Filovirus disease clinical management working group
Meeting report

Geneva, Switzerland • 16–17 March 2023
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Acknowledgements

WHO Secretariat

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See Annex 3 for the complete lists of participants.

WHO would also like to thank the translation team: Rosemary Hynes, Céline Petipas, Starr Pirot, Rebecca van Horck and Kiersten Weeks, who were key to enabling participation and understanding throughout the meeting.

Declarations

Declarations of interest were collected and assessed for all participants and external contributors. No conflicts of interest were judged to be significant.

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## Abbreviations

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<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>ALIMA</td>
<td>Alliance for International Medical Action</td>
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<td>CRF</td>
<td>case report form</td>
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<td>EBOV</td>
<td>Ebola virus</td>
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<td>EVD</td>
<td>Ebola virus disease</td>
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<td>FVD</td>
<td>filovirus disease</td>
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<tr>
<td>GDG</td>
<td>Guideline Development Group</td>
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<tr>
<td>GRADE</td>
<td>Grading of Recommendations Assessment, Development and Evaluation</td>
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<td>KPI</td>
<td>key performance indicators</td>
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<td>MEURI</td>
<td>Monitored Emergency Use of Unregistered Interventions</td>
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<tr>
<td>NGO</td>
<td>nongovernmental organization</td>
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<tr>
<td>oSOC</td>
<td>optimized standard of care</td>
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<td>PEP</td>
<td>post-exposure prophylaxis</td>
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<tr>
<td>PICO</td>
<td>population, intervention, comparator, outcomes</td>
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<td>PPE</td>
<td>personal protective equipment</td>
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<td>RCT</td>
<td>randomized controlled trial</td>
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<td>SimEx</td>
<td>simulation exercise</td>
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<td>SVD</td>
<td>Sudan virus disease</td>
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<td>VHF</td>
<td>viral haemorrhagic fever</td>
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<td>WHO</td>
<td>World Health Organization</td>
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Background

Ebola virus disease (EVD) is a life-threatening disease caused by Ebola virus (including Zaire ebolavirus [EBOV]). Viruses of the genus Ebolavirus (of the family Filoviridae) can cause life-threatening disease.

To date, six filoviruses have been discovered in humans; four in the genus Ebolavirus (Bundibugyo virus, EBOV, Sudan virus and Tai Forest virus). The remaining two human filoviruses belong to the genus Marburgvirus (Marburg virus and Ravn virus). EBOV causes outbreaks of EVD, historically the most severe and most frequent; however, the recent outbreak of Marburgvirus in Guinea in February 2023, is a stark reminder that clinical readiness and response capacity for all filoviruses of outbreak potential remains crucial across the known at-risk countries.

To improve support to Member States and nongovernmental organization (NGO) partners, WHO has been developing a teaching and clinical management training for country readiness and response for future filovirus outbreaks. The cumulative content and lessons learned from training delivered during outbreaks in multiple countries have been standardized and consolidated into a draft learning package to support training of health care workers to work safely and effectively in treatment centres.

The meeting (conducted in-person and online), held 16–17 March 2023, provided the opportunity to host a group of global experts in filovirus disease (FVD) management, outbreak response and clinical and operational research to discuss the current and future development of clinical management training materials, guidelines and guidance development, research gaps and future priorities to improve care and outcomes for patients.

The meeting was officially opened with remarks from Dr Mike Ryan, Executive Director, WHO Health Emergencies Programme, extending thanks to the group of global experts and organizations who, through their commitment, expertise and contribution to responses in the field over the last decade have driven significant improvement towards clinical care and outcome of patients with viral haemorrhagic fevers (VHFs).
Methods

During the meeting, there was consensus to widen the meeting focus from using the disease nomenclature “viral haemorrhagic fever (VHF)” to “filovirus disease (FVD)” for the meeting; hence the renaming of the meeting report and use of FVD throughout.

Day 1 of the meeting focused on consultation with global experts on the draft FVD training modules. Prior to the meeting, experts were allocated into groups and a fixed number of draft modules were reviewed and feedback consolidated. Structured discussion allowed the WHO Secretariat to capture the next steps and to prioritize them.

Day 2 of the meeting focused on presentations from global experts on key areas of FVD clinical management that require further research, guideline development and operational implementation. The discussion and input from the group allowed the WHO Secretariat to prioritize next steps and develop a timeline of actions.

Both days’ meetings and discussions were recorded and links made publicly available.
Summary of Day 1 presentations and discussion: clinical management training materials

The meeting was initiated by Dr Maurice Nzogu (Technical Officer, WHO) sharing a summary of the draft clinical management training package, planned use and implementation, progress to date, awareness of gaps and omissions, knowledge depth and implementational barriers.

Prior to the meeting, experts were allocated into groups and a fixed number of draft modules were reviewed and feedback consolidated. During the meeting each group presented their summarized feedback and received wider inputs from the group.

Modules 1–4 Chair: Dr Marta Lado, Partners in Health, Sierra Leone.
Modules 5–8 Chair: Dr Shevin Jacob, Liverpool School of Tropical Medicine, the United Kingdom.
Modules 9–12 Chair: Dr Hans-Joerg Lang, ALIMA, Senegal.
Modules 13–16 Chair: Luca Fontana, Health Logistics, WHO.

