Public health events of initially unknown etiology: A framework for preparedness and response in the African Region

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Final editing of this document was undertaken by the Framework Technical Review Group, whose members include Dr Tshioko Florimond and Dr Benido Impouma from the WHO Regional Office for Africa, Ms Lisa Kramer from USAID, Ms Helen Petrozzola of USAID/EPT/RESPOND/TRG and Douglas Hatch, MD, from USAID/EPT/RESPOND/DAI.

CONTENT

ACRONYMS

EMC Epidemic Management Committee
IDSR Integrated Disease Surveillance and Response
IEC information, education, communication
IHR International Health Regulations
IPC infection prevention and control
M&E monitoring and evaluation
PHE public health event
PPE personal protective equipment
RRT rapid response team
WHO World Health Organization

PREFACE

Following the adoption of the WHO African Region's Integrated Disease Surveillance and Response (IDSR) Strategy in 1998 (1) and the International Health Regulations (IHR) in 2005 (2), the ministries of health in the WHO African Region committed to work collaboratively to minimize the effects of public health events (PHEs) on human health, livelihood, travel and commercial trade by improving preparedness, surveillance systems and response capacity for PHEs (1, 2). The WHO African Regional Office and its partners remain committed to implementation of IDSR and IHR in the Member States and to supporting the use of accurate and timely health information to guide decision-making during PHEs, including emergencies, whether of infectious or non-infectious etiology.

Although technical guidelines are available for Member States to strengthen the response to PHEs with disease-specific etiology such as yellow fever, cholera and anthrax, there is a dearth of guidance on appropriate steps in the early phases of detection, reporting, alert management, field investigation and response for PHEs of initially unknown etiology. To address that issue, the WHO Regional Office for Africa has worked closely with public health leaders and subject-matter experts in the Region and partner organizations to draw up and design this framework to serve as a concise and easy-to-use technical and managerial guide for senior level decision-makers and members of national emergency management committees (EMCs) and rapid response teams (RRTs) in Member States.

This framework is designed to supplement the more detailed information contained in the IDSR Technical Guidelines (3) and to enhance country-level emergency preparedness and response capacity, including capability to manage alerts of PHEs before they become public health threats of national, regional or international importance. The framework also aims to improve understanding of the process of assessing the credibility of an alert by an EMC and to strengthen the capacity to organize and deploy a well-qualified and equipped RRT to conduct a field investigation. The framework underscores the importance of monitoring and evaluation (M&E) during this process, as well as of using M&E findings, including those from after-action reviews (AARs) to strengthen preparedness and response capacity of Member States.

In accordance with IHR (2) and the IDSR Regional Strategy (1), the components of this framework are grouped into three phases: preparedness, response, and monitoring and evaluation.

We advise that this framework be read alongside the relevant sections of the IDSR Technical Guidelines (3) and the technical documents and scientific articles cited herein.

1 INTRODUCTION

1. PHEs of initially unknown etiology

A public health event (PHE) is defined as any occurrence that may have negative consequences for human health, including those that have not yet caused disease or illness but that have potential and those that may require a coordinated response (2, 4). This framework focuses on PHEs of initially unknown etiology, which are PHEs for which the cause has not yet been determined. For such events, the One Health approach (5) is recommended, where the ministry of health works in close collaboration with other ministries and multisectoral partners to enhance teamwork and improve efficiencies in preparedness, response, and monitoring and evaluation (M&E).

2. Categorization of PHEs of initially unknown etiology

Between 2000 and 2012, the ministries of health in the WHO African Region identified a mean of 100 PHEs annually (see the WHO EMS[1]). The majority of those occurred in areas characterized by poverty, armed conflict and/or suboptimal health care delivery or access (5). Typically, during its alert management stage, a PHE is initially categorized as being of unknown etiology. Once there is laboratory confirmation of the cause of illness, the PHE can be categorized as infectious or non-infectious, with infectious events further classified as zoonotic or non-zoonotic.

3. Mapping of PHEs of initially unknown etiology

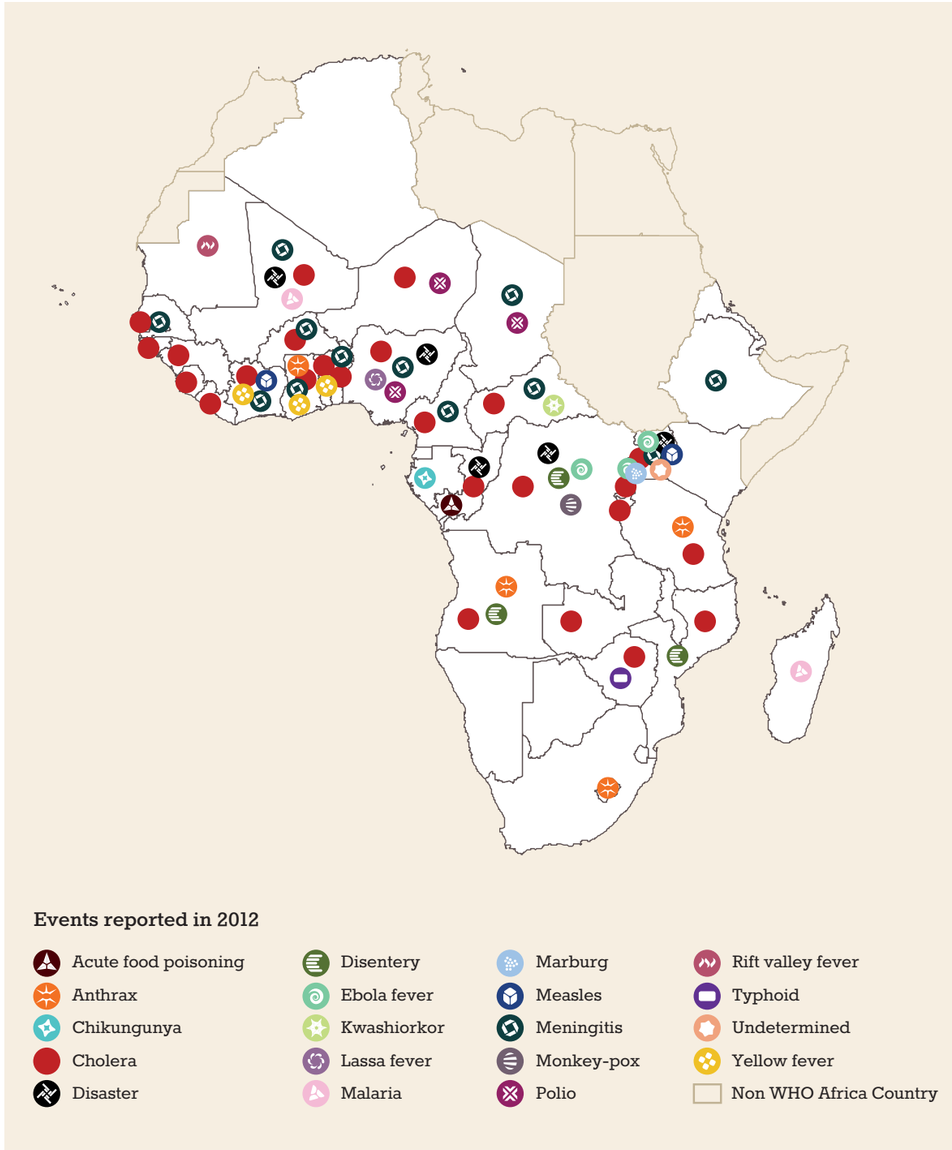
Fig. 1 presents a map on the distribution of PHEs identified in the WHO African Region during 2012. All the PHEs were initially classified during the alert management stage as being of unknown etiology. PHEs in the Region reported to the EMS during 2011 and 2012 were categorized under the following groups, listed is in order of decreasing frequency and magnitude:

- infectious disease outbreaks
- moderate or severe malnutrition events
- outbreaks of undetermined etiology
- natural and human-caused disasters
- animal disease outbreaks
- toxins and chemical exposures

Examples of PHEs from non-infectious toxins and chemical exposure include food, water and environmental contamination; exposure of animals to toxic chemicals; chemical hazards; and radiation or nuclear incidents.

[1] The EMS is an internal WHO tool used to track and monitor public health events.

Fig. 1 – Distribution of PHEs in the WHO African Region in 2012. Source: WHO EMS.



The rapid growth in industrial activity in sub-Saharan Africa, including exploration for fossil fuels and mining, is increasingly exposing communities to non-infectious health risks (5). Examples of such exposures on the continent include lead (Pb) toxicity poisoning in young children involved in artisanal gold mining in Nigeria during 2010 (6) and contamination of a river system in South Africa by mercury (Hg) from an industrial processing plant in 2011 (7).

Like some non-infectious PHEs, infectious PHEs _ which include zoonotic diseases and foodborne or waterborne illnesses such as cholera, shigellosis, salmonellosis and amoebiasis (10, 11) - often traverse geopolitical boundaries (8, 9). In both 2011 and 2012, aside from *Vibrio cholerae*, which accounted for approximately 30% of confirmed PHEs, an estimated 24% of confirmed infectious disease outbreaks were zoonotic (see WHO EMS). Other important PHEs related to infectious diseases recently identified in the African Region and reported via ProMED Mail [2] and WHO EMS were due to avian and pandemic influenza, meningococcal meningitis, anthrax, measles, acute poliomyelitis, yellow fever, malaria, dysentery, plague, dengue, or the Ebola, Marburg, Crimean-Congo, Lassa and Rift Valley viral haemorrhagic fevers.

4. PHEs and the One Health approach

Scientific and public health experts agree that the majority of infectious agents identified as causes of human illness in recent decades originated in domesticated animals or wildlife, such as SARS, the highly pathogenic avian influenza, Ebola and Marburg (12, 13). The importance of zoonotic diseases in the Region reinforces the logic for using the One Health multisectoral approach to evaluate PHEs. Multisectoral national teams of professionals working together on the diseases involving the animal, human and ecosystem interface can strengthen efficiencies by sharing important and timely health information from their respective surveillance systems and working collaboratively in the field. This type of coordination and teamwork can lead to better understanding of the epidemiology of emerging or re-emerging diseases, as well as identify unknown modes of transmission, elements that will improve the efficiency of disease prevention and control efforts (14).

5. Aims and target audience of this framework

The overall aim of this framework is to minimize human morbidity and mortality associated with PHEs by:

- providing the ministries of health in the WHO African Region with technical and managerial guidance for early and effective preparedness for and response to PHEs;
- improving PHE preparedness and response systems;
- strengthening multisectoral and multidisciplinary communication and coordination; and
- complementing the IDSR Technical Guidelines (3).

The specific objectives of the framework are to:

- describe the core functions and responsibilities of country-level structures - that is, the EMC and the RRT - for effective PHE management;
- call attention to the critical importance of preparedness activities and methods to enhance response capacity;
- outline the step-by-step PHE response activities; and
- provide key indicators for M&E of national preparedness and response activities.

The target audience for this framework includes:

- senior policy-makers and decision-makers;
- EMC leadership and members; and
- RRT leadership and members.

