

TECHNICAL REPORT



Health emergency preparedness for imported cases of high-consequence infectious diseases

Operational checklist for country preparedness planning
in the EU/EEA countries

ECDC TECHNICAL REPORT

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This report of the European Centre for Disease Prevention and Control (ECDC) was coordinated by Agoritsa Baka.

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Abbreviations

AAR	After action review
BSL	Biosafety level
CCHFV	Crimean-Congo haemorrhagic fever virus
CDC	Centers for Disease Control and Prevention, USA
DRC	Democratic Republic of the Congo
EC	European Commission
ERCC	Emergency Response Coordination Centre
EVD	Ebola virus disease
EWRS	Early Warning and Response System
HCID	High-Consequence Infectious Disease
HCW	Healthcare worker
HEPA	High-efficiency particulate air filter
HFRS	Haemorrhagic fever with renal syndrome
HSC	Health Security Committee
IHR	International Health Regulations (2005)
LHF	Lassa haemorrhagic fever
MARV	Marburg virus
Medevac	Medical evacuation
MERS	Middle East respiratory syndrome
MVD	Marburg virus disease
NHS	National Health Service (UK)
PHE	Public Health England
PHEIC	Public Health Emergency of International Concern
PoE	Points of Entry
PPE	Personal protective equipment
PUI	Persons under investigation
RVF	Rift Valley fever
RRA	Rapid Risk Assessment
SARS	Severe acute respiratory syndrome
SFTS	Severe fever with thrombocytopaenia syndrome
SOP	Standard operating procedure
VHF	Viral haemorrhagic fever
WHO	World Health Organization