General module discussion main points

Wide consensus of the need to expand the training package content from VHF to ensure relevance towards FVD more broadly (encompassing both Ebolavirus genus and Marburgvirus).

- Wide agreement on the training audience – doctors, nurses and allied health staff involved in direct treatment, care and operations of treatment centres and patients.
- Recommendation and agreement to develop an additional four modules:
  - nutrition
  - mental health
  - psychosocial support (for patients and staff)
  - patient and nursing care.
- Suggestions were made for specific changes to training goals, and minor alterations to the overall training and learning objectives.
- Identified challenges faced to keep materials updated and translated. Methodology for systematic review and updates to be devised.
- Request to adapt training materials to other languages – not only Spanish or English – but local languages where possible to be explored in the future.
- New material suggestions:
  - Persistence of virus after recovery.
- Health promotion and importance of communication with health workers/health promoters can improve case management (via improving community links).
- Post-discharge support: not only patients but also consider groups, family, community affected by the disease.
- Discussion on need for a specific nursing module to be included, but could be contrary to ethos of creating a multidisciplinary training that is able to accommodate all health care workers. Agreement to add a specific module that focuses on patient care delivered by nursing team, but important to ensure that ALL modules are appropriately framed for the whole health care team.
- Inclusions of survival follow-up materials requested.

**Engagement with training participants:**
- Discussion regarding interactions with participants to provide they are engaged throughout the training – varied styles, delivery and formats?
- Important to have different training formats and to build learning versatility early in the development of the products.
- Engagement with other care providers/entities – local NGOs, partners, institutions would be helpful.
- Overall agreement that “Readiness” workstream needs to be more holistic: advance work with local ministry of health, training identified health care workers, pre-designated treatment centre sites (are they integrated into the health system?) – these are ambitions for the future to ensure more seamless start-up clinical responses in outbreaks and to reduce delay to patients being in safe settings for effective delivery of care.
- Medical supplies, logistics and distribution are fundamental for the quality of care – a concern shared widely from recent outbreaks where supply chains are limited or broken. More effort and coordination need to be made for countries and responses to have access to critical items to operate safe health care during phase 1 of an outbreak.
- Partnership with academic institutions – globally and locally to improve access to facilitators and training; curriculum quality could be explored.
- Lengthy discussion on how to ensure clinicians and care teams are empathetic to patients and families. It is challenging to create/convey this within the training package, but very important. Should be brought out in scenarios in relevant modules and during simulation exercises (SimEx).

### Specific module recommendations
- Minor modification needed in the content of clinical case studies.
- Useful to quantify how the content relates to each filovirus – insert slides containing the percentage of patients with EVD in the training package.
- Recognition that the pathophysiology module will be a high-level recap and will require more understanding before beginning the training package.

### Facilitators and facilitator guide

The facilitator guide has been developed as a step-by-step tool on how to support facilitators in leading, managing and guiding a group through a learning process.

#### Facilitators and facilitator guide main points
- Provide guide and modules for facilitator to review well in advance of training.
- Clear guidance on which materials should be prepared and printed/available in advance needed.
• Language barriers not really addressed yet (specifically non-English translations); identified as an issue to explore in the future given the geographic distribution of FVD.

• Interactivity during the sessions: facilitator should have time to ask questions during and after the sessions, but this must be agreed (people always feel time is not enough during training sessions).

• Social and local cultural context should be looked at when preparing/delivering the training.

• Choice of facilitators will determine the success of the training – there can be constraints on their availability, and the facilitator guide may need to be modified by them in order to be relevant to the local health system.

• Historically, a small group of the same expert trainers have deployed training in active outbreaks. There is increasing interest from countries to have readiness training when a neighbouring country outbreak is ongoing and a longer term ambition for “readiness” training in countries with known outbreak risk profiles. Efforts need to be made to expand the list of facilitators – building local and regional capacity. List to be maintained by WHO; partners can express interest in sending experts to deliver training.

• Facilitator meetings pre-training and follow-up would be advantageous. How often do we need to organize these training sessions? Yearly or more frequently?

SimEx module

The SimEx presentation focused on the following items: structure, content, design and flow, scenario, skills assessed, debrief.

Overwhelming feedback to date from participants is of the value of the clinical case studies, and SimEx in face-to-face training.

SimEx module main points

• Different scenarios running at the same time might make the SimEx interesting and stimulating.

• Mobile training kit and “unit” may improve communication and delivery.

• Need to identify local contextual priorities in training/simulation.

• Some countries might already have places designated for treatment centres. If they don’t, work together with the local teams to select sites.

• Need to develop a checklist for identifying potential facility for simulations.

• The SimEx should have a diagram to explain the various roles of participants within it.

Design presentation

WHO will be collaborating with a design company to produce the final content – for use online and offline – initially aimed at face-to-face learning, but increasingly building the capability for self-paced learning, where participants can work through online modules – and use face-to-face time for SimEx.