6. IDSR and the PHE framework

More than 10 years ago, the WHO Regional Office for Africa and WHO Member States in the Region, along with their technical partners, adopted a strategy for developing and implementing comprehensive public health surveillance and response systems in the Region.

To highlight the essential link between surveillance and response, the subsequent document, which is referred to as the "IDSR Technical Guidelines" (3), in short, was widely adopted and adapted throughout the African Region. Since the adoption of the IDSR Technical Guidelines and its revision in 2010, significant progress has been made by Member States in preparing for and responding to public health events.

Based on the challenges and lessons learned in dealing with PHEs in the Region, the WHO African Regional Office and partners developed this new framework for preparedness and response, and beta-tested it in Uganda and the Democratic Republic of Congo in 2013. This framework, which aligns with IHR and IDSR requirements, is designed to clarify issues relating to management of alerts, the role of the EMC in preparedness, the importance of real-time communication among entities participating in the EMC, and the critical aspects of the preparedness phase. Table 1 shows the key topics contained in the IDSR Technical Guidelines related to strengthening of PHE preparedness and response capacity at the district level, compared with those of this framework.

Table 1– IDSR Technical Guidelines compared with the PHE framework

Component	IDSR Technical Guidelines	Framework
Level of government:		
National	◊	+
District	+	◊
Preparedness	++	+
Response:		
Alert management	-	+
Field investigations	+	+
Field Response:		
Unknown etiology	◊	+
Known etiology	+	-
M&E	++	+
Purpose of document:	Comprehensive guidelines describing the steps for organizing preparedness activities in the district. Emphasis is on 40 well-understood priority diseases and conditions in the African Region (see Annex 1 for skills, activities and tasks relevant to each level in a public health surveillance and response system).	Practical guide on preparedness for PHE detection and response in its earliest phase, prior to determination of its etiology.

*Note: + = Emphasized in document ◊ = Not highly emphasized - = Not applicable

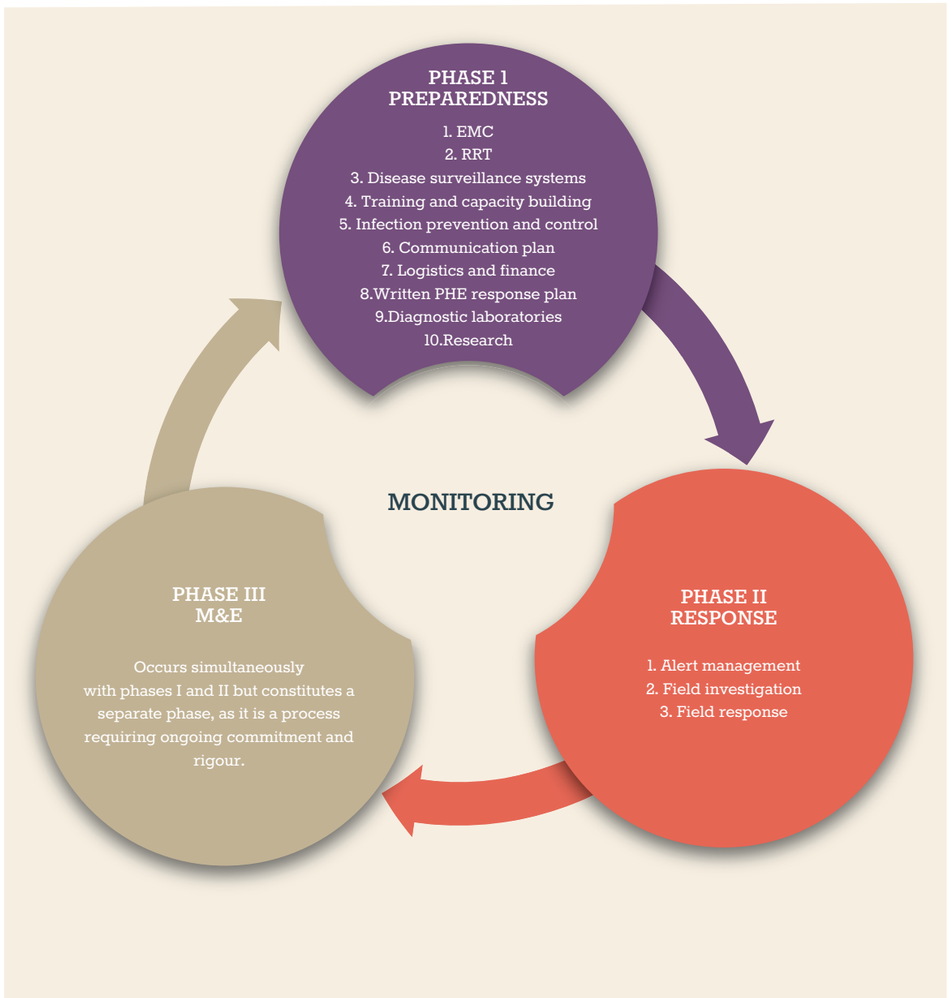
In order to achieve the maximum benefit of this Framework, EMC members and stakeholders are encouraged to consider the flow of disease surveillance information in their country, including from formal and informal sources as well as from the private health sector and industry. Then, ministries responsible for the data can enhance appropriate strategies and methods to promptly identify alerts and manage the response in coordination with the EMC.

[2] A program by the International Society for Infectious Diseases, ProMED Mail tracks infectious diseases. It can be accessed at http://www. promedmail.org/

7. The three phases of the framework

PHEs often evolve quickly and unexpectedly and may involve novel infectious agents or previously unknown modes of transmission. Therefore, Member States are encouraged to establish a strong foundation for preparedness to be able to deal as promptly and as effectively as possible with these threats. Additionally, response is often complex, requiring well-informed planning, decision-making and multisectoral collaboration. M&E plays a critically important role in this process, enabling the lessons learnt from previous field investigations to be applied to address identified gaps, thereby enhancing preparedness (Phase I) and future response activities (Phase II). In line with IHR (2) and the IDSR regional strategy (1), this framework categorizes these activities into three phases as shown in Fig. 2.

Fig. 2 – The three phases of the framework



2 COUNTRY-LEVEL STRUCTURES FOR EFFECTIVE PHE MANAGEMENT

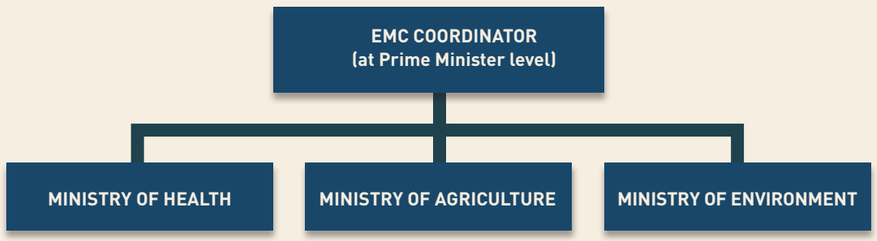
Although not a specific phase, it is imperative that the core functions and responsibilities required for realizing early and effective preparedness for, response to, and M&E of a PHE be handled by the country-level coordinating structures and individuals who serve as institutionally supported RRT members (see Annex 2). This section describes the roles and responsibilities of the EMC and RRT.

Consistent with IDSR and IHR specifications, the WHO African Region, together with Member States, identified key management and institutional structures with the primary responsibility for PHE preparedness and response, and to enable, plan, manage, and monitor and evaluate related activities, as defined below.

1. Emergency Management Committee

The EMC is designed to be a multisectoral platform for coordinating inputs from the national health agencies responsible for human, domesticated animal, environmental and wildlife health for collaborative assessment of credibility of reports of PHEs of potential national importance. The Member States are responsible for developing the legal framework, policies and actions to establish EMCs, permitting mobilization of appropriate resources, allocating budgets and authorizing disbursement of funds for preparedness and response activities. Fig 3 shows an example of the structure of a typical EMC.

Fig. 3 – Structure of a typical EMC [3]



[3] The EMC coordinator may be delegated by the prime minister to an appropriate ministry.

The EMC is a formal government body that includes senior technical and health management representatives officially responsible for preparedness, response and M&E activities related to PHEs of national importance. Members are formally appointed and, in line with the One Health approach, should include representatives from the ministry of health and the ministries responsible for livestock, wildlife and environmental health; national laboratories; and other agencies as required, such as the police, military and civil aviation, as well as national and international health organizations and development partners including WHO.

Based on the IDSR Technical Guidelines, the core functions and responsibilities of the EMC include to:

- develop a formal national PHE preparedness and response plan;
- develop and implement a formal emergency communication plan that covers procedures for sharing the latest information on PHEs among the EMC, the RRT and other government agencies and partners and informing and educating the public on PHEs and effective measures to prevent disease transmission or limit high risk behaviours;
- maintain the terms of reference for RRT roles;
- maintain a roster or computerized database of the names, titles, education, training, skills, experience, vaccination history and contact details of RRT members;
- obtain approvals for deployment of RRT members for field investigations;
- ensure policies and procedures are in place for immediate disbursement of funds to enable prompt RRT deployment during PHEs and for any other official PHE response activity;
- solicit for supplemental resources from key partners and stakeholders for technical, financial, laboratory, logistical or other needs;
- oversee procurement of emergency materials and pre-positioning of supplies in adequate stock levels at secure and strategic locations;
- work with the relevant ministries to identify PHEs of national importance based on historical trends, latest surveillance information, risk mapping and the WHO and national priority disease thresholds;
- plan and implement emergency preparedness and response training;
- plan periodic simulation activities;
- coordinate after-action reviews to evaluate PHE response;
- implement recommendations from after-action reviews to strengthen preparedness and response capacity; and
- communicate important developments to the national IHR focal point.

2. Rapid response team

a. Core functions and responsibilities

The core functions and responsibilities of a national or subnational level RRT as detailed in the IDSR Technical Guidelines include:

- investigate rumours and media reports on PHEs of importance, including possible disease outbreaks and other public health emergencies;
- propose appropriate strategies and methods for field investigation of PHEs and disease prevention and control measures;
- organize risk communication activities;
- coordinate response activities with subnational health officials, partners and other agencies during PHEs;
- plan and support RRT training and capacity building;
- prepare detailed reports of field investigations;
- contribute to the final evaluation and the after-action review of each outbreak response (3).

b. RRT membership and deployment

An official database or up-to-date roster of subject-matter experts qualified to carry out the core RRT functions should be created during the preparedness phase. The information should be regularly updated and should include details on the professional qualifications of each individual, formal education, specialized training and level of experience with emergency response, disease surveillance systems and field investigation of disease outbreaks, including supervisory experience. Job responsibilities of RRT members should be drawn up and agreed upon by all relevant technical and political entities prior to RRT member deployment. Deployment of RRT field members to investigate PHEs should be based on the alignment of their field experience and expertise with the core RRT functions needed and assurance that the planned investigation is balanced and scientific. Those selected for an RRT should participate in all relevant meetings and activities.

The EMC works with representatives from relevant ministries to determine the proper number and type of subject-matter experts required for an RRT to conduct the appropriate field investigation based on current information about the type of PHE reported and an assessment of available resources. Following the logic of the One Health multisectoral approach, the recommended membership of an RRT should comprise the following experts at a minimum:

- manager or team leader
- human or animal epidemiologist
- clinician or infection control specialist
- veterinarian or wildlife expert
- environmental scientist or public health officer
- social mobilization expert
- logistician
- laboratory specialist.

