



## **MISSION** REPORT

# Public health emergency preparedness for cases of viral haemorrhagic fever (Ebola) in Portugal: a peer review

30 March – 1 April 2015

**ECDC MISSION REPORT**

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This report of the European Centre for Disease Prevention and Control (ECDC) was coordinated by Graham Fraser and Svetla Tsoлова.

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# Contents

Abbreviations .....	iv
Executive summary .....	1
1 Introduction .....	4
1.1 Background .....	4
1.2 Nature and evolution of the communicable disease threat .....	4
1.3 VHF emergency response systems in Portugal .....	4
2 The peer review process .....	6
2.1 Objectives .....	6
2.2 Methodology .....	6
2.3 Limitations .....	7
3 Review findings .....	8
3.1 System governance .....	8
3.2 Primary responder organisations .....	12
3.3 Designated receiving organisations .....	16
3.4 Whole system issues .....	23
4 Summary and conclusions .....	24
Annex 1. International and national teams, and national respondents .....	26
Annex 2. Visit itinerary .....	29
Annex 3. DGS guidance issued in relation to preparation for and management of Ebola cases .....	31
Annex 4. Ebola simulation exercises, Portugal, 2014–15 .....	32

# Figures

Figure 1. Conceptual scheme: potential pathways for recognition and management of an imported VHF case .....	7
Figure 2. Calls to medical support line, DGS, Portugal, April 2014 – March 2105 .....	10
Figure 3. Publicity event for use of national health line for Ebola enquiries; television presenter Catarina Furtado in front of an INEM ambulance; Lisbon, October 2014 .....	10
Figure 4. Exercise drill, emergency department, Hospital de S. José, Lisbon .....	14
Figure 5. Simulation exercise <i>Meliandou</i> , October 2014: supervised donning of personal protective equipment, ambulance crew (INEM), Lisbon .....	18
Figure 6. Simulation exercise, Hospital Curry Cabral, Lisbon, November 2014 .....	20
Figure 7. Simulation exercise, supervised doffing of PPE, second stage, Hospital Curry Cabral, Lisbon, November 2014 .....	20
Figure 8. Simulation exercise: decontamination of clinical area post discharge, Portuguese army .....	21
Figure 9. Secondary Ebola case, timeline, Madrid, September–November 2014 .....	22

# Tables

Table 1. Probable cases of Ebola infection assessed, Portugal, 2014 to the present .....	9
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## Abbreviations

DGS	Director-General of Health
ED	Emergency department
EVD	Ebola virus disease
INEM	National organisation of medical emergencies
PRTAF	Portuguese Air Force
PRT Armed Forces	Portuguese Armed Forces
PPE	Personal protective equipment
VHF	Viral haemorrhagic fever

## Executive summary

The largest ever epidemic of Ebola virus disease (EVD) has been ongoing in West Africa since December 2013, affecting mainly Guinea, Liberia and Sierra Leone. This has also exposed EU/EEA Member States with unprecedented levels of risk of importation of highly contagious viral haemorrhagic fever (VHF) cases, through both repatriation of known cases and return of unrecognised cases of infected individuals.

Following invitation from Portuguese public health authorities, an ECDC team of five experts (including two from EU Member States,) visited Lisbon during 30th March to 1st April 2015, to conduct a peer review with Portuguese colleagues of the country health emergency preparedness systems for imported cases of VHF. The principal objective of the visit was to support national public health leaders to review and identify strengths and desired improvements in the country public health emergency system, in the context of preparedness for recognition and safe management of cases of Ebola infection.

The peer review was based on a classification framework developed by ECDC, also cognisant of international and national recommendations, of the system elements and organisational competencies that should be present in a country's response systems in order to ensure the prompt recognition and safe management of a person suffering from VHF.

Reviewers visited and carried out semi-structured interviews with professionals and leaders in several health organisations potentially involved in Ebola response in Lisbon. The work of other organisations involved in the system was discussed in plenary at the DGS offices. Experience from Spain and Germany in public health and clinical management of EVD cases was discussed in closed session.

The reviewers found that Portugal has effectively implemented comprehensive and integrated Ebola emergency preparedness measures, which have been tested and improved through implementation of planned management of nine probable cases (none positive). It is apparent that key responder organisations within and beyond the health service have gained much from their programmes of Ebola preparedness; there have been substantial advances in staff skills and knowledge, organisational policies and protocols, and (in some cases) facilities and physical infrastructure for management of highly infectious diseases such as EVD.

As at the time of the review the risk of imported EVD infection was declining significantly, the reviewers were of the view that Portugal should shift into its planned evaluation phase, in order to consolidate the gains made in preparedness (staff skills, organisational preparedness, physical infrastructure) for highly infectious communicable diseases; extrapolate EVD learning to foreseeable present or emerging highly infectious disease of public health significance, and evaluate lessons learned from the Ebola crisis for future public health emergency preparedness.

From this strategic perspective, the reviewers suggested the following priority areas for consideration:

- Staff skills: maintenance of the skills, competencies and capacities developed by staff of all responder organisations for the management of highly infectious diseases;
- Designated hospitals: ensuring the staffing capacity and capabilities for effective and safe care of a single VHF patient, and business continuity plans for the affected specialist hospital services;
- Healthcare workers: ensuring the support and monitoring of healthcare workers engaged in the care of highly infectious patients, and those returning from work in the affected countries;
- Certain generic system issues: simplification of the PPE specifications (fewer layers) should be considered; PPE use should be adjusted to the contextual risk and take into account clinical efficiency and effective duration of use; classification of contacts by level of risk to facilitate efficient tracing and monitoring;
- Evaluation: planned evaluation should be implemented and strengthened, including use of critical incident reviews of probable cases; subjective feedback from system participants and retrieval and analysis of proxy information on system operation.

## List of areas potentially subject to review

Subject areas are listed in order of appearance in the report; for priority areas please refer to the summary section below.

### Protocols and guidance

- Guidance and protocols should continue to be regularly reviewed and reassessed in the light of experience with probable (or confirmed) cases, and international recommendations.

### Operational system evaluation:

- 'Probable cases' should be included in a table-top 'critical incident review' involving all parties involved in the identification and management of the patient.
- Available retrospective proxy information indicative of system operation should be identified and analysed.

### Monitoring and support of healthcare workers returning from service in affected countries in West Africa:

- Guidance should be developed for the monitoring and support of healthcare workers returning from clinical, laboratory or epidemiological support work in the affected countries.

### Primary healthcare

- Consider how to preserve the competence and skills gained by staff in procedures for safe management of highly infectious cases, at health centre level.
- Ensure that all health centres have designated temporary isolation areas for suspect VHF cases, and supporting protocols.

### Emergency departments

- Protocols for support and monitoring of healthcare staff exposed to VHF patients should be established, as part of the hospital policy.

### Points of entry

- Airports
  - The procedures developed could be trained in a simulation exercise including airport, airport health authority, DGS, INEM.
- Maritime ports
  - Assess awareness of procedures for managing highly infectious patients in 'un-designated' ports.
  - Consider exercising the retrieval of a probable case, and the scoping of decontamination needed on board a vessel.

### Public health

- Ensure that professionals continue to be informed about EVD and the nature and level of risk in Portugal.
- Consider how to maintain the skills, competencies and capacities developed by primary care centres in management of highly infectious diseases.
- Consider how to enhance public health staff skills in the assessment, clinical communication, and public health management of highly infectious diseases.
- Contacts should be classified by level of risk to facilitate efficient tracing and monitoring.
- Regional public health units could be made responsible for monitoring the health of healthcare workers returning from affected countries.

### Medical evacuation

- In the case of a medical evacuation, contact local domestic IHR focal point to assess the local situation and clarify the mode of transport of patient from the local Ebola Treatment Unit to the airport.
- Arrangements with other countries should be considered for repatriation of severely ill VHF patients.
- Capacities and capabilities should be maintained through regular training.

#### Designated hospitals

- Staffing and business continuity contingency plans should be in place to determine staffing needs for a single VHF patient and to anticipate the consequences for the designated hospital.
- Written agreements should be in place between designated hospitals for provision of specialist nursing and medical staff between them in the event of one receiving a confirmed case.
- PPE specifications adjusted for clinical risk and effectiveness in use: further expert review of the PPE needed, and discussions with concerned professional groups should be undertaken, with a view to possible agreement on somewhat simpler specifications which are adjusted to the risk while still ensuring maximum reasonable clinical efficiency and duration of use.
- Protocols should be developed for the monitoring of clinical and laboratory staff involved in the care of VHF patients and the clinical environment. These should use sufficiently sensitive definitions for the initiation of an investigation in the event of illness and define the roles of occupational health and other hospital services (e.g. psychological, counselling) in the monitoring and support of staff involved in VHF care.
- Particular attention should be given on how the limitations of the physical infrastructure affect the operation and effective design of VHF patient care units.



# 1 Introduction

## 1.1 Background

An epidemic of Ebola virus disease (EVD) has been ongoing in West Africa since December 2013, mainly affecting Guinea, Liberia and Sierra Leone. This is the largest ever documented epidemic of EVD, both in terms of numbers and geographical spread. On 8 August 2014, WHO declared the Ebola epidemic in West Africa a 'Public Health Emergency of International Concern.'

The European Union and European Economic Area (EU/EEA) Member States have been faced with major challenges to prepare and respond to the risk of importation of highly contagious viral haemorrhagic fever cases, such as Ebola infection.

Following invitation from Portuguese public health authorities, a team of five experts (three from ECDC and two from the EU Member States Germany and Spain) visited Lisbon during 30 March to 1 April 2015 to conduct a peer review with Portuguese colleagues of the country health emergency preparedness systems for imported cases of viral haemorrhagic fever (VHF), with particular reference to the Ebola crisis.

## 1.2 Nature and evolution of the communicable disease threat

The present epidemic is the largest ever documented epidemic of Ebola virus disease, both in terms of numbers and geographical spread; to date, more than 26 000 cases have been reported, with 11 000 deaths. More than 800 healthcare workers have been infected, with more than 500 deaths<sup>1</sup>.