Facilitators will be able to review content in advance – as it will be hosted on a single online platform. This will reduce the risk of using out-of-date material and the need to update slides (and add any extra content) but does reduce “localization” of the context and this will remain a role and responsibility of the in-country training team to convey in person.
Design presentation main points

• Dynamic interactive system inside the 3D using hotspots with embedded videos, content and toolkit with links.

• Optimal functionality of the training will be viewed via internet connection – therefore identifying training locations with sufficient bandwidth will be key. However, offline materials will be available in PowerPoint, but functionality will be reduced and materials will look more repetitive.

• Recognition of the benefit of easy updating of materials, and translation to other languages.

• Over time, materials may increasingly be used in a more self-paced modality and for review prior to face-to-face training, so that very disease-specific content and operational aspects can be focused on during face-to-face training.
Conclusions and next steps on clinical management training materials

In general, there was common agreement on the overall direction of the materials’ development, recognizing more design, functionality and editorial work is required alongside the addition of extra modules yet to be done.

The level of the material should be aimed at trained skilled clinical and nursing staff and competent novices, who are identified as part of country readiness teams or those deploying to outbreaks to work inside treatment centres who need disease-specific content and orientation.

Recommendation to strike the balance between basic clinical content versus disease-specific content, avoiding the tendency to over describe basic clinical management.

Recognition of the value of having a core training package that can be easily updated, translated, developed in the future, and possibly replicated/adapted to other diseases.

WHO Secretariat to finalize the training package in 2024.

Next meeting (virtual): Quarter 2 or Quarter 3, 2024.
Summary of Day 2 presentations and discussion: clinical management development and innovation

Dr Janet Diaz (Clinical Management Lead, WHO) opened Day 2 with a reflection on the progress in clinical management of FVD over the last decade including key milestones and research outcomes. These milestones included the WHO recommendation for the use of monoclonal antibodies for patients with EBOV (Zaire ebolavirus) in August 2022 and the global effort required to generate the evidence and the need to continue to drive evidence generation and disease characterization further for all filoviruses.

However, the provision of quality clinical care remains fundamental to all patient outcomes, and collective responsibility to “get the basics right” is a continued call for action for all those caring for patients and engaged in FVD outbreak response.

Day 2 involved a series of presentations, discussions and group work spanning several clinical and operational themes that would benefit from further development and innovation. These sessions allowed meeting participants to understand the status of research, clinical guidelines, operational guidance, identify areas of support and collaboration and agree a timeline of priorities for reviews, working groups and meetings.

MEURI protocol implementation and opportunities for innovation

Dr William Fischer (University of North Carolina, United States) presented Monitored Emergency Use of Unregistered Interventions (MEURI) protocols as the preferred approach to provide a rapid intervention with new or repurposed therapeutics for an outbreak in the event there is a delay in implementing a randomized controlled trial (RCT) while generating basic monitoring and safety data.

Implementation of the MEURI protocol has several challenges, as faced recently in the field, and discussions revolved around identifying opportunities to reduce barriers and increase timeliness of protocol implementation.

**MEURI implementation challenges**

- Molecule/agent identification and selection processes (if not done in advance, can be lengthy and delay initiation, as seen with the Sudan virus disease [SVD] outbreak in Uganda in 2022).
- Timeline for regulatory/ethics approval; real time can cause delay – where possible to be initiated pre-emptively.
- Access and logistics – ship to country, transport to treatment location, administration to patient.
- Availability of experienced personnel at all levels.
- Delays in patient diagnostics – testing turnaround time, to ensure early delivery of interventions.
Ability to provide optimized clinical care and monitored therapeutics’ delivery (and transition to RCT if possible).

Informed consent, MEURI framework operationalization and capacity building.

Therapeutics packaging/infusion kits – having self-contained and comprehensive, easy-to-use packaging in the right place at the right time, with staff trained in their use.

Capacity to manage data, adverse event monitoring and recording.

Community engagement is essential for therapeutics’ research.

Timely analysis and sharing with the wider medical and scientific community are essential.

Addressing and reducing these barriers and obstacles by having standardized protocols, data capture and standing agreements with ministries of health, NGOs and governments will reduce the delays to intervene and generate evidence that may contribute to improved understanding and use of therapeutics.

**Current MEURI examples**

- MBP134 therapy for SVD has just finished phase 1 (safety) with no serious adverse events detected.
- Remdesivir combination therapy extends the therapeutic window (remdesivir and MBP134).

**MEURI recent successes**

- Operationalized optimized standard of care (oSOC) as the backbone required to provide therapeutics within the MEURI framework.
- Implemented MEURI for MBP134, and combination therapy (increased SVD clinical/therapeutics capacity).
- MEURI, like outbreak response, must shift from crisis response during discrete outbreaks to an integrated cycle of readiness and response.

**Research landscape main points**

Dr Ian Crozier (National Institutes of Health, United States) described the current research landscape. Several studies have been carried out during recent epidemics making it possible to considerably improve the quality of care for FVD patients. However, mortality remains high. The expert group discussed ongoing research and possible opportunities to explore to improve patient outcomes in EVD/FVD clinical management.