Annex 2 contains descriptions of RRT roles.

Each Member State can develop country-specific guidelines for RRT membership, which may vary based on the profile of the PHE being investigated – that is, if the disease has an infectious or non-infectious etiology – and resource availability. Other specialties may be added to the job descriptions for RRT members provided in Annex 2. EMC leadership may work with partner organizations to ensure that the composition of the RRT includes the necessary expertise. It should be noted that experienced RRT members may be capable of fulfilling multiple core functions. For example, a health or veterinary officer who has experience in dealing with outbreaks and appropriate training is often capable of serving as both the epidemiologist and the RRT leader.

Findings from field investigations, even if preliminary, should be promptly communicated by the RRT leaders to the leadership of the national EMC, which is responsible for sharing the real-time information with officials from the ministries of health and agriculture, the wildlife and environmental agencies, national reference laboratories and other key government institutions and partner organizations. The RRT must also remain in close communication and coordinate work with the local EMC leadership, such as district level representatives, to keep them and agency representatives updated about the scientific findings from the field investigations.

3 IMPLEMENTING THE THREE PHASES OF THE FRAMEWORK

PHASE I: PREPAREDNESS

Preparedness is the foundation of a Member State's human and institutional capacity to prevent, respond to and manage PHEs. Therefore, one of the key responsibilities of the EMC is to engage with senior decision-makers to ensure that the resources and the formal legal framework are in place for optimal preparedness. The EMC is also responsible for working closely with individual ministries - respecting their areas of responsibility - to coordinate preparedness planning to ensure early identification of possible disease outbreaks, epidemics or other PHEs and to plan a unified strategy for response.

Owing to the frequency and complexity of disease outbreaks and disasters and the potential risk for terrorism-related PHEs, Member States and ministries of health are encouraged to establish an emergency operations centre to respond to such PHEs in a coherent, effective and efficient manner. This centre can serve as the health ministry's central location for organizing, coordinating, supporting and managing all aspects of the response and planning efforts to tackle evidence-based PHEs.

The institutions and systems involved in preparedness, in line with the IDSR Technical Guidelines (3) and other relevant documents (15, 16), are described below. Properly maintaining these systems to undertake their activities should facilitate prompt RRT deployment, enhance the capacity to determine the etiology of the PHE being investigated and foster the implementation of appropriate disease prevention and control measures.

01
EMC

- Established by senior decision-makers as a formal government structure based on a legal framework
- Unifying structure that includes representatives from the ministries responsible for coordinated decision-making on emergency preparedness and response
- ncludes national reference laboratories, the WHO focal point, multilateral health agencies and key stakeholders
- Has at least one individual for each of its core roles

Continues on the following page ▸

02
RRT

- A group of qualified technical experts available for immediate deployment as required by the EMC
- Maintains a roster or database populated with details of a minimum of one, preferably more, qualified individual for each of its positions
- Provides updated training for each expert on the roster
- Ensures that training of its members includes conducting of field investigations
- Trains members to work with subnational partners and communities

03
Disease surveillance systems

- Respective ministries are responsible for ongoing, systematic collection and analysis of data for human, animal and environmental health and for providing these data to the EMC
- The EMC is responsible for information analysis and decision-making on preparedness and response to PHEs
- Surveillance systems are operational at national, provincial, district and community levels
- Event and indicator-based surveillance
- An essential component for prompt identification of PHEs of national importance
- Should include formal mechanisms for real-time sharing of key public health information across sectors and ministries
- Historical information is useful for risk mapping, to identify possible PHEs and to determine disease trends*

04
Training and capacity building

- Scenario-based field training or drills are highly useful for preparedness and response
- Recommendations from after-action reviews following each PHE response should be routinely implemented to improve preparedness
- Includes review of relevant scientific articles

Continues on the following page ▸

*Reference *IDSR*, Annex 8D, Indicator 2. (p. 215)

05 Infection prevention and control

- Standard precautions [4], basic infection control, and universal precautions should be routinely applied to protect health workers and patients from infection
- Existing policies and procedures apply to and should be enforced for all clinicians and staff involved in emergency response and community action
- National vaccination policies should apply to all situations and people, including clinicians and RRT members
- If additional technical guidance is needed, technical experts can be sought to provide it
- The existing infection control policy should be reviewed and gaps addressed

06 National communication plan

- EMC should oversee the exchange of PHE information among the ministries, the RRT and subnational officials
- Information sharing by EMC to routinely include WHO Region of forAfrica focal point and key stakeholders
- Community health education and outreach should include methods of disease prevention and likely factors or behaviours associated with a high risk for exposure to disease

07 Logistics and finance

- EMC needs the authority to control resources such as personnel, materials and equipment and distribution channels to support rapid emergency response to PHEs
- Policies need to be in place for accountability and for appropriate requirements for per diem, lodging, transportation, personal protective equipment (PPE), medical materials, general supplies and communication devices
- A budgetary mechanism for timely release of funds needs to be set up prior to the field investigation stage;
- A system is needed to oversee procurement and pre-positioning of materials
- Systems need to be in place for rapid acquisition of financial, technical or material support from WHO or other partner to fill gaps
- Logistical capacities need to be strengthened in line with the requirements of the regional logistical plan [5]

Continues on the following page ▸

[4] See http://www.cdc.gov/hicpac/2007IP/2007ip_part3.html for information on precautions to prevent transmission of infectious agents

[5] In draft form as of Feb. 6, 2014.

08 Formal PHE response plan

- The EMC should to develop a formal country-adapted and context-relevant national plan
- Formal terms of reference describing the responsibilities and qualifications of each RRT member should be prepared as part of preparedness actions
- Response plan should includes methods to process alerts
- Standardized epidemiological and clinical data collection templates should be provided for use during field investigation and response stages
- The plan should be updated based on new information, PHE profile and after-action review recommendations
- The response plan should operationalize the steps identified in the framework
- The plan needs to be aligned with the IDSR Technical Guidelines (3)
- The plan uses risk mapping and disease trends to identify unexpected PHEs [*]

09 Diagnostic laboratories

- This is a national system of government laboratories, including reference and district level facilities
- Formal agreements are drawn up with international laboratory networks to fill gaps in the national system and provide the full range of diagnostic capacities
- Existing laboratory policies, procedures, agreements, operating procedures, and biosafety and biosecurity norms apply to EMC and RRT activities
- The laboratories provide recommended protocols and materials for safe shipping of samples nationally and internationally

10 Research

- Algeria Declaration on Research (17)
- Operational research should be designed and activities planned prior to an outbreak
- Research activities should facilitate the work of the RRT and not delay or interfere with the PHE response
- Best practices are required for human subject protection, environmental protection, ethical review board related issues and research topics

[*] Reference *IDSR, Key sections of the epidemic preparedness and response plan*, p. 137

PHASE II: RESPONSE

Phase II deals with the recommended step-by-step activities for the successful conduct of the three sequential stages of a response to a PHE by an EMC or RRT (see Fig. 5 to 7):

- stage 1: alert management
- stage 2: field investigation
- stage 3: field response

Details provided in this framework can serve as a recommended checklist for key activities, although the profile of each PHE, as well as the local capacity, will determine to what degree and in what manner each stage will be implemented. Although the activities are presented in approximate chronological order, some may be carried out in parallel.

1. Stage 1: Alert management

Alert management is the first stage in the PHE response process. The objective is to promptly identify PHEs of possible national or international importance. An alert occurs when health information from a formal or informal source reports the presence or likely commencement of a PHE (18). Alerts may be categorized based on whether they have formal or informal sources. An example of a formal source is a routine review of existing public health or livestock health surveillance systems data. An informal source could be the media or a private citizen providing a written or verbal alert report.

The alert management stage aims to verify the occurrence of a suspected PHE, commence a field investigation if necessary and report the details to the next level, as defined by the IDSR Technical Guidelines (3). Box 1 lists criteria that might be useful in gauging the importance of an alert about a possible PHE.

To draw the maximum benefit from this framework, EMC members and stakeholders are encouraged to be knowledgeable of the flow of disease surveillance information in their country, including from formal and informal sources, the private health sector and industry. That way the ministries responsible for the data can use appropriate strategies and methods to promptly identify alerts and manage PHEs, working in coordination with the EMC. Fig. 4 provides an illustration of the flow of "pre-alert" information from a variety of formal and informal sources, its subsequent triage by the responsible ministries to determine the presence or absence of a PHE of potential national importance and the role of the EMC to assess the credibility of an alert and to accurately report the information to the WHO African Regional Office focal point.

Box 1 – Alert criteria useful to determine whether to initiate a field investigation of a PHE

1. Source of the information

Consider the source and the potential validity of the alert as well as the potential for the alert to cause panic. Available epidemiological data

2. Available epidemiological data

Consider the size and health status of the population affected, giving special attention to vulnerable and marginalized groups, the expected or observed rise in mortality or morbidity, and the method transmission or degree of transmissibility of the pathogen.

3. Contextual information

Review the access of the population to local health care delivery systems, and the resources, the level of preparedness and the response capacity of the local authorities. Identify the likely population vulnerabilities, public misperceptions, degree of panic and robustness of the civil society's coping mechanisms. EMCs should also consider the likelihood of concurrent PHEs drawing from the limited local emergency resources.

4. Magnitude, duration and severity of the reported PHE

Establish the magnitude of the PHE based on factors such as the proportion of the population affected or displaced, geographical area and number of districts affected, number of persons hospitalized, number of deaths, case fatality ratio, presence of susceptible or high risk groups and duration of the PHE.

5. Potential risk for international spread

Mode of transmission, disease severity, size of susceptible population,crowding and population displacement may increase the potential of a PHE to extend beyond a locality or a Member State's borders.