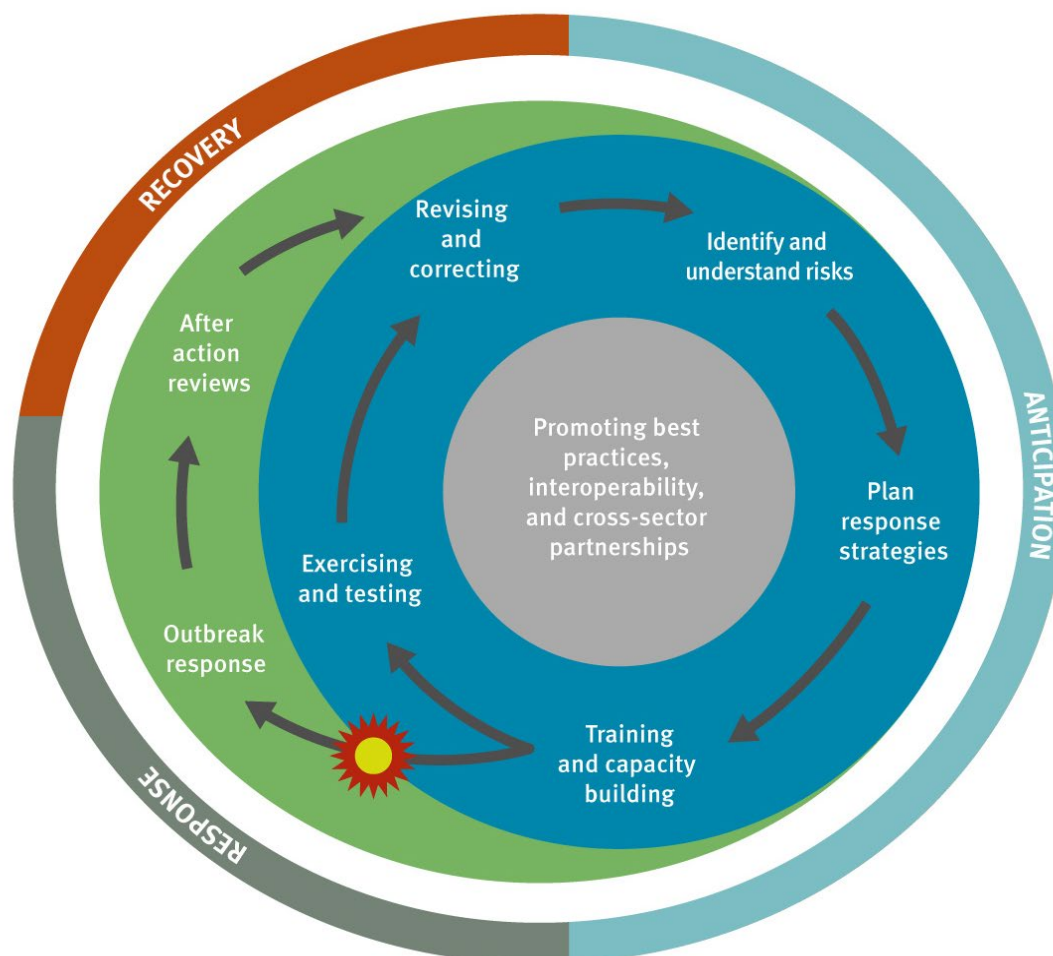
Glossary

Term	Definition
Contact	Refers to a person not currently presenting symptoms, who has contact with, or may have been in contact with, a confirmed HCID case, bodily fluids from a case, or the contaminated environment within a period equal to the maximum incubation period [1].
Contact tracing	The identification and follow-up of persons who may have come into contact with a person infected with a certain pathogen. Contacts can be offered advice, testing and treatment or immunisation depending on their type of exposure. If no treatment or vaccine are available, they can be monitored for a period equal to the maximum incubation period for signs of illness. They may also have to be isolated for the same period of time to prevent ongoing transmission.
Early warning system	A system for identification of potential crises, mainly through bulletins, forecasts, alerts [2].
High- Consequence Infectious Disease (HCID)	Also known as Infectious Disease of High Consequence (IDHC). HCIDs constitute serious human health threats. Patients with such diseases typically develop severe symptoms and require a high level of care. The case-fatality rates can be high. Several HCIDs are transmissible from person to person and therefore require healthcare workers to take precautions to prevent transmission [3].
Medical evacuation (medevac)	The evacuation of persons, usually by air transportation, accompanied by trained personnel able to provide care, to a place where they can receive appropriate medical care. In the case of an HCID (probable or confirmed) patient, there is an additional need to mitigate transmission risks during the medevac operation [4].
Person under Investigation (PUI)	A term mainly used in the case of Ebola virus disease and refers to a person meeting the clinical and the epidemiological criteria OR a person with history of high-risk exposure and any of the listed symptoms of EVD, including fever of any grade [5].
Points of Entry (PoE)	The International Health Regulations (IHR) define a point of entry as 'a passage for international entry or exit of travellers, baggage, cargo, containers, conveyances, goods and postal parcels, as well as agencies and areas providing services to them on entry or exit' [6].
Preparedness	The knowledge and capacities developed by government, professional response and recovery organisations, communities and individuals to effectively anticipate, respond to and recover from the impacts of likely, imminent or current crisis [2].
Preparedness planning	Involves factoring in plans at the local, national and EU level in various sectors that affect emergency plans. Preparedness plans provide a backbone structure for developing core elements to address different types of health threats and improve the interoperability of such plans; preparedness planning addresses threats and emergencies that threaten or are likely to threaten public health in a Member State [2].
Public health risk	The likelihood of an event that may adversely affect the health of human populations, with an emphasis on whether it may spread internationally or present a serious and direct danger [2].
Public health threat	An event (incident), condition or agent, which by its presence has the potential to rapidly harm - directly or indirectly - an exposed population in such a way as to lead to a crisis [2].
Response	The provision of emergency services and public assistance during or immediately after a crisis, in order to save lives, reduce impact on health, environment and society, ensure public safety and meet the basic subsistence needs of those affected [2].
Risk	The combination of the probability of a crisis and its negative consequences [2].
Risk assessment	A scientifically based process consisting of the following steps: i) hazard identification, ii) hazard characterisation, iii) exposure assessment and iv) risk characterisation [2].
Risk communication	The exchange and dissemination of adequate information concerning risks to enable decision makers, stakeholders and the public to make appropriate decisions [2]
Risk management	The process, distinct from risk assessment, of weighing policy alternatives, risk assessment and other factors that are relevant for protecting the health of consumers – in consultation with all parties involved. If necessary, this process may result in the selection of appropriate prevention and control options [2].
Standard Operating Procedures (SOP)	Standard Operating Procedures are documents that prescribe the operational steps to be followed in relation to processes or policies, so that they are performed in the same way every time to guarantee the outcome.
Surveillance	The systematic ongoing collection, collation and analysis of data for public health purposes, combined with the timely dissemination of public health information for assessment and public health response [2].

Introduction and scope

Preparedness planning is essential in order to respond effectively to outbreaks, including single case occurrences of high-consequence infectious diseases (HCID), such as the importation of a viral haemorrhagic fever (VHF) case. The preparedness cycle (Figure 1) includes planning, identification and prioritisation of risks; training and simulation exercises; after action reviews; evaluation of lessons learned and implementation of the organisational change identified. This checklist has been developed for public health planners as an operational tool to review the system of preparedness for responding to a possible imported HCID in the European Union/European Economic Area (EU/EEA) (Table 1). The content is based on the work performed during the large Ebola virus disease (EVD) outbreak in West Africa (2013–2016) and a specific protocol used in the peer-review of the health systems of Belgium, Portugal and Romania [7,8]. The checklist, enhanced with a number of literature/resource references, may be seen as complementary to broader preparedness checklists, such as those available from the World Health Organization (WHO) [9].