**Discussion main points**

- Quickly identifying positive patients and provide a quick answer – requires rapid diagnostics. Barriers to testing and result turnaround need to be reduced, with better point of care testing.
- Getting therapies to patients as soon as possible is reliant on multiple factors – testing, availability, trained staff and supervision.
- Scalability of monoclonal antibodies is a limiting factor; hence combination antiviral molecules deserve testing and further scrutiny.
- Pre-discussion/planning between outbreaks needs to be regularized to discuss research status and next steps.
- Wider engagement of partners to co-create a research plan before the outbreak, using combined data.
- Recommendation/indication for the use of drugs at the beginning of the outbreak (to reduce transmission).
- Communication – key for diagnostic tools, surveillance and community engagement. This can reduce time from suspected and confirmed case to start care immediately.
- Model of care needs further exploration and analysis.
• Integrated response team – contact tracing in multidisciplinary teams.

• Where interventions are already used without good evidence, standard of care already fixed and difficult to establish RCTs: MEURI remains very appropriate in these instances.

**Specific outstanding questions**

• Need to analyse survivor data to compare how different treatments work.

• Emphasize the need to understand the relationship between host co-factors and comorbidities.

• Post-exposure prophylaxis (PEP) (get treatment fast to a patient before a confirmed infection, how we identify the disease as soon as possible); what other interventions can be done other than PEP? Rapid diagnostics is another type of intervention.

• Special populations, e.g. children.

• Multiple approaches can be taken to reduce time to response (vaccines, oral medications).

**Global Clinical Platform for VHF**

Dr Jamie Rylance (WHO) presented an initiative WHO introduced at a global level during COVID-19 to facilitate disease characterization, aid severity analysis, ensure best use of clinical data and harmonize data elements across sources – the Global Clinical Platform. The platform now hosts a dedicated case report form (CRF) for VHF.

The objectives of the Platform are to:

- Describe the clinical characterization of disease, its natural history and severity.

- Identify the association of clinical characteristics of VHF with outcomes; and enable an understanding of clinical resource use when providing high-quality supportive care.

Previous versions of this platform have captured data for individual VHFs, e.g. Marburg virus disease, EVD and SVD. This latest version aims to be a common tool which can be used in these and other illnesses and may allow future comparison between viral diseases.

WHO invites Member States, health facilities and other entities to participate in the global effort to collect anonymized clinical data relating to suspected or confirmed cases of VHF and contribute data to the WHO Global Clinical Platform. The CRF is divided into three modules, to standardize data collection of clinical features of VHF among hospitalized cases at baseline (admission); during treatment; and at discharge, transfer or death. These three CRF modules may be completed prospectively or retrospectively.

The CRF is designed to collect data obtained directly from patient examination and interview, and from review of hospital or clinical notes of people with suspected, probable or confirmed VHF.

The Platform is REDCap based, and allows global positioning and partnerships. It supports the need for data sharing within the International Health Regulations, and has been granted WHO ethics approval. It has been used for EVD and SVD and can be more broadly used for demographic details during VHF outbreaks. The Platform can be rapidly deployed. The next steps are now to solve transparency and data usage through MEURI protocols and expand the Platform through various ways, including using sentinel sites.

**Discussion highlights**

• Offers an ethical framework.

• Prospective approval of data collection required (ministry of health).

• Prospective discussion of the statistical analysis plan as a way of highlighting advantages.
• Coordination with all partners (NGOs) to harmonize CRFs.
• Ownership (siting of server, data use agreement) but data remain the property of the contributing country.
• Metadata need to complement patient-level data, ideally including qualitative feedback from sites, staff, competencies and functions.
• Proof of utility (and understanding where the observational data might be at odds with RCT data) using data from Eastern Democratic Republic of the Congo outbreaks (Rebecca Coleburn, Laura Mercer at Epicentre and the Ebola Data, Initiative respectively).
• Add on of follow-up CRF to monitor survivors for post-infection sequelae.

Quality improvement and key performance indicator (KPI) development

Dr Daniel Youkee (King’s College London, the United Kingdom) led this discussion focused on the proposal of developing a standardized tool to assess quality of care management for FVD using standard indicators and KPIs.

Discussion main points and questions

• Some sites already well developed – access, collect and develop tools and indicators in place in the Democratic Republic of the Congo.
• Are we looking for the optimal or the minimal level? Scope (specific questions)?
• Survivor care included.
• Do pregnant women deliver in a facility?
• Which elements of care? Labs? Special groups, children, obstetrics?
• Need to delineate what is a tool, what is a guideline and what is guidance.
• Potential indicators (KPIs) to be developed, with subsequent monitoring:
  • Process, surveillance, contact tracing, biological.
  • Satisfaction.
  • Satisfaction perspectives – patients, clinicians, family, staff, cleaners, nurses.
  • Outcomes: mortality; mortality rate after 48 hours (determine an indicator for when to determine a community death or facility death); length of stay; delay from triage to admission.
  • Infection prevention and control and, water, sanitation and hygiene: hygiene; number of cross contaminations in the treatment centre; number of staff contaminated.
  • Logistics: waste management, electricity, ambulance, supplies, cold chain, lab tests available, materials available.
  • Patient, family and community perspectives: pain control, patient satisfaction, psychosocial support given during hospitalization, upon discharge, patient support, family support.
  • Human resources – patient/clinician ratio; number of clinicians trained in basic resuscitation.
  • Infrastructure/site.
• Audit is important: quick to conduct, mixed methods, inter-observer reliability, modifiable.