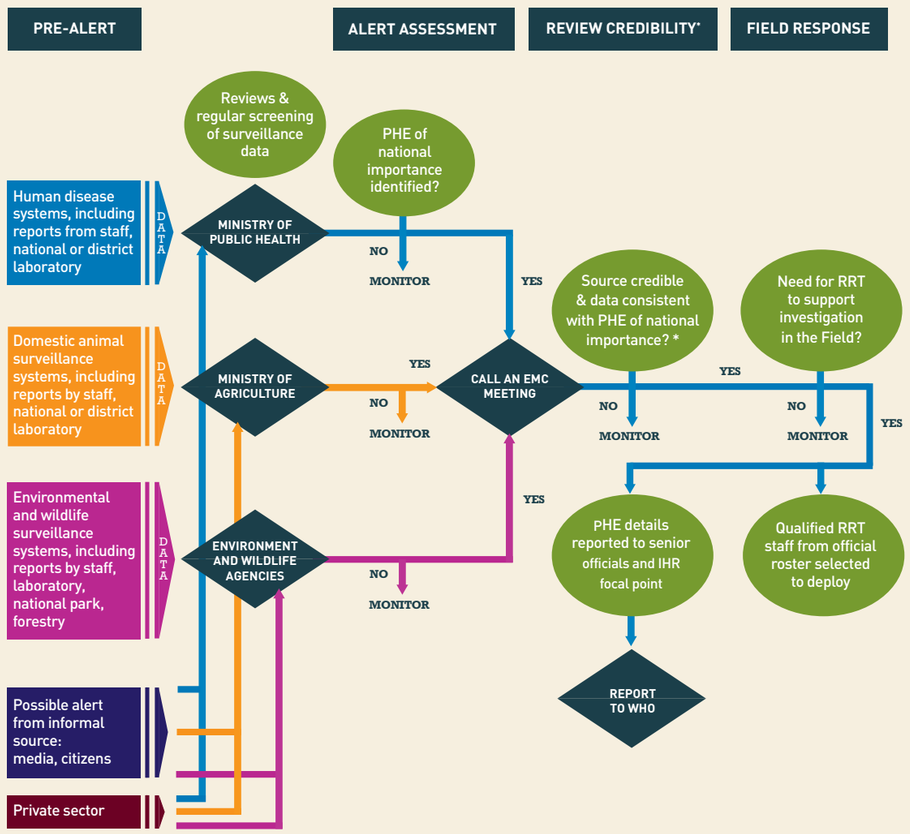
6. Political implications of not responding

The PHE might be a risk to the reputation of leaders if response is not prompt, or have the potential to bring about the loss of their credibility or authority, or a threat to social and economic stability.

7. Media interest

Level of interest of the media in the alert, possibility of inaccurate or incomplete information, and the potential for the media reports to result in fear or panic in the population.

Fig. 4 – Alert reporting and assessment, and PHE management information flow



The activities under alert management have an emphasis on characterizing PHEs and developing standardized clinical and epidemiological case definitions following the IDSR strategy (1).

They involve the following steps:

Fig. 5 – Stage 1 – Alert management activities (5 steps)

Step 1. Ensure the establishment of an alert network during the preparedness phase.

- A process for regular review of information from formal disease surveillance systems
- A mechanism to capture information from informal sources reporting the presence of PHEs of potential national importance
- Regularly reviews information on possible PHE from other agencies, the private sector and digital disease surveillance systems such as Promed
- Has an established and functional system to promptly identify unexpected PHEs of national importance
- Applies a multisectoral and multidisciplinary (One Health) approach
- Develops clinical and epidemiological case definitions and epidemic thresholds and disseminates them for all priority diseases

Step 2. Maintain vigilance

- Regularly monitor formal and nonformal sources of potential PHEs, as credible alerts may not always be obvious. For example, filovirus outbreaks often are initially recognized from an epidemiological link among cases rather than a specific clinical case definition (18, 19).

Step 3. Receive alerts and assess their credibility

- Use standardized criteria to determine if the alerts are credible (see Box 1) and recording how and by whom the alert was communicated to the EMC
- Proactively enquire in the community and/or request for more information from sources of alerts when needed

Step 4. Commence coordination of the field investigation once an alert is determined as credible, coordinating the field investigations with other agencies with roles in the investigation

- The EMC and RRT determine the possible public health risks and ensure the relevant stakeholders are informed and are ready to support the field investigation
- WHO, which coordinates international support through regional mechanisms and the Global Outbreak Alert and Response Network, may be requested for assistance. It is important that commencement of the field investigations be not hindered by lack of logistical or financial resources if previous scenario-based field and deployment training for EMC and RRT ensured that the management processes needed for effective and prompt multisectoral response were in place.

Step 5. Evaluate

- The alert management stage should be regularly evaluated for efficiency and effectiveness (see Annex 4, indicators 2.1_2.3).

2. Stage 2: Field investigation

The field investigation is the second stage of the PHE response process. During field investigation activities, it is important that the national and district EMCs remain in close communication. Deployed RRT members need to work collaboratively with local health officials, clinicians and nurses, as well as community leaders. The priorities for RRTs are (1) to collect the epidemiological information needed to determine such factors as the magnitude or scope of the problem, for example the number of people that are ill, hospitalized or with a fatal outcome due to the illness of interest; the likely mode of transmission; and the high risk groups such as young children or occupations, and (2) to use the available information to implement appropriate disease prevention and control actions.

RRT leadership should coordinate work with local health facilities and laboratory staff to both understand the magnitude and severity of the PHE and ensure that clinical samples are properly collected and transported per appropriate protocol to the laboratories identified earlier on for diagnostic testing and confirmation of the cause of the disease. RRT case-management experts and those trained in infection control and prevention should work closely with local health facility and hospital staff to assure that treatment of patients is optimal, respecting cultural and ethical sensitivities. The field investigation activities cover 10 steps (IDSR Section 4, p. 110-113; 114-117):

Fig. 6 - Stage 2 – Field investigation activities (10 steps)

Step 1. Prepare for fieldwork

- Determine, in coordination with the EMC and the pertinent local authorities what is needed for supplies and commodities and the type of transport to conduct the fieldwork.
- Select appropriate medication and treatment protocols based on the best knowledge on the type of condition or illness and likely mode of transmission as determined by a trained medical doctor.
- Pack field supplies, including diagnostic sampling kits (as recommended by official laboratory protocols), office materials and equipment, communication devices, data collection templates, and data analysis tools such as a laptop computer with appropriate statistical software (see IDSR-recommended packing lists for laboratory supplies [IDSR, Annex 4B, p. 123] and personal protective equipment [IDSR, Annex 4C, p. 124]).
- Ensure availability of appropriate vehicles or other transportation means and funds for field expenses, such as standard per diem for food and lodging during official deployment.
- Include essential medications, the official letter authorizing the travel, useful technical documents, such as IDSR Technical Guidelines, IHR and this framework, and appropriate standard operating procedures and policies.

Step 2. Arrive at the location

- Coordinate actions with local, district, national and regional health and political authorities, and define the roles and responsibilities of each party, ensuring complementarity of the entities' investigative responsibilities.
- Proceed to the geographic location where the PHE of initially unknown etiology is occurring.

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Step 3. Conduct a preliminary assessment and develop an initial case definition

- Together with local authorities, review all available sources of information about the affected community, including patient registers at each health facility.
- Use demographic and epidemiological data combined with symptom and clinical data to develop an initial case definition in order to identify persons showing similar symptoms or illness of interest.

Note: All stakeholders should adhere to the initial case definition. Case definitions may be modified once additional information is available (see IDSR Annex 4, Indicator 3.3).

- Provide standardized data collection templates, modified as needed from those designed during the preparedness phase.

Step 4. Formulate a hypothesis about the possible cause of the illness or disease

- Based on the data collected, including on symptoms of people with the illness, formulate a hypothesis about the likely mode of transmission of the disease and its most likely etiology, for example if it is caused by an infectious agent, a chemical or a toxin.
- Ensure access to the potential hazard is blocked if the source is local, such as water, food or a particular location.
- Regularly review the latest information about the PHE and modify the hypothesis as appropriate.

Step 5. Collect and send specimens or samples for laboratory diagnosis

- Collect appropriate samples from patients, animals or the environment affected by the PHE, consulting with laboratory and epidemiological experts and following laboratory protocols to confirm the diagnosis.
- Inform the laboratory that samples are being sent (see Annex 5, Indicator 3.1).
- Explain the procedures and reasons for the diagnostic tests to suspected patients and their family, observing cultural norms and, wherever possible, obtain their verbal consent.
- Label each specimen using permanent ink. For each sample include a unique identification number linked to the case patient's name, age, gender and residence.
- Include a log of the specimens in the shipping container and retain one copy with the RRT leader or health facility to ensure that the diagnostic test results will be linked to the correct sampled individuals.

Note: An agreement with private laboratory facilities defining procedures for their support during an emergency field investigation should have been secured during the preparedness phase.

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Fig. 6 - Stage 2 – (continued)

Step 6. Train and educate

- Provide training on proper treatment of patients who are found from the diagnosis to have the illness.
- Train health staff on proper use of disinfectants, sterile techniques and case management as needed.
- Educate local authorities and the population about the risk factors for the disease, methods to limit high risk behaviour and home-based care of ill family members.
- Provide access to essential medications and PPE and related training to local health staff and field investigators.

Step 7. Ensure optimal clinical care

- Ensure that optimal clinical care and early clinical management are provided for those affected by the PHE (see Annex 5, Indicator 3.2), being considerate of cultural and ethical concerns. Optimum patient care is defined as the best possible care available based on the probable and eventual diagnosis of the PHE and the contextual setting.

Step 8. Communicate to EMC and enact support channels

- Communicate the key field investigation findings to the EMC at regular intervals to keep the leadership informed and to ensure that technical and political support channels can be activated and utilized to support the response effort. The EMC should commence IHR reporting (2) at the national level as appropriate.
- Consider requesting an on-site diagnostic laboratory.

Step 9. Prepare a field investigation report

- Write a detailed report to inform all the relevant authorities and stakeholders of the situation at hand. A template for such a report can be found in Annex 6.

Step 10. Identify potential research

- Identify practical research topics that may determine the cause of the illness or contribute to improved disease control, prevention or treatment.

Remember: Ensure that the standards for clinical research and human subject protection are respected. The appropriate study protocol that is approved by the ethical review board must be used and written consent must be obtained for research participation from individuals, who should also be informed about the potential risks, benefits, alternatives and responsibilities of the study prior to enrolling in it. Special provisions will be needed for illiterate participants.

3. Stage 3: Field response

Field response is the third stage of the PHE response process. It aims for coordination and mobilization of resources and personnel to implement an appropriate public health response (2).This stage mainly works to prevent disease transmission and to ensure that optimum patient care is provided. Primary transmission involves human infection through a single or multiple events from a hazardous source, while secondary transmission typically results from a direct contact with a person's infected bodily fluids during the acute phase of their illness or their remains or with contaminated fomites.

Typically, an RRT remains on the PHE site during the transition from the field investigation to the "full-blown" field response stage. A laboratory diagnosis confirming the cause of the PHE typically triggers the implementation of the more appropriate and effective response activities. Recommended field response activities include regular review of outbreak information to determine whether to scale up, maintain or scale back the level of the response effort (Fig. 7). As a part of these activities, efforts are focused on reducing exposure to the agent causing the illness, whether it is infectious or non-infectious, and providing optimum clinical care, based on the etiological agent identified.

Fig. 7 - Stage 3 – Field response activities (3 steps)

Step 1. Scale-up response components

- In no predetermined order of priority, the RRT commences the response components in Fig. 8 or ensures each component is addressed by a relevant entity and activities are aligned with national and/ or international standards
- Components are aimed at preventing exposure to the agent (infectious or non-infectious) responsible for the PHE and ensuring the provision of optimum patient care for those infected/ affected.