Epidemic incidence is presently declining<sup>1</sup> in the three principally affected countries and declared under control in Liberia. The risk of importation of cases to EU Member States must also be considered to be reducing accordingly. However, this importation risk may be expected to decline more slowly, due to the substantial number of European healthcare and aid workers in the affected countries, and being progressively repatriated for some months to come. To date, 38 individuals have been subject to medical evacuation to European Member States (and a further 27 to the United States), including thirteen with confirmed Ebola virus infection; the last medical evacuation was on 18 March 2015.

The risk of importing unrecognised cases of EVD into EU countries in general, and into Portugal in particular, remains low or very low. Portugal has extensive historic links with several African countries, although less so for the countries currently principally affected; only about 100 Portuguese nationals (and less than ten healthcare workers) are thought to be currently resident in these three countries. Larger numbers of Portuguese nationals reside in Guinea-Bissau, which is contiguous to the most affected countries, but to date has no confirmed cases.

However, a single case would make substantial demands on the receiving specialist hospital (see below). Healthcare workers, particularly in the hospital unit caring for the patient, are at risk of infection if effective precautions are not taken and maintained; the risk is small, yet such infections have occurred in two countries (Spain, USA). Finally, secondary transmission to family and community contacts remains a significant risk, which cannot be excluded; the magnitude of this community risk relates to the ability of healthcare system and related services to recognise the case early and effectively manage all contacts.

## 1.3 VHF emergency response systems in Portugal

Emergency preparedness for cases of highly infectious diseases, such as viral haemorrhagic fevers, are under the responsibility of the Director General of Health (DGS), who is the competent National Health Authority. The DGS is directly accountable to the Minister of Health, and responsible for national health plans covering prevention and control of both non-communicable and communicable diseases.

Preparedness for management of cases of Ebola infection has proceeded via a clear organisational infrastructure dedicated to the early recognition and management of Ebola infection, under the leadership and direction of the DGS. Coordination of a response began in March 2014 with an initial Task Force in response to the outbreak in Guinea, and was reinforced in August following the WHO PHEIC announcement. In October 2014, the *Platform for response to Ebola virus disease* was published, and the interministerial Commission for the Coordination of Ebola Response established.

<sup>1</sup> European Centre for Disease Prevention and Control. Outbreak of Ebola virus disease in West Africa. 11th update – 11 May 2015. Stockholm: ECDC; 2015.

The Response Platform provides for preparedness planning through four parallel working groups of experts and system stakeholders:

- risk assessment
- prevention and control
- communication
- evaluation (internal and external).

Outputs of these groups have included ongoing risk assessments; guidelines including procedures, protocols and algorithms for all relevant partners; a communications plan, in particular to the public and health professionals; a training plan to ensure preparation of responder staff and organisations throughout the system; the design and implementation of simulation exercises to test the system, among others (see Box 1).

### Box 1: Ebola contingency plan, Portugal: planning axes, scope and working outputs

#### Risk assessment

- epidemic intelligence
- early warning and detection tools
- surveillance
- risk assessment
- reporting
- national and international collaboration
- international health regulation (IHR) area

#### Prevention and control

- elaboration of guidelines, procedures and communication flow
- evidence base/consensus based
- education and training
- simulation exercises

#### Communication

- key message: advise citizens to first contact PNHS Call Centre (hotline *Saúde24*) for orientation and guidance instead of heading directly to health services
- avoid or reduce public alarm
- systematise, manage and centralise the activities of communication and information

#### Evaluation

- internal evaluation
- external evaluation

*Source: DGS, Portugal*

Preparedness and response of the wider health system and related sectors is regulated and guided by a comprehensive set of guidance and protocol documents issued by the DGS, under the umbrella of an overall national contingency plan (see Annex 4).

## 2 The peer review process

### 2.1 Objectives

The principal objective of the visit was to support national public health leaders to review and identify strengths and desired improvements of the country health emergency system, in the context of preparedness for recognition and safe management of cases of Ebola infection.

The following outcomes were envisaged:

- Identification of practices and lessons learned, based on activities to strengthen preparedness for health threat of imported infections of highly contagious infectious diseases, such as viral haemorrhagic fevers
- Identification of system strengths, potential vulnerabilities and risks, and recommendations of areas for further possible review and action
- Sharing of experiences between EU Member States
- Identification of areas for potential further support from ECDC
- Input to the wider EU dialogue on lessons learned from Ebola outbreak in West Africa and actions to strengthen preparedness in Member States.

### 2.2 Methodology

#### 2.2.1 Review instruments

An ECDC expert group developed a classification framework of the system elements and organisational competencies that should be present throughout a country's response systems in order to ensure the prompt recognition and safe management of a person suffering from viral haemorrhagic fever. This framework was developed drawing on current international and national protocols for management of cases of infection with Ebola virus, viral haemorrhagic fever, and highly infectious diseases, and ECDC expert opinion.

For each of the system elements and organisational capabilities, international standards were identified, where existing, and where not extant, effective functional standards for organisational capabilities were identified by expert opinion. From this framework, a check list of questions and key enquiries were developed for use by the peer reviewers on location in the country.

Critical areas of potential pathways for a VHF case were the primary focus of the methodology and system review: points of entry; first responders and public health, emergency transportation, designated hospital treatment, medical evacuation from overseas. In addition the support infrastructure around these key pathways and responders were considered: system governance and organisation, surveillance system and laboratory services.

'*Primary responders*' were defined as organisations which may have first exposure to an unrecognised case of VHF. Critical capabilities for these organisations include ability to recognise the person as possibly suffering from VHF, to safely isolate and manage the patient, and to report immediately to public health authorities.

'*Secondary responders*' were considered organisations responsible for management of a person who has been identified as possibly infected with a VHF virus. Key organisational capabilities for these organisations include effective clinical care for the patient while ensuring safety of staff and environment.

In addition, the governing organisational infrastructure for the governance, coordination and support of this integrated system of responder organisations, was also reviewed.

The assessment framework (higher levels: system elements and organisational capabilities) was made available to all respondents prior to the visit, and the full instrument, to the Portuguese visit steering group.

#### 2.2.2 Country visit

Following invitation from the country, terms of reference were agreed (including generic principles of the review), a detailed visit itinerary, and a visiting peer review team (including experts from Member States). Country authorities provided copies of, and links to, relevant current documents relating to the Ebola preparedness system; the publications available through the Ministry's (DGS) dedicated website were reviewed.

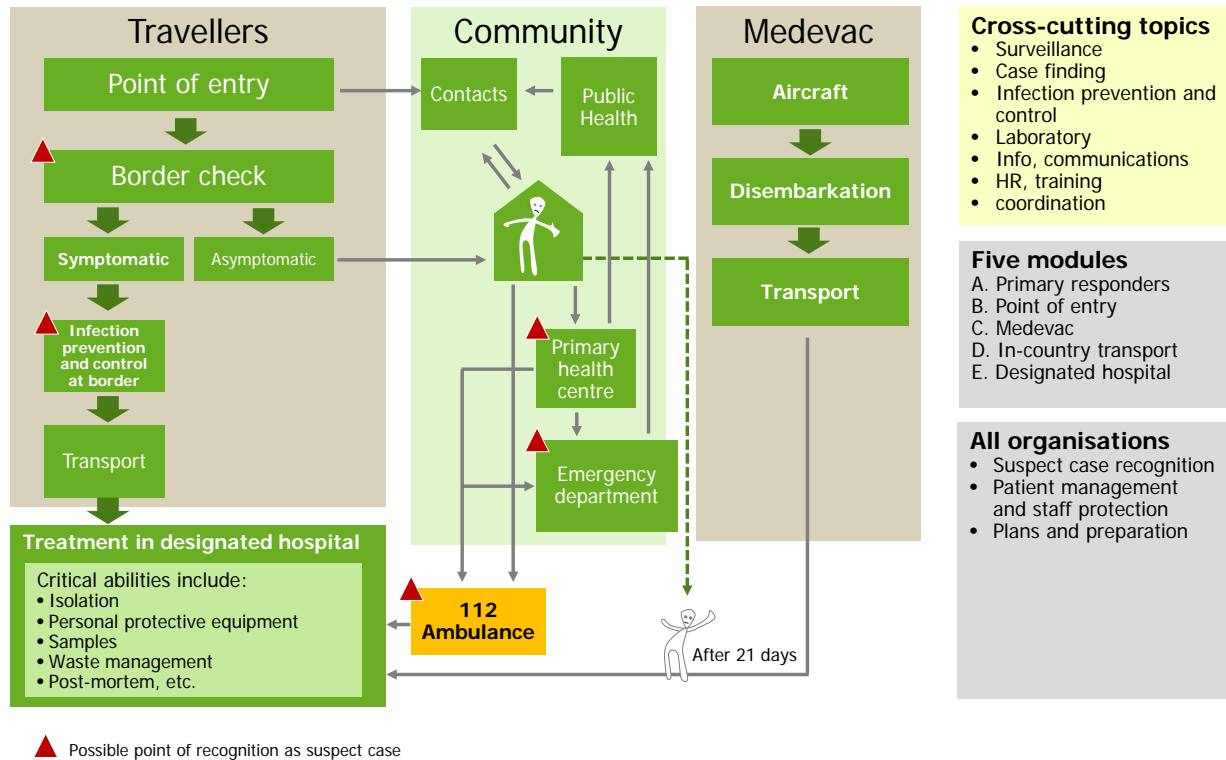
Critical points of emergency preparedness capacities and capabilities and lessons learned from Ebola as a health threat were explored through: semi-structured interviews and site visits based on the review instrument and plenary presentations from, and discussions with, principal system participants. For each of the responder organisations involved in direct management of suspected or confirmed VHF cases, the reviewers reviewed the apparent organisational capabilities, as primary or designated responders, and attempted to identify system strengths, potential vulnerabilities, and possible areas for review.

The work of other organisations involved in the system was discussed in plenary at the DGS offices. Experience from Spain and Germany in public health and clinical management of EVD cases was discussed in closed session.

### 2.2.3 Findings and reporting

Provisional findings of the peer review team were discussed and issues clarified with country system leaders in a debriefing session at the conclusion of the visit. The draft report was reviewed by country leaders twice during report development, to make corrections to matters of fact and to communicate possible variances of perceptions held regarding aspects of system effectiveness and relative importance as matters for possible future review.