Guidelines, operational guidance, optimized standard of care (oSOC) and tools

Dr Tom Fletcher (Liverpool School of Tropical Medicine, the United Kingdom) led a discussion on the status of the relevant guidelines, guidance and oSOC and tools available for clinicians.

How generalized should the tools be? How should we revise the guidelines? There was agreement and consensus to review the 2019 version, but to consider making it applicable for all FVDs, with some disease specificity where relevant. The group widely accepted the limitations on the scope of guidance and need to rely on other key guidelines and guidance.

**Discussion main points**
- More in depth guidance on nutrition requested, including what are the specific requirements for safe food preparation and delivery.
- Request to consider strengthening palliative care and mental health and psychosocial support in the oSOC?
- Surgical interventions to be further discussed: what framework? High risk of severe accident.
- Management in pregnancy, of neonates, and medical abortion, etc., babies who can’t stay with their mother.
- As there have been several outbreaks, different aspects of the use of personal protective equipment (PPE) in case management should be revised in the guideline regarding risk assessment.
- Notion of empathy, psychologic care of patients – all-important “softer side” of care section to be included in revision.
- Management of bleeding and transfusion to be added.
- Recovered patients, better description of survivor care to be integrated.

**Logistics and supply**
Luca Fontana (Health Logistics, WHO) led a discussion on supply chain management and design and management of disease treatment centres.

Stock management standardization is urgently needed. The focus has been on PPE (look out for Smart PPE in development by MSF) but similar approach is required for other aspects.

**Discussion main points**
- Significant delays between placement of request and deployment exist. Consider stockpile of advanced clinical supplies (medicines and equipment) strategically placed in subregion.
- Facility estimator tool to be comprehensive for treatment centres and new modules to extend to other facilities, e.g. screening, transit.
- PPE standardization – same PPE should be used through during outbreaks. Health workers complain about frequent PPE changes.
- Training and other tools and should improve accessibility to supplies.
Conclusions and next steps on clinical management development and innovation

Day 2 of the meeting offered rich and engaging discussion of highly important areas of FVD clinical management care that need to be addressed.

Guidelines and guidance

- WHO to commission systematic reviews necessary to inform a review of the 2019 *Optimized supportive care for Ebola virus disease: clinical management standard operating procedures* (with the view to widen scope to VHF or possibly FVD) in 2024.
- WHO to establish working group to start to explore patient KPIs and indicators in 2024.
- Living guidelines for FVD therapeutics – to convene Guideline Development Group when there is sufficient evidence to review.

Medical supply and logistics

- WHO to work on update of kit for viral haemorrhagic fever, including contents and estimator tools to enable delivery of oSOC and safe use of therapeutics.

Data management

- All partners and experts to review the Global Clinical Platform for VHF, explore usage locally and for deployment in future outbreaks.

Coordination

WHO to convene:

- Annual expert working group meetings.
- Regular meetings during outbreak phase with relevant operational partners.
- Regular meetings – pre- and post-outbreaks for subtopics – research landscape, therapeutics/MEURI protocol.
Links to meeting recordings

**Day 1: recording part 1**
https://who.zoom.us/rec/share/e614Wu03KeC0LWi4iIkJF4fBFb2wFw5BuF2WFSiZfX_nmtuoKQWDmyYtMt2wKiglJ.f2S2Dp9QxYG-z0WS?startTime=1678948486000

**Day 1: recording part 2**
https://who.zoom.us/rec/share/e614Wu03KeC0LWi4iIkJF4fBFb2wFw5BuF2WFSiZfX_nmtuoKQWDmyYtMt2wKiglJ.f2S2Dp9QxYG-z0WS?startTime=1678972948000

**Day 2: recording part 1**
https://who.zoom.us/rec/share/WpvJ9uf4wjjz4La9N-h_Or5lUBtlz0XUTG77XqKQNHoEWWJEYxt2Qh-VKchaX_kx.Yd_AZwbyh9N71kc?startTime=1679035384000

**Day 2: recording part 2**
https://who.zoom.us/rec/share/WpvJ9uf4wjjz4La9N-h_Or5lUBtlz0XUTG77XqKQNHoEWWJEYxt2Qh-VKchaX_kx.Yd_AZwbyh9N71kc?startTime=1679055589000
Bibliography and resources


Ebola clinical management: Clinical Management and Operations Unit. Geneva: World Health Organization; 2024 (Clinical Unit and Ebola Virus Disease (who.int)).

Essential Items Estimator Tool. Geneva: World Health Organization; 2024 (Partners Platform (who.int)).


Annex 1

Meeting concept note

VHF meeting – 16 – 17 March 2023

Concept note: Viral Haemorrhagic Fever Working Group meeting

Background

Ebola virus disease (EVD) is a life-threatening multisystem illness associated with fever and gastrointestinal symptoms that frequently leads to hypovolaemia, metabolic acidosis, hypoglycaemia and multi-organ failure.