Step 2. Maintain response components

- Ensure response are effective and maintained throughout the duration of the event

Step 3. Scale-back response components

- In discussion with multi-sectoral and multidisciplinary stakeholders, EMC and RRT can coordinate to slowly begin to scale-back the response components based on updated epidemiological data
- Remain vigilant as premature scaling back of activities may result in further transmission
- When possible, conduct post-PHE health services restoration, patient follow-up, reporting, and research according to country guidelines

Daily community and multi-sectoral communication for coordination of response components

In line with the IDSR strategy (1) the field response comprises the following 11 components:

Fig. 8 – Field response components

1 Epidemiological surveillance and case detection

- A system, such as contact tracing, is set up for community leaders and members to alert the RRT of suspected cases of the illness of interest.
- Individuals exhibiting symptoms matching the PHE epidemiological or clinical case definition are referred to a health facility for clinical assessment and, if appropriate, hospital admission.
- The aim is to identify PHE cases and allow for prompt hospitalization to minimize, when relevant, secondary transmission in the community (see Annex 6, Indicator 4.1).
- Additional samples may need to be collected from patients or the affected environment during the course of the PHE to guide case management.

2 Case diagnosis

- Individuals displaying symptoms matching the case definition criteria are categorized as suspected cases.
- Samples may be obtained for laboratory confirmation of the PHE. Patients with laboratory-confirmed negative test results are discharged and assessed for an alternative illness or remain in the ward and are re-tested if clinical suspicion still remains (19).
- RRT contributes to discussions about discharge protocols and long-term patient follow-up.

3 Case detection in the health facility

- The aim is to identify possible incident cases and allow for prompt isolation of patients to stop secondary transmission.
- The activities include screening hospitalized persons and outpatients, as well as corpses.
- The general wards refer suspected cases to the specified hospital ward or isolation unit.
- The RRT should encourage the health facility authorities to operate all normal services unless the PHE response overwhelms the facility capacity and it becomes necessary to suspend or reduce non-essential services during the PHE (Annex 6, Indicator 4.1).

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4 Case management

- All patients receive optimal care, which is the best possible care available based on the probable diagnosis of a PHE and the contextual setting (Annex 6, Indicator 4.3).
- Case management protocols used are to be based on national or international standards.

5 Design and construction of an isolation unit

- For an infectious disease, the RRT designs and constructs an appropriate isolation unit, with the design based on the suspected mode of transmission, and separate areas provided for suspected and confirmed cases.
- The size of the structure should provide adequate room for patient accommodation to avoid cross-contamination.
- Transparent, web-like net fencing (20) is erected around the isolation ward, and only a single entrance and exit is provided in order to control patient and staff flow.

6 Provide psychosocial support and psychological care

- The aim is to assist in handling of burials, disinfection and home-based risk reduction for patients, families and the community.
- Directly communicate with patients and their families and caregivers about the PHE and the required procedures in order to attain their agreement with the programme and participation, allay fear and anger, reduce patient stigmatization and quell rumours and panic in the community (21, 22).
- Ensure relatives of deceased people participate in burial and disinfection activities and adhere to biosafety norms.
- Mitigate misunderstandings about the objectives and the activities of the RRT to improve relationships with patients' families and the community.
- Depending on the type of event and taking into account the local culture, language and gender-specific issues, provide illiterate persons with appropriate health education and related information.

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Fig. 8 – Field response components (continued)

7 Peripheral health facility support

- Train health staff from facilities in the area affected by PHE on case definition, disease surveillance and provision of optimal care and treatment.
- Support for peripheral health facilities will be based on the type of PHE in question.

8 Information, education, and communication campaign

- Typically undertaken at the beginning of the field response stage, although its planning occurs during the preparedness phase
- Aims to increase, via mass media communication and discussions with community groups and families, understanding of the PHE and response efforts and to encourage assessment and hospitalization of suspected and confirmed cases at health facilities.
- Mitigates fear and anger, reduces patient stigmatization and quells rumours and panic in the community (21, 22) (Annex 6, Indicator 4.2).
- A spokesperson is identified by the EMC and RRT to coordinate communication at the national, district or provincial levels, ensuring that information about the PHE is accurate, timely and available simultaneously at all levels and to the media.
- The communication campaign is dependent on the type of PHE occurring.

9 Safe burial and disinfection

- The RRT works with family members to adapt burial practices to reduce the risk of disease transmission and, where possible, to incorporate innocuous traditional burial rites such as song, dance and use of coffins. For example, families may identify the corpse before burial, carry and lower the coffin into the grave using gloves and fill the grave with earth, but may not touch the corpse.
- Household items suspected to be exposed to the vector are disinfected with a 0.5% chlorine solution, and items such as mattresses and clothing are burnt and replaced.
- The processes for disinfection, burning and replacement of household items are explained to and witnessed by family members to facilitate acceptance of the procedures and stem rumours.
- The nature of the burial and disinfection procedures is dependent on the type of PHE transpiring.[6]

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10 Home-based risk reduction

- This procedure is used for individuals who resist hospital-based care.
- The patient is advised to stay in one room alone while a designated caregiver is provided with personal protective equipment and trained to take care of the patient. Ideally the caregiver should be healthy and immune-competent and to have been immunized to the disease causing the PHE by vaccination or a past infection. The caregiver should have access to basic hygiene items such as soap and water and appropriate personal protective equipment, based on the cause of the illness. For example a mask is needed if the illness is a respiratory infection.
- The patient is followed up daily by a medical professional and a psychologist who ensure adherence to the home-based risk reduction protocol, replenish medical stocks and assess the patient's clinical status. At each visit, the patient is encouraged to accept hospitalization, as home-based care is a provisional measure, with health facility-based patient management as the preferred practice.
- The type of home-based risk reduction care is dependent on the type of PHE being dealt with.

11 Infection control in the health facility

- Involves the detection and isolation of cases, as well as the use of standard precautions, such as generic infection control (23).
- Activities include improving water quality, storage and delivery, as well as creating systems for safe disposal of sharps and contaminated waste.
- The number of injections given should be limited when possible, and single use vials and syringes should be encouraged.
- When an infectious disease is suspected, effective disinfection of the health facility requires spraying the structure and materials with a 0.5% chlorine solution. Hospital staff and RRT members should wear appropriate personal protective equipment, including hoods, goggles, masks, gowns, aprons, gloves (two pairs) and boots.
- Staff should be trained in the correct method of donning, removing and discarding contaminated protective equipment.

Note: Neither patients nor clinical paperwork should be sprayed with the chlorine solution. Patient's hands or feet may be sprayed only with their or their caregiver's verbal consent.

[6] See also Infection control for viral haemorrhagic fevers in the African health care setting p. 65-81 and pg. 95-99
Information available at: http://www.who.int/csr/resources/publications/ebola/WHO_EMC_ESR_98_2_EN/en/[TREAT

PHASE III: MONITORING AND EVALUATION

Monitoring and evaluation involves the systematic collection, analysis and interpretation of data on preparedness and response activities. Stakeholders should use timely, accurate and properly analysed information from monitoring and evaluation to plan, implement and improve the public health strategy. For this framework, monitoring focuses on routine and continuous tracking of EMC and RRT preparedness and response capacities, as well as the efficiency and effectiveness of the response action, including alert management, field investigation and field response. Evaluation will provide periodic assessment of how well EMCs and RRTs meet their objectives, for example the efficiency and effectiveness of the response in reducing the population's exposure to the causal agent, modifying high risk behaviours or providing early, optimal clinical care for those infected (24).

Monitoring and evaluating of emergency preparedness and response capacity is best achieved by using practical indicators that can be measured repeatedly and directly or indirectly over time (24) and that are valid and reliable. Indicators can be expressed as whole numbers, ratios or percentages. Reliability is an estimate of the consistency of the measurement, whereas validity is an estimation of its accuracy.

Indicators are typically categorized as being of either process or outcome nature. Process indicators measure programme and activity performance. Outcome indicators measure how well the EMC or RRT initiative is accomplishing its stated objectives, such as how much by comparison health determinants within a defined population improve over weekly or monthly intervals after the field investigation and response stages.

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ANNEXES

Annex 1 – IDSR core functions and activities by health system level

	COMMUNITY
Identify	▪ Use simple case definitions to identify priority diseases, events, conditions or other hazards in the community
Report	▪ Report essential information on priority diseases, events, conditions or hazards to health facility and appropriate authorities
Analyze and Interpret	▪ Involve local leaders in observing, describing and interpreting disease patterns, events and trends in the community ▪ Undertake verbal autopsies on causes of deaths
Investigate and confirm	▪ Support event investigation activities
Respond	▪ Assist local authorities in selecting response activities ▪ Ensure the community seeks care immediately in cases of emergency and danger signs of disease, events and conditions ▪ Participate in response activities including home-based care ▪ Mobilize resources appropriate for the activity at hand ▪ Carry out community health education for behaviour change
Communicate (feedback)	▪ Give feedback to community members about reported cases, events and prevention activities
Evaluate	▪ Verify if public health interventions were undertaken as planned ▪ Verify the community response to the public health action
Prepare	▪ Participate in disaster or emergency preparedness and management committees ▪ Participate in risk mapping of potential hazards ▪ Conduct community-based surveillance ▪ Manage eventual contingency emergency stock ▪ Participate in training, including simulation exercises

Annex 1 – IDSR core functions and activities by health system level (continued)

	HEALTH FACILITY
Identify	▪ Use standard case definitions to detect, confirm and record priority diseases or conditions ▪ Collect and transport specimens for laboratory confirmation ▪ If possible, use local laboratory capacity to confirm or initiate
Report	▪ Report case-based information for immediately notifiable diseases ▪ Report summary data to the next level ▪ Report laboratory results from screening of sentinel populations ▪ Report laboratory results to the next level
Analyze and interpret	▪ Prepare and periodically update graphs, tables and charts to provide information on time, person and place for reported diseases and conditions ▪ From the information analysis, immediately report any disease or condition that: - exceeds an action threshold - occurs in locations where it previously was absent - presents unusual trends or patterns ▪ Interpret results in planning action and initiate public health actions with local authorities
Investigate and confirm	▪ Take part in investigation of reported outbreaks ▪ Collect, package, store and transport specimens for laboratory confirmation
Respond	▪ Manage cases and contacts according to standard case management guidelines ▪ Take relevant control measures
Communicate (feedback)	▪ Communicate with community members about outcomes of reported cases and prevention activities
Evaluate	▪ Assess community participation ▪ Conduct self assessment on surveillance and response activities ▪ Monitor and evaluate programme targets and indicators for measuring the quality of the surveillance system ▪ Monitor and evaluate programme timeliness and completeness of reporting from health facilities in the district ▪ Monitor and evaluate timeliness of response to outbreaks ▪ Monitor and evaluate prevention activities and modify them as needed
Prepare	▪ Participate in disaster or emergency preparedness and management committees ▪ Participate in rapid response training ▪ Conduct risk mapping of potential hazards ▪ Conduct training of the community ▪ Participate in simulation exercises