**Figure 1. Conceptual scheme: potential pathways for the recognition and management of an imported VHF case**



### 2.3 Limitations

The peer review visit was of short duration, limiting the organisations and sites visited to one or two examples only of each of the key responder organisations in the system. Some sites could not be visited in the time available (e.g. airports and maritime ports). Given the short time for visit preparation, it was also not possible to gather systematic information on system capacities and capabilities by other means, e.g. a survey to country authorities.

## 3 Review findings

### 3.1 System governance

#### 3.1.1 Organisational infrastructure and coordination

The dedicated Ebola response organisation (under DGS leadership) appears well understood by organisations and professionals throughout the health system and in related sectors. The requirement to consult the DGS team on suspect cases appears widely understood.

The principal responder organisations have taken substantial measures to produce – within the context of national contingency plan and DGS guidance – their own preparedness plans to ensure the availability of facilities, staff, equipment and operational protocols, and to train and practice these plans. There has been substantial investment in training of staff, within the context of a national training plan, from emergency department receptionists to specialist infectious disease care nurses and physicians.

Public and professional communication measures have been substantial, with significant commitment to a strategy of direct public contact with the well-established national helpline, in preference to consulting primary medical practices or hospital emergency departments.

#### 3.1.2 Guidance for identifying persons requiring investigation

Clear guidance including algorithms are available nationally and appear to be well understood throughout the system. ‘Probable’ cases (widely referred to as ‘DGS cases’) are formally assessed, including through a short hospital admission. ‘Suspect’ and ‘probable’ case definitions are essentially the same, except that the latter have been verified by the DGS team.

The present probable case definition continues to rely in the presence of fever, although some international and national authorities have ceased to recommend this as necessary (in the light of experience to date in the Ebola crisis, see Box 2). The continued requirement for ‘fever’ in the case definition poses the risk of delayed recognition of VHF cases in their prodromal phase where fever may not (yet) be present.

#### Box 2: International recommendations for ‘persons under investigation’ for Ebola infection, as of 28 May 2015

##### ECDC

From early 2015, ECDC has defined a ‘person under investigation’ as: a person meeting the clinical and the epidemiological criteria; or with high-risk exposure and any of the listed symptoms, including fever of any grade.

##### CDC

In January 2015, CDC defined a ‘person under investigation’ (PUI) as follows:

A person who has both consistent signs or symptoms and risk factors as follows should be considered a PUI:

- Elevated body temperature or subjective fever or symptoms, including severe headache, fatigue, muscle pain, vomiting, diarrhea, abdominal pain, or unexplained hemorrhage; AND
- An epidemiologic risk factor within the 21 days before the onset of symptoms.

Source: <http://www.cdc.gov/vhf/ebola/exposure/risk-factors-when-evaluating-person-for-exposure.html>

##### WHO

By contrast, WHO recommendations – which also cover countries without Ebola cases – continue to define a ‘case under investigation’ as any person who has travelled to, or stayed in, a country that has reported at least one confirmed case of EVD, within a period of 21 days before the onset of symptoms, and who presents with:

- sudden onset of high fever and at least three of the following symptoms: headache, vomiting, diarrhoea, anorexia/loss of appetite, lethargy, stomach pain, aching muscles or joints, difficulty swallowing, breathing difficulties, hiccup; OR
- inexplicable bleeding/haemorrhaging; OR
- who died suddenly and inexplicably.

### 3.1.3 System operation to date

To date, nine probable cases have been recognised by the Ebola response system; all nine cases were managed in accordance with DGS guidelines. One of these probable cases was reported through the SINAVE<sup>2</sup> national electronic surveillance system, which has not yet been fully implemented.

Management of probable cases has included isolation and assessment of the patient in a designated tertiary hospital, with full infection control precautions pending confirmation that the patient is not infected with Ebola virus disease (two tests), resulting in an admission of usually of 2–3 days.

All probable cases were confirmed as negative for Ebola infection. The diagnostic outcomes are given in Table 1. The receiving designated hospitals have gained experience through these cases and have progressively reviewed and improved their procedures as a result (see Section 3.3.3).

**Table 1. Probable cases of Ebola infection assessed, Portugal, 2014 to the present**

Case no.	Month of report	Source of report <sup>1</sup>	Age group	Sex	Final diagnosis
1	March 2014	Hospital emergency department	35–44	Male	Negative, <i>Salmonella typhi</i>
2	August 2014	Hospital emergency department	25–34	Female	Negative, Pyelonephritis
3	September 2014	Hospital emergency department	45–54	Male	Negative, <i>Plasmodium falciparum</i>
4	October 2014	Hospital emergency department	15–24	Male	Negative, <i>Plasmodium falciparum</i>
5	October 2014	Hospital emergency department	35–44	Female	Negative, Pyelonephritis
6	October 2014	Hospital emergency department	15–24	Male	Negative, influenza-like illness
7	November 2014	Hospital emergency department	45–54	Male	Negative, <i>Plasmodium falciparum</i>
8	November 2014	National health line	65–74	Male	Negative, psychiatric disorders
9	February 2015	Hospital emergency department	25–34	Female	Negative, <i>Plasmodium falciparum</i>

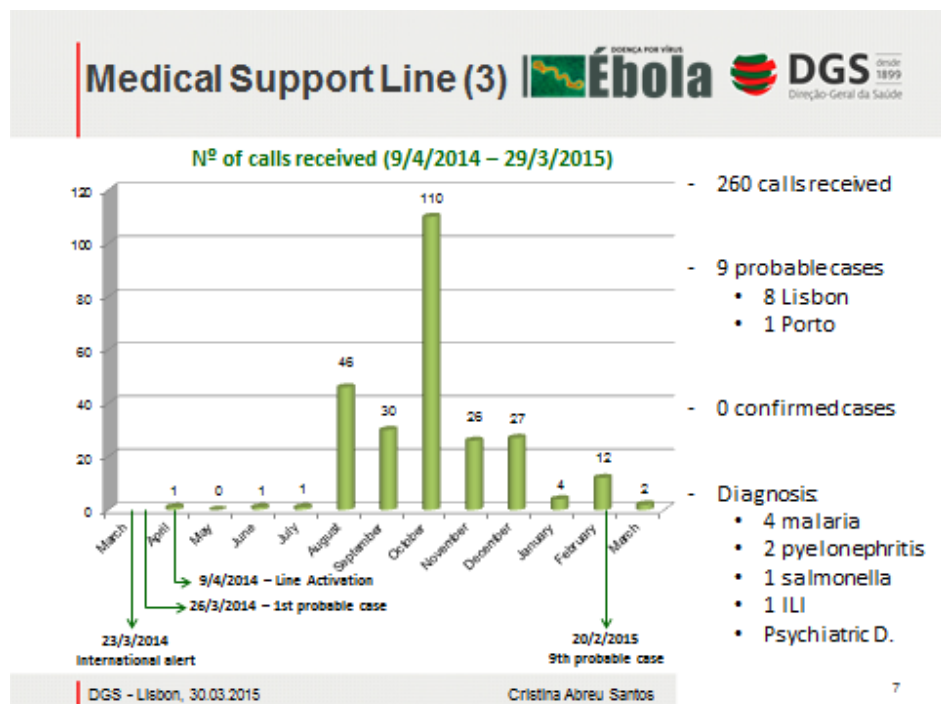
<sup>1</sup> System source first reporting the suspect case, e.g. primary care, hospital emergency department, ambulance, airport health, etc.

#### Medical support line enquiries

A number of calls to the DGS team through the support line for health professionals concerning suspect cases have resulted in the person being classified as not meeting the criteria for a probable case. For these people, diagnostic investigation and patient management followed normal clinical procedures. The number and source of these enquiries is recorded on a paper form. Only the diagnostic outcomes for probable patients were recorded. Overall, the dedicated Ebola medical support line has received 260 calls to date (March 2015) from health professionals, with a peak in October which was associated with the Madrid nurse assistant case.

<sup>2</sup> Sistema Nacional de Vigilância Epidemiológica

**Figure 2. Calls to medical support line, DGS, Portugal, April 2014 – March 2015**



**National health line – 808 24 24 24**

As of the date of writing, thirty-six calls have related specifically to concerns about possible Ebola infection. Of these, five were referred to the DGS team, and one was subsequently classified as a probable case. Several calls were related to requests for advice or reassurance about Ebola infection.

**Figure 3. Publicity event for use of national health line for Ebola enquiries; television presenter Catarina Furtado in front of an INEM ambulance; Lisbon, October 2014**



**Surveillance of travel-related cases**

A total of 196 confirmed cases of malaria were notified to the national surveillance system between January 2014 and 31 March 2015. Four of these cases were in persons travelling from one of the affected countries as defined in the EVD 'probable' case definition.

### 3.1.4 System evaluation

As noted above (Section 1.3), operational evaluation of the preparedness system is led by an independent team headed by an academic expert. System evaluation was established in October 2014.

The national preparedness plan foresees an internal and external evaluation; the present peer review is part of the external evaluation. The internal evaluation is still to take place under the specific axis of the national plan.

Evaluation to date has emphasised the implementation of a number of national, subnational and subsystem simulation exercises (see Annex 4). Further evaluation is planned to be conducted retrospectively, e.g. after six months of emergency response system operations.

#### *System strengths*

There are:

- strong, clear, and dedicated arrangements for Ebola response (governance and organisational aspects), with well recognised leadership under the DGS;
- a comprehensive set of national guidance protocols, issued by the DGS within the framework of a comprehensive and overarching national contingency plan;
- participation of professional experts and system organisational leaders in the development of national guidance;
- dedicated infrastructure for the reporting, assessment and management of suspected Ebola cases, well known and understood by all participants in public health and related sectors;
- clear coordination and collaboration with key organisations beyond the health sector;
- strong public and professional communication strategies;
- a comprehensive national training plan;
- strong commitment to Ebola preparedness of key responder organisations, which have produced their own plans for Ebola preparedness, staff training, and testing through simulation exercises;
- a suite of simulation exercises has been implemented at the national and subnational/subsystem level, with further exercises planned;
- a specific mechanism for system evaluation.

#### *Potential system vulnerabilities*

Guidance and protocol development

- Protocols and guidance need continued attention in the light of changing recommendations from international and leading national authorities, in the context of lessons drawn from events during the international crisis.