The publication by WHO of Optimized supportive care for Ebola virus disease in 2019 was a response to the prolonged 2013–2016 EVD outbreak in West Africa, and incorporated learning on how high-quality case management can significantly improve outcomes for patients, by carefully addressing their physiological needs.

Further improvements in care for patients with Ebola are likely to arise from novel therapeutics. This has been demonstrated by the effectiveness of antibodies Ab114 and REGN-EB3 in Ebola Zaire virus disease. Subsequent outbreaks of viral haemorrhagic fever (VHF), including Sudan virus disease (SVD) in Uganda in 2022 and Marburg virus disease (MVD) in Equatorial Guinea in 2023, have further highlighted the need to evaluate new therapeutics: there is currently no clinical trial evidence for therapies in SVD or MVD, although some have been used within the monitored emergency use of unregistered and experimental interventions (MEURI) framework in SVD.

In order to support Member States, WHO has been developing teaching and training materials for country preparedness and response. These have been formalized and incorporated into a package/toolkit to support training of health care workers to work safely and effectively in Ebola treatment centres. Additionally, WHO has created and deployed data capture tools which can be used to collect information on patient characteristics, health care delivery, use of therapeutics (including MEURI-related compounds) and patient outcomes.

This meeting provides the opportunity for global experts to discuss the current and future development of clinical care materials, guidelines for VHF and data tools, which might be used to improve care for patients.
VHF meeting – 16 – 17 March 2023

Objectives
1. To finalize the Ebola training package for health workers.
2. To discuss and plan development and updates to:
   a. optimized supportive care for VHF
   b. living guidance for VHF
   c. operational guidance.

Methods
The 2-day workshop will focus on consultation with global experts through the presentations of learning from previous experience in Ebola outbreaks. Structured discussion will allow us to capture the next steps, and to prioritize them.
### Viral Haemorrhagic Fever Working Group meeting

#### DAY 1

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<th>Time</th>
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| 09:00–09:15 | Welcome remarks                                 | Dr Mike Ryan  
Executive Director General  
Health Emergencies Programme  
WHO, Geneva, Switzerland  
Dr Janet Diaz  
Lead, Clinical Management  
Health Emergencies Programme  
WHO, Geneva, Switzerland |
| 09:15–09:30 | Agenda and tools presentation                   | Dr Maurice Nzogu  
EVD Technical Officer  
Health Emergencies Programme  
WHO, Geneva, Switzerland |
| 09:30–10:00 | Report of chairs to the group on synthesis of evaluation | Moderator: Vanessa Cramond  
Dr Marta Lado  
Partners In Health, Sierra Leone  
Dr Shevin Jacob  
Liverpool School of Tropical Medicine, Uganda |
| 10:00–10:30 | Coffee break                                    |                                                                               |
| 11:00–11:30 | Report of chairs to the group on synthesis of evaluation | Dr Hans-Joerg Lang  
ALIMA, Germany  
Luca Fontana  
Health Logistics Officer  
Health Emergencies Programme  
WHO, Geneva, Switzerland |
<p>| 11:30–12:00 |                                                |                                                                               |
| 12:00–13:00 | Lunch break in the WHO cafeteria                |                                                                               |</p>
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<tr>
<th>Time</th>
<th>Session</th>
<th>Facilitator</th>
<th>Details</th>
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| 13:00–13:30  | Facilitator guide                                                       | Hossein Hamam Nazih         | Educational Methodologist  
Health Emergencies Programme  
WHO, Geneva, Switzerland     |
|              | Review survey results                                                   |                            | Moderator: Maurice Nzogu                                               |
|              | Open discussion                                                         |                            |                                                                        |
| 13:30–14:15  | Simulation: Review simulation development                                | Luca Fontana                | Health Logistics Officer  
Health Emergencies Programme  
WHO, Geneva, Switzerland     |
|              | Review survey results                                                   |                            | Moderator: Maurice Nzogu                                               |
|              | Open discussion                                                         |                            |                                                                        |
| 14:15–14:45  | Coffee break                                                            |                            |                                                                        |
| 14:45–15:15  | Design presentation                                                     | Russell Holley              | Managing Director  
ACW                                                                        |
| 15:15–16:45  | Panel session                                                           | All co-chairs               | Moderator: Jamie Rylance                                               |
|              | Training package ready?                                                 |                            |                                                                        |
|              | What is missing?                                                        |                            |                                                                        |
|              | Roll out of package                                                     |                            |                                                                        |
| 16:45–17:00  | Session closure                                                         | Dr Pierre Formenty          | Health Emergencies Programme  
WHO, Geneva, Switzerland     |
|              |                                                                        |                            |                                                                        |
| 17:00        | Refreshments in the WHO cafeteria                                       |                            |                                                                        |
## DAY 2