	DISTRICT, STATE, PROVINCE
Identify	▪ Collect surveillance data from reporting sites, including designated points of entry, in a timely manner and review their quality ▪ Ensure a reliable supply of data collection and reporting tools is available at the reporting sites ▪ Collect and transport specimens for laboratory confirmation ▪ If possible use local laboratory capacity to confirm cases
Report	▪ Make sure health facilities know and use standard case definitions for reporting priority diseases and conditions ▪ Make sure health facility staff know when and how to report priority diseases and conditions ▪ Report data on time to the next level ▪ Report laboratory results to the next level ▪ Periodically conduct risk assessment for priority diseases, events, conditions or hazards
Analyze and interpret	▪ Define denominators and ensure their accuracy ▪ Aggregate data from health facility reports ▪ Analyse data by time, place and person ▪ Periodically update graphs, tables and charts to describe reported diseases, events and conditions ▪ Calculate PHE rates and thresholds ▪ Compare current data with previous data ▪ Make conclusions about trends, thresholds and analysis results ▪ Describe risk factors for priority diseases or conditions
Investigate and confirm	▪ Arrange and lead investigations of reported diseases or outbreaks ▪ Assist health facilities in ensuring safe collection, packaging, storage and transport of laboratory specimens for confirmatory testing ▪ Receive and interpret laboratory results ▪ Decide if the reported outbreak is confirmed ▪ Report the confirmed outbreak to the next level ▪ Distribute specimen collection kits for special surveillance activities
Respond	▪ Select and implement appropriate public health response depending on the disease. For example plan to strengthen case management, conduct immunization, or improve control and prevention activities ▪ Convene an epidemic response committee and plan a response to the PHE ▪ Conduct training for emergency activities ▪ Plan timely community information and education activities ▪ Alert neighbouring areas and districts about the confirmed outbreak
Communicate (feedback)	▪ Alert nearby areas and districts about the outbreak ▪ Give health facilities regular, periodic feedback about routine control and prevention activities ▪ Provide feedback on surveillance and data quality findings

Annex 1 – IDSR core functions and activities by health system level (continued)

	DISTRICT, STATE, PROVINCE (CONTINUED)
Evaluate	▪ Monitor and evaluate programme targets and indicators for measuring the quality of the surveillance system ▪ Conduct regular supervisory visits
Prepare	▪ Participate in disaster or emergency preparedness and management committees ▪ Conduct training and simulation exercises for staff ▪ Conduct risk mapping of potential hazards ▪ Support and conduct health facility-based surveillance ▪ Develop and manage contingency plans ▪ Put together and support a rapid response team ▪ Document response activities

	NATIONAL LEVEL
Identify (continuous on the next page)	▪ Develop, update guidelines and ensure compliance with national policy and guidelines ▪ Develop policies and procedures for the national laboratory networks, including quality assurance systems ▪ Use national laboratories for confirmatory and specialized testing if necessary ▪ Collect and transport specimens for additional analysis at WHO collaborating centres as necessary
Report	▪ Report immediately notifiable diseases and events to the appropriate authorities ▪ Report other priority diseases and events on time ▪ Include all relevant laboratories in the reporting network ▪ Use the IHR decision instrument to determine risks for priority diseases, events, conditions or hazards ▪ Inform WHO as indicated in IHR (2005)
Analyze and interpret	▪ Set policies and procedures for analysing and interpreting data ▪ Analyse and interpret data from a national perspective ▪ Regularly convene meetings of the technical coordinating committee to review the analysed and interpreted data before wider dissemination ▪ Carry out special analyses to forecast magnitude and trends of priority disease events
Investigate and confirm (continuous on the next page)	▪ Ensure guidelines and standard operating procedures for outbreak investigations are available at all sites ▪ Coordinate and collaborate with international authorities as needed during investigations ▪ Alert laboratories and support their participation ▪ Provide logistic support for acquisition of supplies, equipment, reagents, specimen transport media, health promotion budget etc.

	NATIONAL LEVEL (CONTINUED)
Investigate and confirm (continued)	▪ Share information with regional and international networks about confirmed outbreaks ▪ Use the decision instrument to decide whether the outbreak is a potential PHEIC ▪ Process specimens from investigations and send timely results as required to each level ▪ Request additional specimens as needed ▪ Participate in the epidemic response team
Respond	▪ Develop policies and procedures for responding to cases and outbreaks of priority diseases and conditions ▪ Support epidemic response and preparedness activities including deployment of rapid response teams ▪ Report and disseminate results of outbreak response in bulletins and the media using press releases and briefings
Communicate (feedback)	▪ Develop and regularly distribute a regional bulletin on epidemiology and public health ▪ Give districts regular, periodic feedback about routine PHE control and prevention activities ▪ Release information quickly in a transparent manner and listen to the affected community ▪ Document provision of appropriate and timely feedback
Evaluate	▪ Regularly monitor IDSR and laboratory core indicators ▪ Conduct outbreak investigations following after-action reviews ▪ Support annual monitoring of IHR core capacities ▪ Conduct regular IDSR review meetings ▪ Conduct regular supervisory visits
Prepare	▪ Develop policies, procedures and training strategies for reporting priority diseases, conditions and events at each level ▪ Adapt and distribute risk mapping guidelines ▪ Adapt and distribute guidelines for disaster or emergency preparedness plans ▪ Develop messages for community education ▪ Develop and manage contingency plans ▪ Organize and support national rapid response teams ▪ Develop and organize simulation exercises ▪ Establish and maintain a national public health emergency command and operation centre

	NATIONAL WHO REPRESENTATIVE, WHO REGIONAL OFFICE
Identify	▪ Develop and disseminate generic guidelines for PHE surveillance ▪ Document and share IDSR best practices ▪ Provide technical support to the national level for detection and confirmation of priority diseases, conditions and events ▪ Inform countries about health problems that may cross borders

Annex 1 – IDSR core functions and activities by health system level (continued)

	NATIONAL WHO REPRESENTATIVE, WHO REGIONAL OFFICE (CONTINUED)
Identify	▪ Coordinate support from the international reference laboratory network and from centres of excellence
Report	▪ Collect and compile reports on outbreaks and international notifiable diseases and events ▪ Produce annual regional profiles or situation reports for priority diseases, conditions and events
Analyze and interpret	▪ Develop and disseminate standard guidelines for analysis of data for each priority disease ▪ Provide technical support to the national level to improve capacity for data analysis
Investigate and confirm	▪ Upon request, provide support to countries for investigation or assessment of outbreaks, diseases or events ▪ Provide support for coordination of laboratory participation during investigations ▪ Provide support for risk assessment using the IHR decision instrument
Respond	▪ Coordinate and support response activities by the Strategic Health Operations Centre, technical experts, virtual rapid response teams etc. and for preparation of guidelines, SOPs etc. ▪ Mobilize resources and facilitate partnerships among Member States or institutions
Communicate (feedback)	▪ Provide feedback on collaboration with national and regional levels ▪ Disseminate risk-communication guidelines ▪ Share information with partners and stakeholders
Evaluate	▪ Use reports from countries to assess IDSR systems and advocate for improvements ▪ Develop, update or revise guidelines and tools for IDSR and IHR monitoring and evaluation ▪ Promote, guide and support operational research
Prepare	▪ Mobilize resources for training, logistics and supervision ▪ Develop, update or revise guidelines for disaster or risk management ▪ Maintain and update a roster of experts for rapid response teams ▪ Develop, update or revise training programmes for IDSR and IHR implementation ▪ Maintain a public health emergency command and operations centre

Annex 2 – Institutional RRT members' minimum core skills and responsibilities

RRT members	Minimum core skills and experiences required	Minimum responsibilities for PHE preparedness, response and monitoring and evaluation	Personal and professional details
Manager or team leader	▪ Relevant management or team leadership experience with PHEs, including in outbreak response ▪ Experience with disease surveillance and response to PHEs ▪ Ability to engage technical and political entities within the national government ▪ Demonstrated leadership qualities ▪ Field experience in surveillance or risk management and response ▪ Scientific reputation in the subject matter of expertise ▪ Ability to advocate for and mobilize resources from technical and political bodies	▪ Maintain communication with and work in coordination with multisectoral institutions identified by the EMC as sources of RRT membership ▪ Ensure that both technical and political mechanisms respond appropriately to a PHE ▪ Oversee the technical activities of each RRT member ▪ Assume responsibility for assessing RRT preparedness and response capabilities, working with the RRT epidemiologist to determine the indicators from recommendations ▪ Oversee testing of the functionality, agility and resilience of the RRT through scenario-based field training at least once every six months once a PHE has been recognized ▪ With the epidemiologist, oversee the management and interpretation of all RRT-generated data. ▪ Manage the biannual updating of the country-adapted and context-relevant PHE response plan ▪ Lead the writing of a concise, accurate monthly RRT report providing details on the alerts received, deemed credible, found to have infectious or non-infectious etiology, and responded to by the RRT, with their corresponding timeframes	▪ Name ▪ Job title ▪ Organization ▪ Contact details

Annex 2 – Institutional RRT members' minimum core skills and responsibilities (continued)

RRT members	Minimum core skills and experiences required	Minimum responsibilities for PHE preparedness, response and monitoring and evaluation	Personal and professional details
Epidemiologist (continuous on the next page)	▪ Postgraduate degree in epidemiology or equivalent experience in a field epidemiology training programme ▪ Proven field experience in responding to PHE outbreaks	▪ Investigate and analyse epidemiology of clusters of suspected, probable or confirmed illnesses for factors of time, place, person and mode of disease transmission, as well as to determine the etiology of a PHE ▪ Establish or strengthen active disease surveillance activities and follow up on case contacts ▪ With the manager or team leader, oversee the determination and interpretation of recommended indicators ▪ Working with the team leader, support mobilization of field teams for rapid outbreak assessment or investigation ▪ Evaluate the current alert and response systems, including existing case definitions ▪ Supervise data management, analysis and interpretation ▪ Lead the planning of the strategy and methods to determine the etiology of the illness during a PHE ▪ Ensure clear routine reporting of key information on PHEs to the EMC at national, district or provincial level ▪ Liaise with international partners in the field as directed by the EMC to facilitate field investigation and response	▪ Name ▪ Job title ▪ Organization ▪ Contact details

RRT members	Minimum core skills and experiences required	Minimum responsibilities for PHE preparedness, response and monitoring and evaluation	Personal and professional details
Epidemiologist (continued)		▪ Identify the factors in the occurrence of the PHE in question ▪ Update and share surveillance data with the rest of the team ▪ Set in motion mechanisms to break the contamination chain for infectious diseases ▪ Provide guidance on risk prevention in the field ▪ Share emerging data with team members on a regular basis and determine the need for surveillance and response	
Clinician or infection control expert (continuous on the next page)	▪ Medical or nursing university degree ▪ Field experience in effective clinical case management during PHEs ▪ Referral system skills ▪ Clinical experience in infection control, training of professionals in infection control measures, and implementing and evaluating infection prevention and control practices	▪ Directly support proper case-management and provision of optimum care for cases in health facilities and the community ▪ Provide guidance on clinical and epidemiological case definitions ▪ Collect robust demographic, treatment, and patient monitoring data for improved clinical response to PHEs ▪ Assess infection control practices in health care facilities in affected areas ▪ Provide guidance on the necessary infection control equipment for central, provincial and district-level hospitals and facilities during a PHE ▪ Review and, where appropriate, recommend changes to update infection control guidelines based on lessons learnt at health care facilities during PHEs	▪ Name ▪ Job title ▪ Organization ▪ Contact details

Annex 2 – Institutional RRT members' minimum core skills and responsibilities (continued)