Identifying persons requiring investigation

- The present probable case definition continues to rely on the presence of fever, although some international and national authorities have ceased to recommend this as necessary (in the light of experience to date in the Ebola crisis, see Box 2). The continued requirement for 'fever' in the case definition poses the risk of delayed recognition of VHF cases in their prodromal phase, particularly in the most likely context of cases among healthcare workers.

Information for operational evaluation of the system: There is relatively little information available on how the 'system' is performing in practice that would support evaluation of effectiveness of directives and other measures put in place.

- Measures appear not to have been established *a priori* to ensure provision of information indicative of the operational functioning of the response system, e.g. key information on all 'suspect cases' addressed to the medical support line (regardless of classification outcome);
- The non-use to date of critical incident ('after event') reviews of the 'probable' cases, including all system participants involved in the case, is a missed opportunity to acquire operational feedback on system performance and to make improvements.

#### *Possible areas for review*

Protocols and guidance

- Guidance and protocols should continue to be regularly reviewed and reassessed in the light of experience with probable (or confirmed) cases and international recommendations.

Definition and management of persons requiring investigation



- The case definitions for identifying persons who require investigation for possible VHF infection could be reviewed, consistent with current recommendations of international and national agencies<sup>3</sup>. However, given the present declining likelihood of importation of an unrecognised EVD case, we do not recommend that this course of action should necessarily be pursued at this stage. However, we would recommend consideration of the following:
  - Protocols should be developed for the monitoring and support of healthcare workers, both those caring for a VHF patient in Portugal and those returning from patient care work in affected countries (see Sections 3.3.3, 3.4.2). Such protocol(s) should include a more sensitive definition of which healthcare workers require investigation for possible Ebola infection; a history of fever or the presence of elevated temperature may not be required<sup>4</sup>.

Involvement of public health services and interaction between clinicians and public health regarding recognition, assessment and public health management of highly infectious disease cases.

- Consideration should be given on how the skills of the public health unit staff in the assessment, clinical communication, and public health management of imported highly infectious diseases can be increased in the medium term.

Operational system evaluation

- Critical incident reviews of some of the 'probable cases' could be considered, e.g. table top 'incident review' exercises involving all parties involved in the identification and management of the patient; each would effectively be a simulation exercise.
- Available retrospective proxy information indicative of operation of the system should be identified and analysed.

## 3.2 Primary responder organisations

'Primary responders' are defined as organisations which may have first exposure to an unrecognised case of VHF. Critical capabilities for these organisations include the ability to recognise persons who possibly have a VHF in order to safely isolate and manage the patient, and to report immediately to public health authorities.

### 3.2.1 Primary healthcare

#### *System overview*

The review team visited ACES Amadora, a local aggregation of healthcare units, located in a densely populated area of Lisbon. This health centre/public health unit appeared to be well prepared for Ebola patients and offered the additional advantage of public health, primary care and community services in the same location, with all sectors collaborating closely. ACES Amadora had also participated in the national simulation exercise 'Meliandou' and was therefore much attuned to Ebola response preparations.

ACES Amadora has recently produced internal protocols in accordance with national guidelines to standardise the procedures of its 11 local health units. The local contingency plan and guidelines were updated after a national simulation exercise (October 2014). These procedures include algorithms with different courses of action, depending on who identifies a person who is possibly infected with EVD (security guard, reception, nurse or doctor). The local guidelines include different risk levels regarding the use of PPE.

The Centre displays posters regarding Ebola at the entrance to inform visitors and patients. An isolation room and a toilet (easy access) are available, complete with phone, appropriate hospital waste container, and PPE (including \ PPE set for the toilet). The 24/7 access numbers to report suspected cases to local and regional public health officers, as well as the number for urgent cases to inform DGS, are well known.

Several training activities organised at the regional level and aimed at primary care centres have been completed. Several non-health sectors were also included.

Staff reported that Ebola preparedness had reinforced communication between different levels in the health sector, which is beneficial for the response to future medical alerts. Lessons learned from the influenza pandemic have also been applied to current planning.

<sup>3</sup> At present, we believe that hospital management could reasonably apply the existing 'probable case' definition to staff engaged in EVD infection patient care; a definition lacking sensitivity could result in delayed recognition of EBV infection in a staff member.

<sup>4</sup> See CDC and ECDC recommendations (see Box 2).

### System strengths

- Contingency plans and protocols are available
- Staff training activities were conducted
- Simulation exercises were held
- There are close links to regional and local public health units.

### Possible system vulnerabilities

- None identified, although observations were limited to one centre, associated with a public health unit, which had participated in a national simulation exercise.

### Possible areas for review

- Ensure that primary care professionals continue to be kept up to date about EVD and the continued potential risk, particularly relating to returning healthcare and aid workers.
- Consider how to maintain the staff's competence and skills in the use of PPE and their knowledge of procedures on the safe management of highly infectious cases at the health centre level.
- Ensure that all health centres have designated temporary isolation areas for suspect VHF cases, complete with a set of supporting protocols.

## 3.2.2 Hospital emergency departments

### System overview

Emergency departments were visited at Hospital de S. José in central Lisbon and Hospital de D. Estefânia (reference hospital for children). The team was given a presentation about the VHF preparedness and capacity at São João Hospital, Porto. The following refers to the situation in Lisbon.

*Suspect case recognition:* There is signage in the reception areas of both emergency departments (ED). 'Fever' would prompt enquiry with regard to overseas travel and travel history to West Africa. There are well designed procedures for immediate isolation of the suspected case, at every level of suspicion from receptionist to triage nurse or emergency department doctor. There are designated facilities for isolation of suspected infectious patients. If Ebola infection is suspected, the patient remains isolated pending review by the on-duty infectious disease physician. A detailed suite of rooms for isolating and interviewing suspected highly infectious patients has been developed at Hospital de S. José, directly opposite the emergency department entrance.

*Reception of a known case:* In both EDs there is a clear pathway from a 'cleared' ambulance bay to the facility for specialist care, with reception by PPE-protected staff.

*Case reporting:* Both EDs have 24/7 access to infectious disease physicians to assess a suspect VHF patient. 24/7 phone numbers for DGS assessment are well known.

*Protocols, staffing, and training:* In both hospitals, protocols for reception and security staff, nurses and doctors have been developed and practiced on a number of occasions.

*PPE protocols, training, and procurement:* Both hospitals have conducted staff training on PPE use for those who would be involved in VHF care (see also Section 3.3.3). PPE supplies are appropriate and adequate, for (at least) initial care.

**Figure 4. Exercise drill, emergency department, Hospital de S. José, Lisbon**

*Note security tape clearance of area around suspect case seated at emergency department reception. Normal patients may continue to be received at reception window, far right. Source: Hospital de S. Jose, Lisbon*

### System strengths

There are:

- well developed and rehearsed plans for every contingency of patient presentation;
- clear contingency plans to continue essential emergency department services;
- dedicated isolation facilities;
- trained and prepared staff, from reception and security staff to nurses (triage) and medics;
- immediate activation of all essential response staff, including senior hospital administration;
- response plans to minimise, close off, and disinfect areas of EVD patient transit;
- plans for disinfection and restoration of affected areas.

### Potential system vulnerabilities

- There are no established protocols for occupational health support and monitoring of healthcare staff exposed to VHF patients (see Section 3.3.3).

### Possible areas for review

- Protocols for supporting and monitoring healthcare staff exposed to VHF patients should be established as part of the hospital policy (see Section 3.3.3).

## 3.2.3 Ambulance (unspecified call out)

### System overview

INEM (National Organisation of Medical Emergencies) has protocols for ambulance staff who suspect a case of EVD infection while on emergency call-out. This protocol has been invoked once; the case was classified as 'not probable' by the DGS team.

If a staff member comes inadvertently into contact with a confirmed EVD case, the procedures for monitoring of healthcare workers would be followed (Section 3.5.3).

### Possible areas for review

None.

## 3.2.4 Points of entry: airports

### System overview

Portugal has not implemented entry screening for travellers at airports. However, incoming travellers are informed through an in-flight video to call the health hotline (Saúde 24) if they suffer from symptoms compatible with Ebola and have visited one of the three affected countries during the last 21 days, instead of seeking medical help directly. There are no direct flights from affected countries.

In August 2014, DGS developed a guidance document for airport ground staff and airline crews which contains case definitions and recommended measures. In the case of a possible suspected case of Ebola infection in a passenger on an aircraft approaching a Portuguese airport, the crew is required to inform the pilot, who then informs air traffic control and gives an 'aircraft declaration of health'.

The airport health authority is then informed by the airport authority. The health authority establishes communication with the pilot via the control tower to verify the case details (including exposure and symptoms in accordance with the case definition). If the suspicion of EVD cannot be ruled out in the course of this communication, DGS is informed through the medical support line and coordinates all further assessment and response measures.

Passengers in direct proximity of the suspect case are asked to move to other seats if possible, and all of them fill in passenger locator cards to facilitate contact tracing if the case should be confirmed. One crew member will be designated to take care of the patient, wearing light PPE.

The aircraft is directed to a designated airport (determined on a case-by-case basis) and to a designated gate. The designated ambulance service collects the patient directly from the aircraft and transports him/her to the nearest designated hospital. The decontamination team will clean the airplane. (Detailed protocols are subject to ongoing discussions with international aviation agencies.) Airport health authority staff does not enter the aircraft to evaluate the patient because they have not been trained in the use of PPE.

The above procedures have not been practiced in a simulation exercise (in contrast to medevac procedures, section 3.5.1). None of the probable cases identified so far were identified during a flight or on arrival at the terminal.

### *System strengths*

- detailed guidance has been issued and updated;
- guidance is consistent with ECDC's RAGIDA guidelines;
- procedures and responsibilities are clearly defined;
- Portugal has not implemented measures for entry screening that correspond to scientific evidence;
- the airport health authority has strong links with DGS and the immigration authorities

### *Potential system vulnerabilities*

- The communication flow via telephone involves several actors, which takes more time during a real event/emergency and can cause delays.
- The system has not been tested in a simulation exercise.

### *Possible areas for review*

- The recommended procedures could be practiced in a simulation exercise involving airport staff, airport health authority staff, DGS staff, and ambulance services.