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<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenter and Affiliation</th>
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| 09:00–09:10 | Opening of the second session                                        | Dr Janet Diaz  
  Lead, Clinical Management  
  Health Emergencies Programme  
  WHO, Geneva, Switzerland     |
| 09:10–09:15 | Catch-up session                                                   | Dr Jamie Rylance  
  Case Management  
  Health Emergencies Programme  
  WHO, Geneva, Switzerland     |
| 09:25–10:15 | Opportunities for innovation                                         | Moderator: Janet Diaz |
|          | MEURI protocol implementation (10 minutes each)                     | Dr William Fischer  
  University of North Carolina, USA     |
|          | EVD research landscape (10 minutes each)                             | Dr Mohammed Lamorde  
  Infectious Diseases Institute, Makerere University, Uganda     |
|          | Clinical data platform Collecting patient-level data in outbreaks (10 minutes each) | Dr Ian Crozier  
  National Institutes of Health, USA     |
|          |                                                                       | Dr Placide Mbala  
  Institut National de Recherche Biomédicale,  
  Democratic Republic of the Congo     |
| 10:15–10:30 | Coffee break                                                        |                                                               |
| 10:30–11:30 | Rotating small group discussions on:                                | MEURI: Chaired by William Fischer  
  Facilitating MEURI use  
  Oversight of MEURI-delivered products and clinical outcomes/adverse events |
|          | • Current gaps in provision or function                              | EVD research: Chaired by Ian Crozier  
  Research questions  
  Study designs     |
|          | • Priority actions and next steps for WHO (Participants spend 20 minutes on each topic, then move to the next. Chairpersons remain static to focus discussion for each group.) | Data: Chaired by Ronaldo Silva  
  Current utility/gaps  
  Making data usable and useful     |
<p>| 11:30–12:30 | Chairs’ feedback                                                    |                                                               |
| 12:30–13:30 | Working lunch in Salle V                                             |                                                               |</p>
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<thead>
<tr>
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<tr>
<td>13:30–14:05</td>
<td>Quality improvement and KPI development (10 minutes)</td>
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<td>Guidelines, operational guidance, oSOC and tools (15 minutes)</td>
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<td></td>
<td><strong>Logistics and supply (10 minutes)</strong></td>
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<tr>
<td>13:30–14:05</td>
<td>Dr Daniel Youkee</td>
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<tr>
<td></td>
<td>King’s College London, UK</td>
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<td>Dr Tom Fletcher</td>
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<td></td>
<td>Liverpool School of Tropical Medicine, UK</td>
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<td>14:05–15:30</td>
<td><strong>Rotating small group discussions covering:</strong></td>
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<tr>
<td></td>
<td>• Integration of oSOC, guidelines and KPIs</td>
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<td></td>
<td>• Priority actions and next steps for WHO</td>
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<td></td>
<td>(Participants spend 20 minutes on each topic, then move to the next. Chairpersons remain static to focus discussion for each group.)</td>
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<td></td>
<td><strong>Quality improvement:</strong> Chaired by Daniel Youkee</td>
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<td></td>
<td>• Scope and priority of selected KPIs</td>
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<td>• How to implement feedback to the system</td>
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<td><strong>Operational guidance:</strong> Chaired by Tom Fletcher</td>
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<td></td>
<td>• How generalized should it be (e.g. by disease)</td>
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<td><strong>Logistics:</strong> Chaired by Luca Fontana</td>
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<td>• Current unknowns/areas for education or improvement</td>
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<td>• VHF kits and facility estimators</td>
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<td></td>
<td><strong>oSOC:</strong> Chaired by Janet Diaz</td>
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<td></td>
<td>• Difference between oSOC and guidelines</td>
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<td>15:30–16:30</td>
<td><strong>Chairs’ feedback</strong></td>
</tr>
<tr>
<td>16:30–16:45</td>
<td><strong>Closing remarks</strong></td>
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<td>16:45–17:00</td>
<td>Coffee and close</td>
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<tr>
<td></td>
<td>Dr Janet Diaz</td>
</tr>
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<td>WHO, Geneva, Switzerland</td>
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Annex 3
List of participants

**Americas Region**

**Carrie Garavan**
Independent
Ireland

**Cindy Albertson**
Samaritan’s Purse
the United States

**Francois Lamontagne**
Sherbrooke University
Canada

**Ian Crozier**
Frederick National Lab/National Institute of Health
the United States

**Rob Fowler**
Sunnybrook Research Institute
Canada

**Sasha Thew**
Samaritan’s Purse
the United States

**William Fischer**
University of North Carolina
the United States

**African Region**

**Paska APIYO**
Gulu Regional Referral Hospital
Uganda

**Augustin Muhindo Karumba**
Independent
Democratic Republic of Congo

**Billy Sivahera**
Independent
Guinea

**Daniel Youkee**
King’s College London
Sierra Leone

**Daniel Mukadi**
National Institute of Biomedical Research
Democratic Republic of Congo

**Jean-Luc Biampata**
National Institute of Biomedical Research
Democratic Republic of Congo

**Jackson Katembo Vihundira**
The Alliance for International Medical Action
Democratic Republic of Congo

**John Kombe Ngwama**
Ministry of Health
Democratic Republic of Congo

**Marie Claire Kolie**
Independent
Guinea

**Marta Lado**
Partners in Health
Sierra Leone

**Mohammed Lamorde**
Infectious Diseases Institute, Makere University
Uganda

**Lompoli Nkoy Ena**
Clinique Hospitalo-universitaire de Kinshasa
Democratic Republic of Congo

**Oumar Bagayogo**
The Alliance for International Medical Action
Mali

**Placide Mbala**
National Institute of Biomedical Research
Democratic Republic of Congo
Richard Kojan  
The Alliance for International Medical Action  
Democratic Republic of Congo