Figure 1. The preparedness cycle



Source: ECDC

HCIDs constitute serious human health threats (Table 1). Patients with such diseases typically develop severe symptoms and require a high level of care. Moreover, the case-fatality rates can be high. Several HCIDs are transmissible from person to person and therefore require healthcare workers to take precautions to prevent transmission [10]. HCIDs may be airborne or can be transmitted via droplets that become airborne under certain conditions (e.g. in the case of secondary aerosolisation.) According to a classification used by Public Health England (PHE) and the UK's National Health Service (NHS), an HCID has some or all of the following characteristics:

- Acute infectious disease;
- Typically, a high case-fatality rate;
- May not have effective prophylaxis or treatment;
- Often difficult to recognise and detect rapidly;
- Ability to spread in the community and within healthcare settings;
- Requires an enhanced individual, population and system response to ensure it is managed effectively, efficiently and safely [11].

Table 1. Examples of high-consequence infectious diseases (HCID) and modes of transmission [11]

Contact HCID	Airborne HCID
Argentine haemorrhagic fever (<i>Junin virus</i>)	Andes virus infection (hantavirus)
Bolivian haemorrhagic fever (<i>Machupo virus</i>)	Avian influenza, highly pathogenic A(H7N9) and A(H5N1)
Crimean Congo haemorrhagic fever (CCHF)	Avian influenza, highly pathogenic A(H5N6) and A(H7N7)
Ebola virus disease (EVD)	Middle East respiratory syndrome (MERS)
Lassa fever	Monkeypox
Lujó virus disease	Nipah virus infection
Marburg virus disease (MVD)	Pneumonic plague (<i>Yersinia pestis</i>)
Severe fever with thrombocytopenia syndrome (SFTS)	Severe acute respiratory syndrome (SARS)

The EVD outbreak (one of the most serious types of viral haemorrhagic fever and an HCID of grave concern) which has been ongoing since May 2018 in the Democratic Republic of the Congo (DRC), is the largest ever recorded in DRC and the second largest worldwide since the discovery of the Ebola virus in 1976. Despite the mobilisation of response actors, significant challenges remain in this complex setting marked by a long-term humanitarian crisis and an unstable security context [12]. The outbreak was elevated to a Public Health Emergency of International Concern (PHEIC) in the WHO International Health Regulations (IHR) Emergency Committee meeting on 17 July 2019 [13].

As of today, the risk that EU/EEA citizens living or travelling in EVD-affected areas of DRC will be exposed to the virus is assessed as low, provided they take precautionary measures [12].

However, the observed trend for this particular outbreak of EVD to expand into new health zones locally is a good reason for EU Member States to consider revisiting plans and preparedness activities that were put in place during the EVD outbreak in West Africa (2013–2016) to respond to a possible imported case of viral haemorrhagic fever. False alarms have been occurring recently and these require a carefully managed response to avoid unnecessary panic. Stakeholders from other sectors (e.g. transport, international affairs, civil protection, internal affairs, and the military) will need to be engaged in the discussions, and links for cross-sectoral collaboration may need to be reaffirmed and/or re-established [14,15].

A simplified conceptual outline of the possible pathways through which an imported HCID case may enter into a Member State's health system is presented in Figure 2 (modified from previous versions [7,8]). The pathways are organised into four key areas (Table 2), related to the progressive stages of entry of a suspect or known HCID case into the country's health system. These sub-systems must operate effectively, and in coordination with public health services, in order to successfully respond to such an event and prevent further community transmission. Therefore, an overall preparedness checklist is included, bringing all the system elements together and presenting the overarching and cross-cutting elements that need to be in place for all the sub-systems to function in a coordinated manner to achieve an effective response.