RRT members	Minimum core skills and experiences required	Minimum responsibilities for PHE preparedness, response and monitoring and evaluation	Personal and professional details
Clinician or infection control expert (continued)		▪ Conduct appropriate on-site infection prevention and control training for staff at provincial or district hospitals after reviewing local infection control measures ▪ Coordinate work with all the response teams ▪ Report on findings of investigations and assist the RRT or international team and national authorities to formulate a plan of action, and participate in after-action reviews	
Social mobilization expert	▪ University degree in social sciences or communication ▪ Experience in social mobilization or behavioural communication approaches, PHE surveillance and response and rumour management	▪ Undertake rapid appraisals to understand perceptions, knowledge, beliefs and practices within households, communities and health care settings in affected areas in relation to PHE control, prevention, and treatment interventions ▪ Identify barriers and facilitating factors, including sociocultural and organizational contexts, that may affect the uptake of recommended risk reduction and health protection measures within households, communities and health care settings ▪ On the basis of the findings of the rapid assessment, advise and make recommendations to the RRT leader on the design and implementation of effective communication strategies and interventions ▪ Based on the findings from the rapid assessment, develop effective social mobilization strategies that support outbreak control and prevention measures	▪ Name ▪ Job title ▪ Organization ▪ Contact details

RRT members	Minimum core skills and experiences required	Minimum responsibilities for PHE preparedness, response and monitoring and evaluation	Personal and professional details
Veterinarian	▪ University degree, preferably an advanced degree in field epidemiology ▪ Experience in animal health, particularly disease detection and reporting ▪ Solid background in zoonoses ▪ Mastery of diseases affecting wildlife and aquatic animals	▪ Create a list of materials and equipment required for zoonoses, particularly for sampling ▪ Manage diagnostic activities for animal diseases ▪ Oversee the application of biosecurity measures if required ▪ Lead information analysis and investigation in the event of suspected outbreaks affecting animals ▪ Galvanize and strengthen surveillance of animal hazards ▪ Collect available data to produce needed animal health information ▪ Collaborate easily with public health partners ▪ Guide epidemic control measures for animal disease vectors ▪ Assess household practices for animals to maximize the effectiveness of disease control efforts	▪ Name ▪ Job title ▪ Organization ▪ Contact details
Wildlife specialist **(continuous on the next page)**	▪ University degree in a wildlife science or a closely related field ▪ Experience in planning, managing, coordinating, monitoring and evaluation of wildlife related projects.	▪ Establish the precise pathogenic agents ▪ Define the relationship between pathogenic agents and host and the environment: parasitism, commensalism, symbiosis ▪ Know pathogenic agent roles to understand how they are maintained in nature ▪ Establish the role of pathogenic agents in nature conservation and in the preservation of biodiversity ▪ Know wild animal pathology (symptoms, etc.)	▪ Name ▪ Job title ▪ Organization ▪ Contact details

Annex 2 – Institutional RRT members' minimum core skills and responsibilities (continued)

RRT members	Minimum core skills and experiences required	Minimum responsibilities for PHE preparedness, response and monitoring and evaluation	Personal and professional details
Wildlife specialist (continued)		▪ Ensure proper expertise about bush meat and safe butchering, handling and preparation ▪ Protect food against rats and other creatures ▪ Determines animal pathogenic agents ▪ Determines the relationship between different disease factors: vectors, reservoirs, hosts ▪ Behaviour of pathogens responsible for diseases ▪ Ensure nature conservation and biodiversity preservation ▪ Knowledge of wild animal pathologies ▪ Bush meat control ▪ Food control	▪ Name ▪ Job title ▪ Organization ▪ Contact details
Anthropologist (continuous on the next page)	▪ University degree in medical anthropology ▪ Extensive experience in developing, implementing and evaluating medical anthropological policies, procedures, and tools in low-resource settings ▪ Experience in PHE response and emergency situations	▪ Work with community leaders and in collaboration with the RRT leader to better understand local cultural attitudes to the PHE, and to identify beliefs and practices, includingbehaviours that may amplify or help control the PHE ▪ Identify and incorporate local beliefs and practices into patient care and PHE response efforts ▪ Contribute to the design and conduct of ecological and epidemiological studies as appropriate ▪ Investigate social and anthological issues that would promote better understanding of community perception of the PHE	▪ Name ▪ Job title ▪ Organization ▪ Contact details

RRT members	Minimum core skills and experiences required	Minimum responsibilities for PHE preparedness, response and monitoring and evaluation	Personal and professional details
Anthropologist (continued)		▪ Investigate cultural and social norms within the communities that will contribute to developing better rapport and trust ▪ Support documentation of the anthropological aspects of the PHE	
Environmental health specialist **Eco-toxicologist, specialised in basic sciences (chemistry, biology, physics, mathematics)**	▪ Environmental quality surveillance ▪ Food chain surveillance ▪ Environmental risk assessment of disease exposure	▪ Conduct environmental investigations of etiological factors related to disease risk ▪ Lead the work on prevention of diseases related to the environment, that is, "sound the alert" for such diseases	▪ Name ▪ Job title ▪ Organization ▪ Contact details
Logistician (continuous on the next page)	▪ University degree or equivalent level of education in supply chain management, emergency response logistics, or PHE response logistics	▪ Ensure logistical support is provided for preparedness and investigation of, and response to, PHEs for each discipline or technical area, such as transport for patient samples for laboratory diagnosis ▪ Maintain stockpiles of essential materials such as personal protective equipment for use during the investigation or response to a PHE	▪ Name ▪ Job title ▪ Organization ▪ Contact details

Annex 2 – Institutional RRT members' minimum core skills and responsibilities (continued)

RRT members	Minimum core skills and experiences required	Minimum responsibilities for PHE preparedness, response and monitoring and evaluation	Personal and professional details
Logistician (continued)	▪ Field experience in logistical operations for responding to infectious disease outbreaks or other public health emergencies	▪ Identify strategic storage points for supply stocking to support the response ▪ Provide guidance on logistics and supply chain management at all levels ▪ Provide logistical support for tracking shipment of samples to identified laboratories ▪ Ensure administrative procedures are observed during field operations and address financial management and human resource issues ▪ Manage finances when relevant ▪ Look after logistical communication devices ▪ Identify and collaborate with local resource persons at the PHE location ▪ Develop a response data base ▪ Coordinate team security	
Occupational health specialist **or doctor** **Industrial hygienist** **Toxicologist** **Local inspector from the health, hygiene and environmental committee**	▪ Monitor and inspect employee health in the workplace ▪ Monitor and inspect workplace conditions ▪ Assess the risk of exposure to chemical substances in the workplace ▪ Surveillance and inspection of security regulations in the workplace	▪ Participate in setting up preventive measures for protection of employees and the work environment, such as medical protocols and injury prevention processes ▪ Ensure ongoing surveillance in the workplace	▪ Name ▪ Job title ▪ Organization ▪ Contact details

RRT members	Minimum core skills and experiences required	Minimum responsibilities for PHE preparedness, response and monitoring and evaluation	Personal and professional details
Laboratory specialist* **(1 to 2)**	▪ University degree in microbiology, biology or a related laboratory science ▪ Field experience in the interaction of laboratories and surveillance activities	▪ Provide guidance in establishment of an operational system for safe and appropriate collection, packaging and transport of samples from the field to the reference laboratory ▪ Develop standard operating procedures for participation of laboratories in investigation and laboratory confirmation of PHEs ▪ Set up systems for efficient linkage of laboratories and epidemiology teams ▪ Work in close coordination with response teams to enhance national, regional and international laboratory networks to allow efficient laboratory identification of epidemic-prone diseases and public health risks	▪ Name ▪ Job title ▪ Organization ▪ Contact details
Financial officer* **(continuous on the next page)**	▪ University degree ▪ Previous finance experience in a ministry of health	▪ Take responsibility for application of appropriate principles of accounting and finance to support deployment of the RRT during a PHE ▪ Assure RRT members understand the rules and requirements for deployment-related payments and reimbursements ▪ Organize for rapid replenishment of funds when required ▪ Organize for petty cash for staff deployed to the field ▪ Ensure that all financial transactions processed during out-of-office hours are recorded and cleared on the first subsequent day of business ▪ Clear all financial documents	▪ Name ▪ Job title ▪ Organization ▪ Contact details

*These positions are suggested, but not absolutely required in the RRT.

Annex 2 – Institutional RRT members' minimum core skills and responsibilities (continued)

Financial officer* (continued)		▪ Monitor cash flow and work with counterparts on cost sharing for relevant activities ▪ Determine the alert threshold for financial and logistical needs ▪ Coordinate technical aspects of deployment of staff to field operations ▪ Develop an organizational chart, working with the team leader	

Annex 3 – Preparedness and response capacity indicators

The following recommended key indicators will facilitate EMCs and RRTs in the WHO African Region to measure and evaluate their preparedness capacity for a PHE. Only data generated by the EMC and RRT should be used. All indicators are to be reported monthly, unless stated otherwise.

Number	Indicator	Numerator/denominator**
1.1	Percentage of RRT member positions filled by a professional who fulfils all required core qualities (per Annex 2)	Number of RRT member positions filled by a professional who fulfils all of the required core functions (see Annex 2), divided by the total number of RRT member positions, both filled or not yet filled
1.2	The number of scenario-based field training events conducted by the EMC or RRT	NA (not applicable) It is essential that EMC or RRT preparedness training be conducted and evaluated at least once every six months.
1.3	The EMC or RRT has developed and written a country-adapted and context-relevant response plan for PHEs	NA (not applicable) It is essential that the response plan be reviewed at least once every six months and, if necessary, revised.

** Numerator is divided by the denominator and multiplied by 100 to calculate the percentage.

Annex 4 – Alert management indicators

The following recommended key indicators will facilitate EMCs and RRTs in the WHO African Region to measure and evaluate the timeliness and effectiveness of their management actions for PHE alerts. Only data generated by the EMCs and RRTs under the supervision of its manager or team leader and the epidemiologist should be used. All indicators are to be reported monthly, unless stated otherwise.

Number	Indicator	Numerator/denominator**
2.1	Percentage of alerts received by the EMC or RRT that it deems credible	Number of alerts received by the EMC or RRT that it deems credible, divided by total alerts received by the EMC or RRT
2.2	Percentage of alerts received by the EMC or RRT that the it deems credible and that are later determined to be associated with an infectious disease	Number of alerts received by the EMC or RRT that it deems credible and that are later determined to be associated with an infectious disease, divided by the total alerts received by the EMC or RRT that it deems credible
2.3	Proportion of alerts deemed credible by the EMC for which field investigations start within 48 hours of being considered credible	Number of alerts received by the EMC that it deems credible for which an RRT field investigation is started within 48 hours of being considered credible, divided by total alerts received by the EMC that it deems credible and for which an RRT field investigation is started.

** Numerator is divided by the denominator and multiplied by 100 to calculate the percentage.

Annex 5 – Field investigation indicators

The following table of recommended key indicators may facilitate RRTs in the WHO African Region when measuring and evaluating the timeliness and effectiveness of the RRT's field investigation of PHEs. Only data generated from the RRT, overseen by its manager/team leader and the epidemiologist, will be used. All indicators are to be reported monthly, unless stated otherwise.