## **3.2.5 Points of entry: maritime ports**

### *System overview*

Portugal has several large maritime ports, with a large volume of shipping. DGS has designated ports which might receive suspected Ebola cases.

Maritime health authorities have prepared for the possible event of a suspected Ebola case on board a ship. The communication flow and actions would be as follows:

The crew informs the master of the ship of a possible case of Ebola on board, upon which preliminary measures will be implemented immediately (coordinator appointed, case isolated, separate room and toilet assigned to suspected case, contacts reduced, all contacts of suspected case remain on board, etc.); in addition, the shipping company will be informed. The shipping company will inform the port health authority who will perform a first assessment of the situation and inform DGS via telephone (medical support line). The port health authorities only allow 'free passage' after further assessment of the event. If the suspicion cannot be ruled out immediately, the port health authority may or may not enter the vessel to further evaluate the case directly on board. The final decision, whether a suspected case is a probable case, is made by DGS.

The case definitions used are provided by DGS and in concordance with other national guidance documents. A probable case is transferred by designated ambulance (INEM) to the nearest designated hospital for clinical assessment. Contacts fill-in passenger locator cards, remain on board, and the ship will not leave the port until the case is confirmed or cleared, and the port health authority has given the permission to release the vessel.

Port health authorities perform contact tracing. The decontamination team of the military performs the decontamination. The communication flow is illustrated by flowcharts and assisted by an electronic tool accessible online: <http://www.portodesines.pt/pls/portal/go>.

These procedures have been practiced in one of the major harbours for cargo ships, with a full-scale simulation field exercise: 'Exercise Niger' in February 2015.

### *System strengths*

- The communication flow is clear and relevant actors are included.
- Good links between the port authorities, port health authorities and DGS.
- 'Health' is included in contingency planning for ports.
- An online portal allows port health authorities to clear ships for entering or leaving the port.
- Procedures were tested in a simulation exercise.

### *Potential system vulnerabilities*

- Suspect Ebola cases might occur in ports other than those 'designated' by port authorities.
- There may be logistic difficulties for ambulance teams retrieving the case from the vessel.
- Decontamination procedures for a ship could be extensive.

### *Possible areas for review*

- Assess awareness of procedures for managing highly infectious patients in 'un-designated' ports.
- Consider practicing the retrieval of a probable case and the scope of decontamination needed on board a vessel if a case is confirmed.

## 3.2.6 Public health

The Regional Public Health Unit (Lisbon) participated in the meeting at ACES Amadora. There are seven health regions in Portugal (five on the mainland and one each in Madeira and the Azores) and fifteen public health units in the Lisbon region.

Under national guidelines, the regional level in Lisbon has been involved in producing and updating internal protocols to standardise procedures for the 15 health units and in coordinating training activities for health centre staff.

After the validation of a suspected case, DGS contacts the regional health authorities to inform them of a case under investigation. Upon laboratory confirmation, tracing and follow-up of the contacts of the patient is initiated at the regional level. No distinction between high- and low-risk contacts is made. The validation process and decision-making related to the initial assessment of the case and its management does not involve public health units at the local or regional level. Further assessment and follow-up of contacts is conducted by the regional and local level.

The *National platform for EVD response* includes a support axis of public health authorities; some local and regional public health experts are part of the consultation process during protocol development. Medical and nursing associations are involved in the development of national guidelines.

### *System strengths*

- Regional public health units work with local primary care services to ensure development of consistent and appropriate protocols (see Section 3.4.1).
- Public health units work with clinicians to follow up the contacts of the case.

### *Potential system vulnerabilities*

- None identified

### *Possible areas for review*

- Ensure that professionals are continually informed about EVD and the nature and level of risk in Portugal.
- Consider how to maintain the skills, competencies and capacities developed by primary care centres in the management of highly infectious diseases.
- Options should be considered for measures which enhance public health staff skills in the assessment, clinical communication, and public health management of highly infectious diseases.
- A distinction should be made between high- and low-risk contacts in order to establish more efficient procedures for follow-up. Regional public health units could be put in charge of monitoring the health of healthcare workers returning from affected countries (Section 3.6.2).

## 3.3 Designated receiving organisations

### 3.3.1 Medical evacuation (medevac)

#### *System description*

Like most EU Member States, Portugal did not have developed capacities to evacuate or repatriate highly infectious patients prior to 2014. The Ministry of Foreign Affairs, however, has substantial experience in the repatriation of Portuguese nationals because of war situations, natural disasters or medical emergencies.

Such evacuations are performed almost on a monthly basis and rely mainly on the local or regional Portuguese diplomatic missions or consulates (over 150 missions worldwide, over 100 consuls; 13 in Africa). These undertake

local assessment of the situation, options and costs, and advise the Ministry of Foreign Affairs. Evacuations are performed either by private security companies or the Portuguese military. The final decision to evacuate is taken through a coordination mechanism, ultimately by the Prime minister, and Minister of Foreign Affairs or his state secretary.

In the light of the Ebola crisis in West Africa, the Portuguese government commenced in August 2014 to establish national capacities to evacuate infected nationals from affected countries, through the Portuguese military. There is a specific protocol for such evacuations, between the Ministry of Foreigners affairs, Directorate General of Health and the Portuguese Air Force.

These capacities are now in place for (a) members of the Portuguese armed forces, (b) Portuguese civilians and, potentially, (c) nationals of other European countries. About 100 Portuguese nationals are currently known to be resident in the three main affected countries (Guinea, Sierra Leona and Liberia), according to a self-registered online database run by the Ministry. The number of Portuguese healthcare workers is thought to be in single figures.

Medical evacuation capacities and procedures have been established by the Director of the PRTAF Aerospace Medical Centre, the teams coordinator at PRTAF AIREVAC (Ministry of Defence), in close cooperation with the National Institute for Medical Emergencies, which would deploy the medical crew. Aircraft available are a Lockheed Hercules C130 (long haul) and an EADS Casa C295 (short haul). Standard operating procedures have been established, and the technical and medical crews have practiced all procedures. Additionally, a simulation exercise was performed in autumn 2014. Aircraft are equipped with an Ebola bio-bag medical isolation unit; it is not permitted to open the bio-bag during travel, even if the patient deteriorates. The team has not been deployed to date.

### *System strengths*

There is/are:

- substantial evacuation experience in the Ministry of Foreign Affairs, based on experiences of other events;
- established medevac capacities;
- close cooperation with the National Institute for Medical Emergencies ensuring joint development of integrated procedures and transport to the designated hospital;
- established protocols;
- trained staff who have participated in simulation exercises.

### *Potential system vulnerabilities*

- the local diplomatic mission might not have all the relevant information needed to fully assess the situation (including local treatment capacities and lists of contacts, etc.);
- transport within West Africa from the Ebola treatment unit to the aircraft could present logistic problems (as demonstrated by Spanish case);
- equipment is not adequate to transport severely ill patients;
- the C295 aircraft is short haul only;
- if not deployed, the new capabilities might not be maintained into the future.

### *Possible areas for review*

- In the case of a medical evacuation, the local IHR focal point should be contacted to assess the local situation and clarify the mode of transport of patient from ETU to the airport.
- Arrangements should be considered with other countries for repatriation of severely ill VHF patients.
- Consider how present capacities and capabilities can be maintained into the future; regular training exercises could be continued in the wider context of potential imported highly infectious diseases.

## **3.3.2 In-country transport: medical emergency services**

### *System description*

The National Organisation of Medical Emergencies (INEM) is responsible for the transfer of suspected cases to the designated hospital. At the call centre there are adequate qualified staff and protocols, supported by in centre medical staff, to handle calls about suspect Ebola cases.

There are three dedicated ambulance teams covering all regions of the country and two decontamination units in proximity to the designated hospitals. The teams are staffed by paramedics (with or without a nurse) and a logistic support team.

The teams have participated in training and simulation exercises, including use of PPE and decontamination of ambulances. Protocols covering operations, use of personal protective equipment and decontamination are in place.

The protocols have been updated based on the conclusions of the national simulation exercise. PPE for the driver has been reduced to maintain clear visibility, and support needed to the primary crew is provided through a third crew member with full PPE in the support vehicle.

**Figure 5. Simulation exercise *Meliandou*, October 2014: supervised donning of personal protective equipment, ambulance crew (INEM), Lisbon**



Photo: G. Fraser

### *System strengths*

There are:

- dedicated ambulances and equipment;
- committed, well-trained staff;
- well-planned geographic coverage;
- logistic support teams;
- procedures and training curricula that have been tested in simulation exercises.

### *Possible system vulnerabilities*

- None identified

### *Possible areas for review*

- None identified

## 3.3.3 Designated hospitals

### *System overview*

General: Three hospitals have been identified for reception and investigation of patients suspected of VHF infection; one general hospital in Lisbon, one in Porto, and one paediatric hospital in Lisbon. No other hospitals or healthcare facilities are expected to provide even short-term inpatient care, or investigation, of patients suspected of possible VHF infection.

### *Organisation and administration*

There is comprehensive guidance by DGS on all components of patient management at the designated units.

**Infrastructure at designated unit: Curry Cabral Hospital, Lisbon**

Care of VHF patients would be provided in the infectious disease unit of the hospital. The unit is located at the ground floor of a separate building of this general hospital and includes 36 beds for patient care for infectious diseases. Two isolation rooms, with anterooms, are dedicated to VHF patients. The rooms are located at one end of the unit, close to a second entrance, but there is no other physical barrier to the rest of the unit. However, it is planned that the whole ward would be isolated in the case of hospitalisation of confirmed cases and thus become strictly dedicated to Ebola care. Due to structural limitations, there is no separate exit from each room, meaning that healthcare workers need to exit through the anteroom. It is possible to provide mechanical ventilation and haemodialysis in the room as well as other intensive care services. Rooms have video surveillance and an intercom connection with the ward station. Plans and protocols have been practiced, and a sufficient number of staff was trained.

**Infrastructure at designated unit: São João Hospital, Porto**

The unit is located in the teaching hospital of Porto. There are two isolation rooms dedicated to the care of potential VHF patients. There is an on-site ICU dedicated to patients with infectious diseases. Staff is experienced in providing critical care to patients with infectious diseases. Plans and protocols have been practiced, and a sufficient number of staff was trained.

