location (e.g health facility, household, schools, camps, prisons etc.)	
		- Sudden illness in a person with a history of recent travel (not more than 30 days).	
		Animal health facilities	- EBS guidelines
		- Cluster of animal deaths attended by a veterinary professional within 14 days excluding animal bites.	
		- Cluster of animals presenting with unusual signs or exhibiting production losses (e.g., abortions, aggression, bleeding, weight loss, diarrhoea, body swellings).	
		- Severe illness and/or deaths in veterinarian, wildlife staff, meat inspector or community members after contact with a sick or dead animal (culling, slaughtering, feeding, treating, vaccinating etc.).	
		- Increase in illness-specific medication sales/requests	
		Laboratories	- IDSR TGs 3rd edition
		- Sudden unexpected increase in numbers of specimens with the same testing request (VHF)	- EBS guidelines
		- Sudden unexpected increase in numbers of positive for the same VHF-pathogen	- Lab Diagnostic SOPs
		- Re-emerging or a new VHF pathogen, or a new/unreported strain of an already known VHF pathogen	-
		Pharmacies	- EBS Guideline
		- Increase in illness-specific medication sales/requests for humans.	
		- Increase in illness-specific medication sales/requests for animals	



		Points of Entry (POE)	- IDSR TGs 3rd edition
		- Traveler/ Group/Cluster of travellers with signs & symptoms suggestive of VHF disease: Headache, Vomiting/nausea, Diarrhoea, Muscle or joint pain, Abdominal pain, Skin rash, Difficulty swallowing, Chills, Anorexia / loss of appetite, Difficulty breathing, Intense fatigue, Hiccups, Conjunctivitis, Unexplained bleeding from any site (not from injury)	- EBS guidelines
		- Traveler(s) who is looking obviously unwell	- POE contingency plans
		- Any person with sudden, unexplained death at PoE or onboard a conveyance.	
		- A healthy traveller with a history of being in a country/area affected by VHF within an incubation period of the disease.	
		- Any sick/ill person, with travel history in an area affected by VHF.	
		Community EBS	
		SAMU (ambulance services), CHWs, CAHWs, general public, Other community members with specific functions (e.g: local leaders, traditional healers, schools leaders/teachers, heads of faith-based congregations, Government agencies, humanitarian NGO, partners, large employers, hotels, local markets representatives, managers of restaurants, butchers managers, livestock keepers) etc… report:	
		- One or more persons with similar severe signs and symptoms in the same community (workplace, public gathering…) within one week. ('severe' can be elaborated at the community level as needing to seek medical care).	- EBS Guideline
		- Anyone with unexplained bleeding from any part of the body.	
		- Anyone presenting with unusual signs, symptoms, or developing illness or died after exposure to sick or dead animal(s).	
		- Cluster of animal deaths in/less than 14 days.	

		– Cluster of animals presenting with unusual signs/behaviour or exhibiting production losses(e.g., abortions, aggression, bleeding, weight loss, diarrhoea, body swellings).	
		Media scan	- EBS guidelines
		A list of keywords is used to support detection of signals of VHF of national interest. The list below is not exhaustive and could change depending on what VHF threats are relevant to the country at a particular point in time:	
		– Chikungunya	
		– Crimean-Congo hemorrhagic fever	
		– Dengue fever	
		– Ebola disease	
		– Marburg virus disease	
		– Rift Valley Fever	
		– Yellow fever	
When should it be reported	Frequency of reporting	Immediate reporting	- IDSR TGs 3rd edition
			- EBS guidelines
Where should reports go	Information flow for CEBS, FEBS, Hoteline, Media scan reporting	Reports go to HC/DH/PHEOC/PHS&EPR.	- EBS guidelines
		- The local level (HC/DH) conducts triage.	
		- DH/PHEOC/PHS&EPR Units conduct verification, risk assessment and response, if needed, and report accordingly to the next level	
How should it be reported	Mechanisms for reporting and standards format	Reporting should be the quickest, most efficient means that still enables the inclusion of all critical information:	- IDSR TGs 3rd edition
		- Community and facility signals are transmitted by eCEBS/Impuruza System,	- EBS guidelines
		- General public use hotline (114)	- eCEBS/Impuruza System user guide
		- Media-Scan use Epidemic Intelligence from Open Sources (EIOS)	- Hotline SOP
			- EIOS user-manual

What feedback mechanisms should be installed	Communication and feedback loops between all levels of the EWAR system	- Live VHF emergency dashboards	- IDSR TGs 3rd edition
		- Weekly epidemiological bulletin report trends seen, alerts confirmed, and actions taken.	- Communication SOPs/guidelines
		- Daily/weekly/monthly meetings between all levels of the surveillance and alert management system allows for communication and feedback.	
		- Community meetings	

Components of risk assessment

Components	Key information	Key questions	Example
Hazard assessment	• Laboratory confirmation of the specific VHF (e.g., Ebola, Marburg, Lassa fever)	• Do laboratory test results confirm a specific VHF or are they consistent with a particular type of VHF? If confirmation has been attempted but was not successful, is a newly emerging VHF suspected?	More than one individual presenting with high fever, severe headache, muscle pain, weakness, fatigue, diarrhoea, vomiting, abdominal pain, and unexplained bleeding from multiple sites.
	• Clinical and epidemiological information, including symptoms, transmission patterns, and potential sources of exposure.	• Is a high level of severe morbidity or mortality anticipated based on the suspected VHF?	
	• Listing of possible VHF causes based on clinical and epidemiological features if laboratory confirmation is not yet available.	• Does the suspected VHF have a high potential for rapid transmission through person-to-person or zoonotic routes?	One sample test positive for Ebola disease (Ebola disease).
		• Is there suspected transmission within a healthcare	

		setting (nosocomial transmission)?	No further cases or deaths have been reported yet
Exposure assessment	• Number of people likely already exposed to the suspected VHF. • Number of exposed individuals who are potentially susceptible (e.g., unvaccinated, immunocompromised) • Likelihood of the population at risk being exposed to the VHF. • Likely path of transmission (e.g., person-to-person, zoonotic, healthcare-associated) • Likelihood of continuing exposure due to factors such as poor sanitation, overcrowded living conditions, or ongoing outbreaks in animals.	• Is clustering of cases with similar signs and symptoms observed at this point in time? • Are there similar events happening simultaneously in different geographical areas (including surrounding areas/countries), perhaps demonstrating spatial expansion? • If the event is due to a zoonotic source (e.g., animal disease or exposure to infected animals), does this have known or potential consequences for human health. • Is clustering of cases with similar signs and symptoms observed at this point in time? • Are there similar events happening simultaneously in different geographical areas (including surrounding areas/countries), perhaps demonstrating spatial expansion?	TBD

Monitoring and Evaluation indicators for VHF sentinel surveillance

S/N	Indicator	Frequency	Expected Outcome



1	Data completeness	Monthly	
	Data timeliness	Monthly	% of VHF surveillance reports received on time/monthly
2			% of VHF CIF completed monthly, e.t.c..
3			
4	Sample turnaround time	Monthly	
5	Report of each VHF sentinel site	Monthly	a) Number of VHF cases b) % positive confirmed cases c) CFR
6	Analysis of VHF cases	Bi-annually	
7	Monitoring & Evaluation visits to VHF sentinel sites	Bi-annually	Report of site performance, challenges, and success at the sentinel sites
8	TWG meetings of sites	Bi-weekly	Reports of sentinel sites TWG meetings
9		Annually	a) VHF surveillance system review report b) Analysis each VHF morbidity and mortality rate