Number	Indicator	Numerator/Denominator**
3.1	Percentage of samples sent to a diagnostic laboratory identified by the RRT during the preparedness phase that were sent following the laboratory's sample-shipping protocol	Number of samples sent to a diagnostic laboratory identified by the RRT during the preparedness phase that were sent according to the laboratory's sample shipping protocol, divided by total samples sent to the diagnostic laboratory identified by the RRT during the preparedness phase
3.2	Percentage of PHE patients who the RRT confirmed were receiving optimum care during the field investigation stage	Number of PHE patients who the RRT confirmed were receiving optimum care during the field investigation stage, divided by total PHE patients identified during the field investigation stage *Note:* Optimum patient care is defined as the best possible care available based on the probable and eventual diagnosis of the PHE and the contextual setting under which the patients are hospitalized.
3.3	Percentage of PHE patients whose epidemiological and clinical data the RRT found recorded by the health facility personnel during the field investigation stage	Number of PHE patients whose epidemiological and clinical data the RRT found recorded by health facility personnel during the field investigation stage, divided by the total PHE patients attended to by the health facility personnel during the RRT field investigation stage
3.4	Were local authorities involved in the field investigation? (yes or no?)	NA (not applicable)

** Numerator is divided by the denominator and multiplied by 100 to calculate the percentage.

Annex 6 – Field response indicators

The following recommended key indicators may facilitate RRTs in the WHO African Region to measure and evaluate the timeliness and effectiveness of their field response to PHEs. Only data generated by the RRT under the guidance of its manager or team leader and the epidemiologist should be used. All indicators are to be reported monthly, unless stated otherwise.

Number	Indicator	Numerator/Denominator**
4.1	Percentage of confirmed PHE patients detected by the epidemiological surveillance system who receive appropriate clinical care or hospitalization within 48 hours of PHE confirmation	Number of confirmed PHE patients detected by the epidemiological surveillance system who receive appropriate clinical care or hospitalization within 48 hours of PHE confirmation, divided by total confirmed PHE patients detected by the epidemiological surveillance system *Note:* Early identification of PHE patients allows for prompt hospitalization and minimization of secondary transmission in the community.
4.2	Number of PHE IEC campaign sessions the RRT conducts at the PHE site during the field response stage for either the affected community or health personnel or both	NA (not applicable) *Note:* IEC campaign sessions increase understanding of the PHE and acceptance of the response, and encourage health facility-based assessment and hospitalization for suspected and confirmed cases. Moreover, IEC sessions mitigate fear and anger among family members, reduce patient stigmatization and quell rumours and panic in the community.
4.3	As assessed by the RRT, the percentage of identified PHE patients who receive optimum patient care at any time during the field response stage	Number of identified PHE patients who receive optimum patient care at any time during the field response stage, divided by the number of identified PHE patients *Note:* Optimum patient care is defined as the best possible care available based on the probable and eventual diagnosis of the PHE and the contextual setting under which the patients were hospitalized

** Numerator is divided by the denominator and multiplied by 100 to calculate the percentage.

Annex 7 – A field investigation report template

Use this template to prepare your field investigation report. Please copy and paste it into a new Microsoft Word document to help you provide the required information and format your report.

REPORT FOR RESPONDING TO AN INVESTIGATION OF A PUBLIC HEALTH EVENT OF UNKNOWN ETIOLOGY

1. Provide a brief summary of the investigation, indicating whether or not a public health event (PHE) of unknown etiology is currently transpiring. Include the name(s) of the villages, towns, districts and country involved. Where possible, provide population numbers for each.

2. Describe the clinical presentation of the patients as assessed by patient registrars, local health authorities or family or friends.

3. Describe the clinical presentation of the patients as assessed by the RRT clinician.

4. Provide a descriptive epidemiology of the PHE. All data should be described and categorized by person, place and time and presented with analyses and interpretation.

   a. Patient's demographic details' summary (i.e. age, gender, occupation, town or village of residence)

   b. Number of cases and deaths (reported by epidemiological week)

   c. Incidence rate (reported by epidemiological week)
   Incidence rate is defined as the number of new cases of a disease that occur during a specified period in a population at the risk of developing the disease during the same specified period of time.

   Incidence rate = Total number of persons who developed a certain illness during a specified time period, multiplied by k (1000 or 10 000), and divided by number of persons at risk of a certain illness in specified time period

   Case fatality ratio (CFR) (reported by epidemiological week)

   d. Case fatality ratio is an incidence proportion. It is the proportion of people among those who develop a disease who proceed to die from it. It does not measure the development of the disease but rather death from the disease. The CFR should be used as a description of the proportion of people who succumb to an infectious disease.

   e. Case fatality ratio = Number of people who die from a certain illness, divided by number of people who developed the illness

   f. Attack ratio (reported by epidemiological week)
   Attack ratio is a type of incidence rate used for acute diseases. It measures the proportion of the population affected by the PHE of unknown etiology until the present time.

   Attack ratio = Number of people at risk of a disease who develop the illness, divided by the number of people at risk of the disease

5. Provide the proposed and preliminary epidemiological and clinical case definition(s) agreed on by the RRT and local health authorities.

6. Include a map of the affected area, with village locations of the identified cases and deaths.

7. Describe how the PHE might be transmitted and the population potentially at risk.

8. Describe the RRT's proposed response activities to control the primary and/or secondary transmission of the PHE of unknown etiology.

9. Provide a security assessment, including information about the affected area's context, security, airports, rivers, lakes and roads.

10. Describe the availability, usage and needs for all resources, including staff, cold chain equipment, vehicles, fuel, medical materials and drug stocks.

11. List the names and locations of the diagnostic laboratories where the samples were sent.

12. State whether or not the RRT would like to request for an on-site diagnostic and patient monitoring laboratory, and if so, what concrete steps are being taken to ensure that such a laboratory is obtained.

13. Describe the current planning, action and potential next steps of the RRT.

14. Describe the factors that demonstrate the capacity of the local health authorities to safely and effectively treat the infected patients and bury the dead.

15. Recommend whether or not specialists not currently part of the RRT are needed to be sent to the PHE location, such as medical toxicologists, medical psychologists, chemical or hazardous material specialists, etc., to satisfy the One Health approach requirements.

16. Provide the disease chronology information if it is available:

a. Date the initial alert was received by the epidemic management committee, rapid response team, or equivalent body (dd/mm/yyyy): .....

b. Date of arrival of the rapid response team at the location (dd/mm/yyyy): .....

c. Date of laboratory confirmation of the etiology of the PHE (dd/mm/yyyy):.....

This report was prepared on (dd/mm/yyyy): .....

Please provide your name and contact details, writing clearly and preferably typing them in or using block letters. This report was written by:

1. Name: .....
Institution and position:.....
Phone:..... E-mail:.....

2. Name: .....
Institution and position: .....
Phone:..... E-mail:.....

3.Name: .....
Institution and position: .....
Phone:..... E-mail:.....

Annex 8 – Participants in WHO African Region beta-testing workshops

Uganda workshop

African Field Epidemiology Network
Dr Olivia Namusisi
CDC, Atlanta, Georgia
Mr Mark Austin
CDC Uganda
Jeff Borchert, PhD;
Robert Downing, PhD;
Trevor Shoemaker, PhD
Central Public Health Laboratories
Mr Atek Kagirita
Civil Aviation Authority
Mr Christopher Mondi
and Mr Okello Thomson
CTPH
Mr Samuel Mutebi,
Gladys Kalema-Zikusoka, DVM
FAO headquarters
Katinka DeBalogh, DVM
Kibaale District
Mr Stephen Byaruhanga
Ministry of Agriculture, Animal Industries and Fisheries
Ms Rose Ademun, DVM;
Mr Deo Ndumu, DVM
Ministry of Public Health
Dr Francis Adatu,
Dr Byamukama Agaba,
Ms Christine Akumu,
Dr Immaculate Ampeire,
Dr Deborah Atai,
Dr Julius Bamwine,
Mr Winyi Kaboyo,
Dr Amone Jackson Kaka,
Dr Dan Kyamanywa,
Mr Luswa Lukwago,
Ms Lilian Luwaga,
Dr Henry Luzze,
Dr Issa Makumbi,
Mr Mugagga Malimbo,
Mr Okumu Morris,
Mr Fred Mulabya,
Dr Robert Musoke,
Ms Rukia Nakamatte,
Dr Esther Namukose,
Dr Christopher Oleke,
Dr Batesaki Roger,
Dr James Sekajugo,
Dr Victor Tugumizemu,
Dr Patrick Tuslime
and Dr Joseph F Wamala
MSF
Mr Elzein Elsiddig,
Ms Jackie Ouire Ronit
Mulago National Referral Hospital
Dr Doreen Nabaawanuka Arison,
Dr Titus Beyeza,
Dr Joyrine Biromumaiso Kasoma,
Dr Julius Muron,
Dr Janet Nakigudde,
Dr Muhwezi Wilson
OPM
Mr Raymong Kirungi
Uganda Viral Research
Dr Barnabas Bakamutumaho, PhD;
Julius Lutwama, PhD;
Luke Nyakarahuka, PhD;
Uganda Wildlife Authority
Patrick Atimnedi, DVM
UPDF
Dr Henry Kyobe
URCS
Mr Anyika Morris
USAID/EPT/RESPOND Project
Mr Georges Bakgongo;
Ms Nina Maiwand;
Ms Rose Nauma;
Ms Sandra Butler Ruth Walkup, PhD;
USAID Uganda
Thomas Easley, DVM
WHO Uganda country office
Dr Charles Okot,
Mr Ben Sensasi
WHO headquarters
Tamara Curtin Nemi, PhD

Democratic Republic of Congo workshop, 2013

Médecin du Monde
Dr Patric Lunzayiladio
Ministère de la Défense Nationale
Colonel Bokolombe
Ministère de la Santé Publique
Dr Theophile Bokenge,
Dr Leopold Lubula,
Dr Mualuka,
Dr Jean Jacques Muyembe,
Dr Dieudonne Mwamba,
Dr Antoine Okitandjate,
Dr Robert Shongo
Ministère de l'Agriculture et du Développement Rural
Hubert Abokibe, DVM;
Justin Masumu, DVM;
Florent Ngamuna, DVM;
Mabela N'Lemba, DVM
Ministère de l'Environnement, Conservation de la Nature et du Tourisme
Kazadi Kazadi Mujkay, DVM;
Matata Ngirabose, DVM
Ecole de Santé Publique, Université de Kinshasa
Prof Liesse Iyamba,
Prof. Prince Kimpanga (OHCEA),
Prof. Jean Malakani, Prof. Okito,
Niveau Provincial
Dr Bosomba Impate (Boende),
Dr Edmond Mulamba (Kasai Occidental),
Dr Louis Elefo (Kasai Occidental),
Dr Faustin Etonye (Katanga),
Dr Isabelle Lumbwe (Kinshasa),
Dr Musafiri Ndemere (Maluku)
UNHCR
Robert Anunu
USAID EPT Programme
Dr Joseph Atibu
USAID EPT RESPOND Project/ Ecology & Environment
Louise Flynn, PhD