**Infrastructure at designated unit: Hospital de D. Estefânia (reference hospital for children), Lisbon**

There is a dedicated room available in the infectious diseases ward, with separate entrance and exit for clinical staff, and adequate facilities for supervised donning and doffing of PPE. Plans and protocols have been practiced, and a sufficient number of staff was trained. The unit is located at the ground floor of a general hospital and includes 15 beds. The dedicated rooms can be used as negative pressure isolation rooms and have spacious anterooms and bathrooms. There is a total of nine beds. It is possible to provide mechanical ventilation and haemodialysis in the room. It is assumed that a VHF child patient would be identified or suspected before admission; the infectious disease ward would thus become a 'VHF care unit' and other patients would be transferred to other areas of the hospital.

**Operational protocols**

In all designated hospitals there are protocols available to all staff on the hospital intranet which describe the operation of the designated units.

**Staff**

No hospital has a clearly defined plan of staffing needs with regard to care of a potential VHF patient. Transferring medical and nursing staff from Porto to Lisbon and vice versa – in the event of an EVD case admission in a designated hospital – is one of the options currently under discussion. At a meeting in March 2015 at Carlos III Hospital in Madrid, hospital staff exchanged experiences with colleagues who had been managing cases of Ebola and discussed potential capacity shortages. All designated hospitals have a business continuity plan for maintaining essential infectious disease/ICU services, but the review team did not have the opportunity to read them. There are established internal procedures with other services and protocols in order to transfer infectious Ebola patients to other hospitals in Lisbon. All unit staff are expected to participate in VHF care; there are no internal selection or opt in/out processes. Talks with the association of nurses and a television debate have been helpful in motivating staff and making them aware of the problem. There are no specific plans for any of the designated hospitals with regard how healthcare workers who care for VHF patients should be monitored and supported by occupational and other health services.

**PPE protocols, training and procurement**

São João Hospital has a copy of the national PPE protocol issued by DGS, complete with a (locally adapted) video tutorial. The minimal requirements for PPE, as published in national guidelines, were developed by expert professional consensus and in accordance with infection control procedures already in place. PPE guidelines are constantly updated. A concern with the recommended PPE has been the issue of comfort and clinical efficiency. Staff report uncomfortable heat and fogging of the goggles, which may affect the episode duration and effectiveness of clinical care performance of the HCW. All designated hospitals have conducted PPE training for staff that may be involved in VHF care. Certification and refresher courses are important aspects of such training, given the limited experience with treatment of VHF cases in European hospitals. Clear visual step-by-step instructions for doffing and donning of PPE are available in the anteroom and isolation room. All designated hospitals have procured their PPE requirements independently based on the DGS national specifications and recommendations; the PPE is reportedly similar in all hospitals.

**Laboratory testing**

The BSL-3 lab at Curry Cabral Hospital is directly opposite of the designated isolation unit and has capacity for diagnostic PCR testing, although confirmatory diagnostic testing is performed at the national reference laboratory. There is also capacity for simple biochemistry and malaria rapid antigen testing at the point of care. There is no BSL-3 laboratory on-site at the São João Hospital in Porto. Samples that may be inactivated can be tested at a hospital laboratory, which has been specifically established and equipped for analyses with point-of-care instruments.



### Waste management, cleaning and decontamination

Routine decontamination is run by each designated hospital and performed by a sub-contractor. Final decontamination (after discharge of patient) is performed by the Biological, Chemical and Radiological Defence Team of the Army, under a protocol between the Ministry of Defence and Ministry of Health. All designated hospitals have agreements with waste disposal companies for the removal of waste produced during the care of VHF patients, with specific protocols for removal. No on-site autoclaves are used for inactivation of solid infectious waste. There is capacity to disinfect and solidify liquid waste before removal as solid waste, as specified in the DGS national guidance. Liquid waste from toilets and showers is disposed in the sanitary sewer and treated on-site before disposal in the municipal sewage network.

### Post mortem

Post mortem, the body is removed and the suite is disinfected and cleaned by the Unit for Intervention and Rescue of the National Guard, under a specific protocol between the Ministry of Health and Ministry of Internal Administration, who receives specific training in these tasks.

**Figure 6. Simulation exercise, Hospital Curry Cabral, Lisbon, November 2014**



*Photo: G. Fraser*

**Figure 7. Simulation exercise, supervised doffing of PPE, second stage, Hospital Curry Cabral, Lisbon, November 2014**



*Photo: G. Fraser*

**Figure 8. Simulation exercise: decontamination of clinical area post discharge, Portuguese army**

Source: Portuguese Army

### System strengths

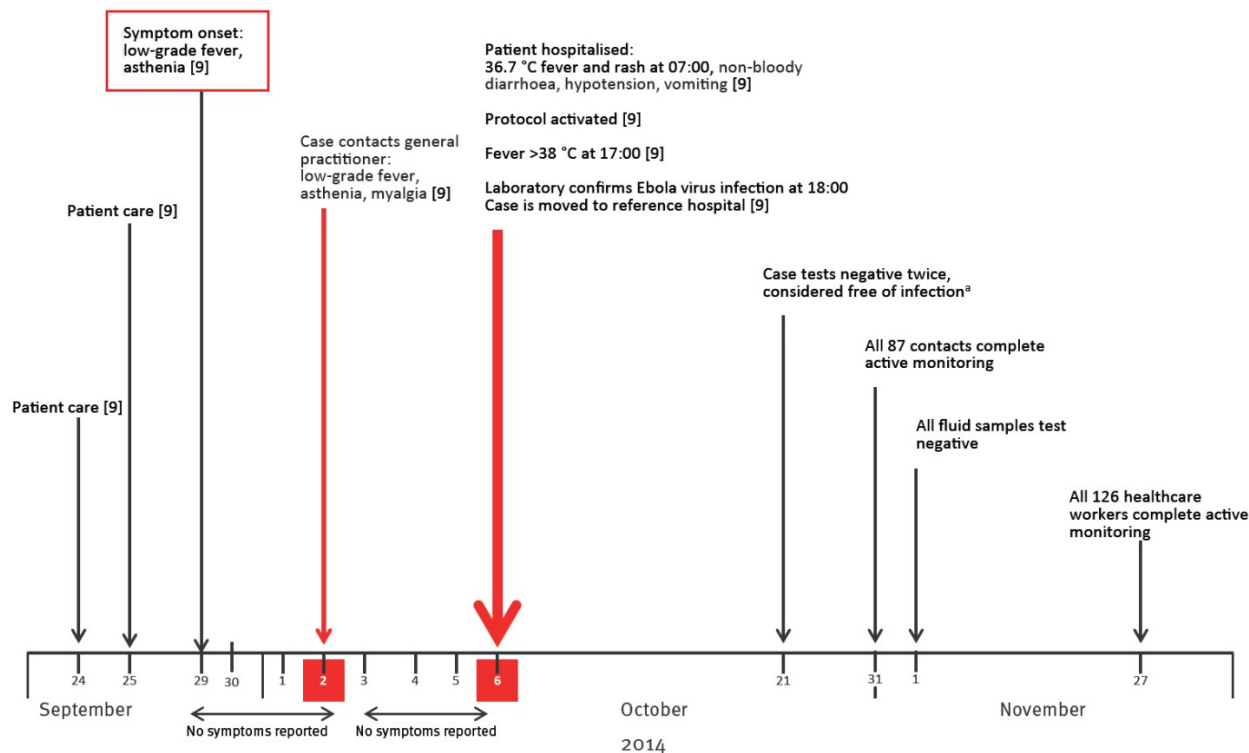
There is/are:

- a clear chain of command, alert and communication;
- availability of isolation rooms with spacious anteroom and bathroom
- capacity for provision of intensive care;
- extensive experience in specialist infectious diseases care;
- video surveillance of isolation rooms (Curry Cabral);
- sufficient availability of PPE;
- staff awareness and commitment;
- adequate staff training and practice (with certification and refresher courses in Porto);
- participation in wider (national) simulation exercises;
- availability of BSL-3 laboratory on-site (Curry Cabral);
- availability of point-of-care diagnostics;
- well-defined waste disposal procedures and contracts.

### Possible system vulnerabilities

- There is no clear plan to ensure sufficient staffing (specialist nurses and doctors) for a confirmed case, e.g. 12–15 trained specialist nurses available on roster for up to four weeks<sup>5</sup>.
- There appear to be no documented plans for business continuity of other essential ID/ICU hospital services which take into account the need to designate staff for EVD patient care.
- There can be significant limitations imposed by the physical infrastructure on the design and operation of the VHF patient care suites.
- Monitoring and support for healthcare workers: there are no specific plans for any of the designated hospitals with regard how healthcare workers caring for a VHF patient should be monitored and supported (occupational health and other advice/services) in order to avoid the problems observed in Madrid and Scotland.
- Reliance on current 'probable' case definitions (fever plus other symptoms) could result in delays in the recognition of secondary cases in clinical staff.

<sup>5</sup> See, e.g., CDC recommendations for Ebola treatment centres

**Figure 9. Secondary Ebola case, timeline, Madrid, September–November 2014**

<sup>a</sup> Culture results for all body fluids taken on 21 October were negative

Source: Lópaz MA, Amela C, Ordobas M, Domínguez-Berjón MF, Álvarez C, Martínez M, et al. First secondary case of Ebola outside Africa: epidemiological characteristics and contact monitoring, Spain, September to November 2014. *Euro Surveill.* 2015;20(1):pii=21003.

### Possible areas for review

- Staffing and business continuity contingency plans should be in place and disseminated so that staffing needs for a single VHF patient can be anticipated by the designated hospital.
- Specific agreements, with regulatory underpinning if needed, should be made between designated hospitals for mutual provision of specialist nursing, additional medical staff, and resources in the event of one receiving a confirmed case.
- PPE protocol: simplification of the PPE specifications (fewer layers) should be considered; PPE use should be adjusted to the contextual risk and take into account clinical efficiency and effective duration of use; protocols should be developed for the monitoring of clinical and laboratory staff involved in the care of VHF patients and their environment. Protocols should use sensitive, appropriate definitions for the initiation of investigations in the event of illness and define the roles of occupational health and other hospital services (e.g. psychological and counselling services) in the monitoring of staff involved in VHF care.
- Particular attention should be given on how the limitations of the physical infrastructure affect the effective design and operation of the VHF patient care units.