Serge Mumbere Kavalami  
The Alliance for International Medical Action  
Democratic Republic of Congo

Shevin Jacob  
Liverpool School of Tropical Medicine  
Uganda

Sulaiman Lakoh  
University of Sierra Leone  
Sierra Leone

European Region

Armand Sprecher  
Médecins Sans Frontières Belgium  
Belgium

Gillian Mckay  
London School of Hygiene and Tropical Medicine  
United Kingdom of Great Britain and Northern Ireland

Hans-Joerg Lang  
The Alliance for International Medical Action  
Germany

Hossein Hamam  
Independent  
Lebanon

Kerry Dierberg  
Médecins Sans Frontières, France  
France

Pierre Mora  
Assistance Publique des Hôpitaux de Marseille  
France

Russell Holley  
ACW  
United Kingdom of Great Britain and Northern Ireland

Mark Evans  
ACW  
United Kingdom of Great Britain and Northern Ireland

Saschveen Singh  
Médecins Sans Frontières France  
France

Timo Wolf  
University Hospital of Frankfurt  
Germany

Tom Fletcher  
Liverpool School of Tropical Medicine  
United Kingdom of Great Britain and Northern Ireland

WHO

Adebola Olayinka  
WHO Regional office for Africa

Alejandro Costa  
Emergency response

Ana Maria Henao Restrepo  
R&D Blue Print

Anais Legand  
High Impact Epidemics

Antoine Delaitre  
Operations Support & Logistics

Anna Silenzi  
Operations Support & Logistics

Bongomin Bodo  
WHO Country Office in Uganda

Chiori Kodama  
WHO Regional Office for the Eastern Mediterranean

Constance Mc Donough-Thaye  
Emergency response

Deusdedit Mubangizi  
Prequalification

Ellen Hynes  
Strategic Health Operations

Emerencienne Kibangou  
WHO Regional Office for Africa

Fahmy Hanna  
Mental Health
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<thead>
<tr>
<th>Name</th>
<th>Position</th>
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<tbody>
<tr>
<td><strong>Firdavs Kurbonov</strong></td>
<td>Research Leadership and Capacity Strengthening</td>
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<tr>
<td><strong>Florestan Boualame</strong></td>
<td>Clinical management and operations</td>
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<tr>
<td><strong>Gary Greg Kuniyoshi</strong></td>
<td>Infectious Hazard Prevention and Preparedness</td>
</tr>
<tr>
<td><strong>Guillaume Queyras</strong></td>
<td>Operations Support &amp; Logistics</td>
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<tr>
<td><strong>Jamie Rylance</strong></td>
<td>Clinical management and operations</td>
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<tr>
<td><strong>Janet Diaz</strong></td>
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<td><strong>John Adabie Appiah</strong></td>
<td>Clinical management and operations</td>
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<td><strong>Julie Viry</strong></td>
<td>Clinical management and operations</td>
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<tr>
<td><strong>Kiki He</strong></td>
<td>Clinical management and operations</td>
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<tr>
<td><strong>Kirrily De Polnay</strong></td>
<td>Food &amp; Nutrition Action in Health Systems</td>
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<tr>
<td><strong>Luca Fontana</strong></td>
<td>Strategic Health Operations</td>
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<td><strong>Marcelle Costa Marinho</strong></td>
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<td><strong>Maurice Nzogu</strong></td>
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<tr>
<td><strong>Mercedes Bonet Semenas</strong></td>
<td>Reproductive Health and Research</td>
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<tr>
<td><strong>Mory Keita</strong></td>
<td>WHO Regional Office for the Eastern Mediterranean</td>
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<tr>
<td><strong>Patrice Kabongo Mbamukonka</strong></td>
<td>WHO Country office in Democratic Republic of Congo</td>
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<tr>
<td><strong>Pierre Formenty</strong></td>
<td>High Impact Epidemics</td>
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<tr>
<td><strong>Rashidatu Kamara Fouad</strong></td>
<td>WHO Regional Office for Africa</td>
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<td><strong>Rhiannon Owen</strong></td>
<td>Clinical management and operations</td>
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<tr>
<td><strong>Ronaldo Silva</strong></td>
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<tr>
<td><strong>Silvia Bertagnolio</strong></td>
<td>Antimicrobial Resistance</td>
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<td><strong>Stephanie Mayronne</strong></td>
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<tr>
<td><strong>Vanessa Cramond</strong></td>
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<td><strong>Victoria Willet</strong></td>
<td>Infection Prevention and Control</td>
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<td><strong>Wilson Milton Were</strong></td>
<td>Maternal, Newborn, Child and Adolescent Health</td>
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