## 3.4 Whole system issues

In addition to organisation-specific capacity issues, there are a number of key strategic issues that apply to the VHF preparedness system as a whole. These are outlined below.

### 3.4.1 PPE specifications adjusted for clinical risk and effectiveness in use

The currently prescribed PPE, as stipulated by DGS national guidance, could be seen as redundant (e.g. triple gloves, gown over coverall) for the expected use; it may also impede clinical efficiency and the duration of protected clinical patient care. Excessive PPE layers may make clinical procedures more difficult and decrease comfort and effective time they can be used; they may also increase the risk of accidents during doffing.

#### *Recommendation*

- Further expert review of the type of PPE needed; discussions with professional groups should be undertaken, with a view to possible agreement on slightly simplified specifications.

### 3.4.2 Monitoring and support of healthcare workers returning from service in affected countries in West Africa

#### *Recommendation*

Guidance should be developed for the monitoring of healthcare workers returning from clinical, laboratory or epidemiological support work in the affected countries. Guidelines should be developed in association with sending and employer organisations and define the roles and responsibilities of the sending organisations, present employers and public health services in monitoring and support of returning staff. Guidance should recommend the use of sufficiently sensitive definitions, not requiring main symptom as fever or elevated temperature, for the initiation of an investigation in the event of illness.

### 3.4.3 Contact classification

Current guidance does not distinguish low- and high-risk contacts, potentially resulting in inefficient and resource-intensive procedures for tracing and monitoring of contacts.

#### *Recommendation*

- Contacts should be classified by level of risk to facilitate efficient tracing and follow-up.

## 4 Summary and conclusions

In response to the present international crisis, Portugal has implemented comprehensive emergency preparedness measures against the risk of imported cases of Ebola. In the preceding sections we have briefly outlined our peer review of the various primary and secondary responder organisations that constitute the VHF (Ebola) emergency system in Portugal, including our perceptions of system functioning, strengths, potential vulnerabilities, and for each we have suggested (where identified) areas for potential review by country authorities.

Given that the risk of importation of either a known or unknown case of Ebola infection is presently declining, it is our view that the further system review could usefully emphasise the following overlapping considerations:

### Legacy: consolidating gains in preparedness for highly infectious communicable diseases

It is apparent that key responder organisations within and beyond the health service have gained much from their programmes for Ebola preparedness, within the framework of the national contingency plan and guidance; there have been real advances in staff skills and knowledge, organisational policies and protocols, and (in some cases) facilities and physical infrastructure available for the management of highly infectious diseases such as Ebola infection.

There is now a strategic challenge regarding how, and to what extent, those skills, organisational preparations and physical facilities and infrastructure can be maintained and further improved into the future to ensure preparedness for the 'next communicable disease challenge', whether that be as part of an international epidemic or the sporadic occurrence (e.g. travel related) of a highly infectious disease in a Portuguese national.

### Extrapolation of EVD learning to all potential causes of highly infectious disease of public health significance

Portugal has achieved effective preparedness for Ebola infection through a well-organised and well-communicated infrastructure. As the probability of Ebola cases in Portugal is presently receding, with the progressive control of the source epidemic, we consider there is value in reviewing the lessons from the Ebola crisis, including the proposals of the present report, in the context of their generalisability to preparedness for all causes of highly infectious diseases of public health importance. This should include not only potentially imported cases of viral haemorrhagic fever, but also other infectious diseases that are present, foreseeable, or emerging.

### Evaluation: drawing lessons for future preparedness

Portugal is now entering the final evaluation phase of its Ebola preparations. As discussed above, we suggest that this should include a focus on the entire preparedness system, in addition to review of how individual responders were able to implement their respective actions. Even if some pertinent information on system operation is not available, this could still be achieved by a mix of proxy information, feedback from participants, and incident reviews of probable cases, in addition to a review of lessons about whole system performance learned from the simulation exercises.

### Suggested priority areas

The areas of potential review in this report are listed for convenience after the executive summary (p. 2). With the above principles in mind, we suggest the following as priority areas for consideration:

- Staff skills
  - Consider how to maintain the skills, competencies and capacities developed by the staff of all responder organisations in the management of highly infectious diseases.
- Designated hospitals
  - Staffing and business continuity contingency plans should be in place to determine staffing needs for a single VHF patient and to anticipate the consequences for the designated hospital.
  - Particular attention should be given on how the limitations of the physical infrastructure affect the design and operation of VHF patient care suites, e.g. waste management.
  - Protocols should be developed for the monitoring of clinical and laboratory staff involved in the care of VHF patients and the clinical environment. These should use sufficiently sensitive definitions for the initiation of an investigation in the event of illness, and define the roles of occupational health and other hospital services (e.g. psychological, counselling) in the monitoring and support of staff involved in VHF care.

- Returning healthcare workers
  - Guidance should be developed for the support and monitoring of healthcare workers returning from clinical, laboratory or epidemiological support work in the affected countries.
- Generic system issues
  - PPE protocols: simplification of the PPE specifications (fewer layers) should be considered; PPE use should be adjusted to the contextual risk and take into account clinical efficiency and effective duration of use.
  - Contacts should be classified by level of risk to facilitate efficient tracing and monitoring.
- Evaluation
  - 'Probable cases' should be subject to a table-top 'incident review', including all parties involved in the identification and management of the patient.

## Annex 1. International and national teams, and national respondents

### *ECDC peer review team*

Name	Organisation
Graham Fraser	Team leader of the visit to Portugal ECDC senior expert, country preparedness support
Svetla Tsolova	ECDC senior expert, country preparedness support
Diamantis Plachouras	ECDC expert, antimicrobial resistance and healthcare-associated infections
Maria José Sierra	Invited Member State expert, Coordinating Centre for Health Alerts and Emergencies, Spain
Ute Rexroth	Invited Member State expert, Robert Koch Institute, Department for Infectious Disease Epidemiology, Unit for surveillance, Germany

### *Portugal: Visit planning team*

Name	Organisation
Francisco George	Director General of Health, DGS, Visit Coordinator
Catarina Sena	Deputy Director-General of Health, DGS
Paula Vasconcelos	Head of the Office of Preparedness and Public Health Support, DGS, Visit Coordinator
Andreia Jorge Silva	Head of the Department for Disease Prevention and Health promotion, DGS
Carlota Vieira	Head of the Office of Strategic Planning and Evaluation
Cristina Abreu Santos	Team Coordinator for the Support Unit of the National Public Health Officer and Public Health Emergencies Management, DGS
Natália Pereira	Senior Officer at the Directorate of Disease Prevention and Health Promotion, DGS

### *National respondents, Portugal*

Alves, Carlos	Medical doctor, infectologist, Department of Infectious Diseases, Head of Ebola Team, Hospital S. João, Porto
Andrade, Paulo	Department of Infectious Diseases, Head of Ebola Team, Hospital S. João, Porto
Antunes, Wilson	Researcher at the Biological Defence Laboratory, Portuguese Army, Ministry of Defence
Araújo, Joana Espirito Santo	Expert at the Division for Administration and Consular Protection, Ministry of Foreigner Affairs
Botas, Conceição	Responsible for the Emergency and Intensive care department, Hospital de S. José, Centro Hospitalar de Lisboa Central
Cachado, Andreia	Nurse at the medical post, Lisbon Airport
Calé, Etelvina	Amadora Health Center, Public Health Authority
Campos, Paulo	President of the National Institute of Medical Emergency
Candeias, Flora	Medical doctor, Department of Infectious diseases, Hospital de D. Estefânia, Centro Hospitalar de Lisboa Central
Carlos, António	Amadora Health Centre, Coordinator of Public Health Unit

Cordeiro, Eugénio	Coordinator of Epidemiology, Regional Department of Public Health, Center Region
Cordeiro, Rita	Member of the Unit for Emergencies and Biosafety/Biosecurity, National Institute of Health Doctor Ricardo Jorge (INSA)
George, Francisco	Director General of Health, DGS
Gomes da Silva, Eduardo	Clinical Director of Centro Hospitalar de Lisboa Central
Gomes, Inês	Researcher, Biological Defence Laboratory, Portuguese Army, Ministry of Defence
Gomes, Sérgio	Team Coordinator at the Support Unit of the National Health Service Contact Centre, DGS
Machado, Jorge	Coordinator of Infectious Diseases Department, National Institute of Health Doctor Ricardo Jorge (INSA)
Maltez, Fernando	Head of the Infectious Diseases Department at Hospital Curry Cabral, Centro Hospitalar de Lisboa Central
Manata, Maria José	Medical doctor at Hospital Curry Cabral, Centro Hospitalar de Lisboa Central
Martins, Maria João	International Health Team Coordinator, Health Authority
Martins, Teresa	Medical doctor, infectologist, Hospital Curry Cabral, Centro Hospitalar de Lisboa Central
Mateus, Regina Ramos	PRTAF Aerospace Medical Centre Director, PRT Armed Forces AIREVAC teams Coordinator, Ministry of Defence
Mexia, Ricardo	Public health doctor, Epidemiologist at National Institute of Health Doctor Ricardo Jorge (INSA)
Miranda, José Santos	Health Department, Directorate-General of Maritime Authority
Neves, Elsa	Nurse at the Department of Infectious Diseases, Hospital de D. Estefânia, Centro Hospitalar de Lisboa Central
Nuno, Sebastião	Expert at the Division for Administration and Consular Protection, Ministry of Foreigner Affairs
Oliveira, Ana	Chief nurse, Infectious Disease Department, Hospital de D. Estefânia Centro Hospitalar de Lisboa Central
Pais, João	Chief nurse, Department of Infectious Diseases, Hospital Curry Cabral, Centro Hospitalar de Lisboa Central
Pelerito, Ana	Member of the Unit for Emergencies and Biosafety/Biosecurity, National Institute of Health Doctor Ricardo Jorge (INSA)
Pinto, Carla	Expert at National Institute of Civil Aviation, Ministry of Economy and Employment
Pinto, Cátia Sousa	Head of the Division of Epidemiology and Statistics, DGS
Ramos, Raquel	National Institute of Medical Emergency
Santos, Cristina Abreu	Team Coordinator for the Support Unit of the National Public Health Officer and Public Health Emergencies Management, DGS
Santos, Fernanda	International Health Authority; Local Unit of Health, Department of Public Health
Silva, Ana	Commander of the CBR Defence Element; CBRN Officer of the Land Forces Command, Portuguese Army, Ministry of Defence
Silva, Andreia Jorge	Head of the Department for Disease Prevention and Health promotion, DGS
Tavares, Albino	Lieutenant Coronel, at Intervention Unit, National Republican Guard (Guarda Nacional Republicana, GNR), Ministry of Internal Affairs
Tavares, António	Regional Director of Health, Regional Health Authority of Lisbon and Tagus Valley, Public Health Professor of National School of Public Health



Vasconcelos, Paula

Head of the Office of Preparedness and Public Health Support, DGS

Vieira, Carlota

Head of the Office of Strategic Planning and Evaluation, DGS

## Annex 2. Visit itinerary

### Day 1 – 30 March 2015, Monday

Time	Place	Subject	Main speaker/institutions representatives
9:15	DGS	1. Welcome and introductions 2. Visit objectives and agenda review	Francisco George (10 min) Graham Fraser
		3. Approach to VHF system peer review: Reflections on some European perspectives	Graham Fraser (10 min)
		4. Overview and governance of Ebola preparedness and response <ul style="list-style-type: none"> <li>Contingency plan</li> <li>National platform (axes and partners)</li> <li>National surveillance system</li> </ul>	Cristina Abreu Santos (5 min) Cátia Sousa Pinto (5 min)
10:30	DGS	Coffee break	
10:45	DGS	5. Products <ul style="list-style-type: none"> <li>Guidelines</li> <li>Communication plan</li> <li>Training plan</li> <li>Simulations exercises</li> </ul> Concluding discussion	Andreia Jorge Silva (5 min) Carlota Vieira (5 min) Sérgio Gomes (5 min) Paula Vasconcelos (5 min)
12:00		Lunch	
13:45	DGS	6. Early detection aspects <ul style="list-style-type: none"> <li>National lines: <ul style="list-style-type: none"> <li>National health line (Linha Saúde 24)</li> <li>Medical support line</li> </ul> </li> </ul>	Sérgio Gomes (5 min) Cristina Abreu Santos (5 min)
14:00		7. Procedures implemented in Portugal at points of entry (airports and ports )	Maria João Martins (5 min) Fernanda Santos (5 min) Carla Pinto, Andreia Cachado, José Santos Miranda
15:00		Coffee break	
15:15		8. IHR approach to civil aviation in Germany	Ute Rexroth (5 min)

### Day 2 – 31 March 2015, Tuesday

Time	Place	Subject	Main speaker/institutions representatives
9:15	DGS	9. Case studies; detection, management, secondary infection prevention, Member States <ul style="list-style-type: none"> <li>Case study from Spain</li> <li>Case study from Germany</li> <li>Case study from Portugal</li> </ul>	Maria José Sierra (10 min) Ute Rexroth (10 min) Maria José Manata (10 min)
10:15	DGS	Coffee break	
10:30	DGS	10. Relevant aspects from case management <ul style="list-style-type: none"> <li>Designated Hospitals</li> <li>Laboratory</li> <li>Decontamination/Waste/Post-mortem</li> </ul>	Carlos Alves, Teresa Martins, João Pais, Maria José Manata, Ana Oliveira, Elsa Neves, Flora Candeias Rita Cordeiro Ana Silva, Albino Tavares
12:00		Lunch	
13:00 – departure from DGS		11. Site visits (3 groups):	
13:45 – 15:30		<ul style="list-style-type: none"> <li>Group 1 – Health Center Amadora and public health</li> </ul>	Maria José Sierra Svetla Tsoлова António Tavares António Carlos Etelvina Calé

**Day 2 – 31 March 2015, Tuesday**

13:30 – 15:30	<ul style="list-style-type: none"> <li>Group 2           <ul style="list-style-type: none"> <li>Hospital Curry Cabral (reference hospital for adults)</li> </ul> </li> </ul>	Diamantis Plachouras Ute Rexroth Teresa Martins, João Pais
13:30 – 14:30 14:45 – 15:45	<ul style="list-style-type: none"> <li>Group 3           <ul style="list-style-type: none"> <li>Hospital de S. José (emergency department)</li> <li>Hospital de D. Estefânia (reference hospital for children)</li> </ul> </li> </ul>	Graham Fraser Maria José Manata Eduardo Gomes da Silva Conceição Botas Ana Oliveira, Elsa Neves, Flora Candeias

**Day 3 – 1 April 2015, Wednesday**

Time	Place	Subject	Main speaker/institutions representatives
9:15	DGS	12. Medical evacuation procedures in Portugal 13. Medical evacuations experiences in Member States: <ul style="list-style-type: none"> <li>In Germany</li> <li>In Spain</li> </ul>	Regina Ramos Mateus (5 min) Joana Araújo/Nuno Sebastião (5 min) Ute Rexroth (5 min) Maria José Sierra (5 min)
		14. Participation in international missions	Eugénio Cordeiro (5 min)
10:15	DGS	Coffee break	
10:30	DGS	15. In-country transportation of patients	Raquel Ramos (5 min)
11:15 – departure from DGS		16. Site visit to INEM ambulance	Diamantis Plachouras Ute Rexroth Maria José Sierra Svetla Tsoleva Raquel Ramos
12:30		Lunch	
13:30 – 15:30	DGS	17. Provisional debriefing from review team and discussions and report preparation; priorities and future actions	ECDC review team Francisco George, Paula Vasconcelos

## Annex 3. DGS guidance issued in relation to preparation for and management of Ebola cases

### Orientações

Orientação nº 012/2014 de 08/08/2014 atualizada a 01/12/2014  
Doença por vírus Ébola. Procedimentos gerais.

Orientação nº 013/2014 de 11/08/2014 atualizada a 29/10/2014  
Doença por Vírus Ébola. Procedimentos de vigilância de viajantes por via marítima.

Orientação nº 014/2014 de 11/08/2014 atualizada a 29/10/2014  
Doença por vírus Ébola. Procedimentos de vigilância de viajantes durante um voo, antes do embarque ou após o desembarque.

Orientação nº 015/2014 de 02/09/2014 atualizada a 23/12/2014  
Doença por vírus Ébola. Procedimentos laboratoriais para Hospitais de Referência e INSA.

Orientação nº 018/2014 de 29/10/2014 atualizada a 08/01/2015 (atualização recente)  
Doença por vírus Ébola. Vigilância de Contactos na Comunidade e em Contexto Laboral.

Orientação nº 019/2014 de 29/10/2014 atualizada a 22/12/2014 (revoga a Orientação nº 017/2014)  
Doença por vírus Ébola. Procedimentos perante um doente que se apresente nos serviços de saúde.

Orientação nº 020/2014 de 29/10/2014 atualizada a 04/12/2014 (revoga a Orientação nº 003/2014)  
Doença por vírus Ébola. Procedimentos e Equipamento de Proteção Individual (EPI).  
Esta Orientação é complementada pelo filme DGS\_EPI.mov. Consulte a página do Plano de Formação.

Orientação nº 021/2014 de 29/10/2014 atualizada a 05/12/2014 (revoga a Orientação nº 003/2014)  
Doença por vírus Ébola. Descontaminação e Gestão de Resíduos.

Orientação do INFARMED de 28/10/2014 revista em 30/10/2014  
Doença por vírus Ébola. Orientações de Acesso a Terapêuticas Experimentais.

*Source: DGS website, Ebola portal*

## Annex 4. Ebola simulation exercises, Portugal, 2014–15

Exercise	Organisation	Type of exercise	Date	Objectives	Participants	Status atual
National Exercise Meliandou	DGS	Field exercise and command post exercise	31/11 e 1/12/2014	Test procedures from detection to transportation, management at designated hospitals, lab confirmation and contact tracing	DGS; INEM; CHLC-HCC; CHSJ; ACES Amadora INSA; DSP ARS LVT; DSP ARS Norte;	Final report at <a href="http://www.ebola.dgs.pt/simulacros/exercicio-meliandou.aspx">http://www.ebola.dgs.pt/simulacros/exercicio-meliandou.aspx</a>
Boké	DSP – ARS Centro	Field exercise	19/12/2014	Test detection by primary health care and contact tracing at regional level	DSP-ARS Centro; INEM ACES Pinhal Interior; ACES Baixo Mondego; DGS; CHSJ	Final report at <a href="http://www.ebola.dgs.pt/simulacros/exercicio-boke.aspx">http://www.ebola.dgs.pt/simulacros/exercicio-boke.aspx</a>
NIGER2015	DSP – ARS Alentejo e ULS Litoral Alentejano	Field exercise	5/2/2015	Test detection of suspected case in a ship arriving harbor	DSP – ARS Alentejo; ULSLA; INEM; Autoridades portuárias	Final report at: <a href="http://www.ebola.dgs.pt/simulacros/exercicio-niger.aspx">http://www.ebola.dgs.pt/simulacros/exercicio-niger.aspx</a>
Freetown	DSP – ARS Norte	Table-top exercise e Field exercise	4/2/2015	Testing transportation, designated hospitals procedures, including decontamination as well as regional contact tracing.	INEM; DSP – ARS Norte; Unidades de SP dos ACES e ULS; CHSJ; INEM; GIPS da GNR; Elemento BQR do Exército	Report ready for publication
TBD	DSP –ARS Algarve	Table-top exercise	Spring	Testing contact tracing procedures at regional level	TBD	
TBD	CSP – RAA (Açores)	Table-top exercise	Spring 2015	Testing contact tracing procedures at regional level	TBD	
TBD	IASAúde (Madeira)	TBD	TBD	To test response to suspected cases detected in the RAM	TBD	

Source: DGS, Portugal

**European Centre for Disease  
Prevention and Control (ECDC)**

Postal address:  
Granits väg 8, SE-171 65 Solna, Sweden


Visiting address:  
Tomtebodavägen 11A, SE-171 65 Solna, Sweden

Tel. +46 858601000  
Fax +46 858601001  
[www.ecdc.europa.eu](http://www.ecdc.europa.eu)

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