Each key area checklist is presented as a stand-alone table, subdivided conceptually into the organisational capabilities required to:

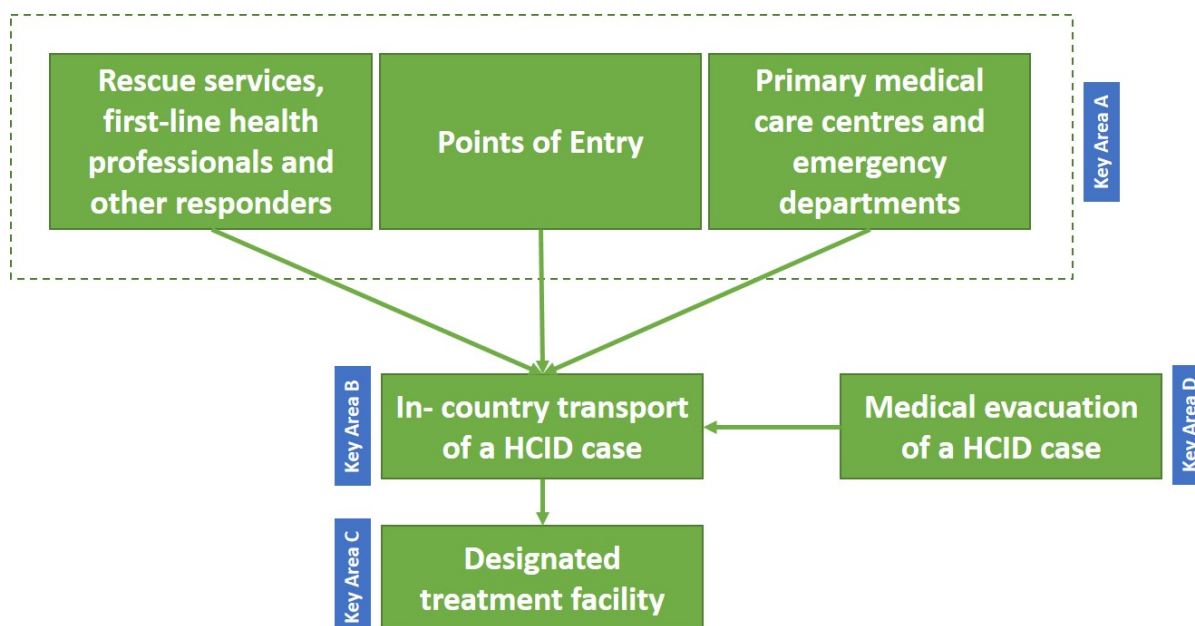
- recognise individuals who may be infected with HCID agents: 'Case recognition';
- effectively manage the care of a suspect or diagnosed HCID patient, while ensuring the safety of staff in contact with the patient: 'Patient management and staff protection';
- prepare so as to ensure that the above is achievable in the event of an HCID case: 'Planning, protocols and training'.

Therefore, some repetition is evident in the system elements that need to be planned in each checklist.

Table 2. Overview of key areas for planning response to an imported HCID case

Key areas	System elements addressed
Overall preparedness	Overarching system planning elements
Key area A	Potential first system points of contact of an unknown HCID case
Key area B	In-country transport of a probable or confirmed HCID case
Key area C	Designated treatment facility for HCID case(s)
Key area D	Medical evacuation of an HCID case.

Figure 2. Key areas of planning for the response to an imported HCID case



Overarching planning checklist

Managing all the aspects described in this document surrounding a serious event such as an imported case of a HCID, like a VHF, especially in the context of an international outbreak requires resilient public health and healthcare capacity, appropriate leadership and flexibility in the response. These are issues included in the lessons identified after the response to the West Africa EVD outbreak (2013 – 2016), and in order to implement these a public health preparedness plan/procedure needs to be in place in advance addressing the issues mentioned previously by Key Area [14,16-20].

Before proceeding to more focused checklists, we present here a list of overarching and cross-cutting issues that connect all activities in the preparedness checklists, which may serve as a template for planning to respond to an imported HCID case. This checklist refers only to activity areas and system elements to plan without outlining the organisational competencies.

Table 3. Preparedness checklist for an imported HCID case in EU/EEA-template for overarching issues

Overarching system elements planning checklist	
Activity area	System element to plan
Public health infrastructure	<ul style="list-style-type: none"> • HCID surveillance (case definitions, reporting forms, investigation protocol(s)) • Sustainable staffing and resources • Updated contact points and standard operating procedures (SOPs) for notifying the appropriate early warning systems (Early Warning Response System (EWRS) and IHR) • Vaccination strategy: guidelines for use and access, regulatory approvals, etc. • Contact tracing protocol covering: <ul style="list-style-type: none"> – criteria and definitions of different types of contacts – specifics on contact tracing staff such as first responders, health professionals (different levels), auxiliary healthcare staff exposures – procedures to obtain passenger lists (airports, ports) in collaboration with transport, civil aviation and/or port authorities – procedure for follow-up/monitoring of contacts (up to 2x incubation period) – legal issues surrounding isolation and quarantine clarified – community engagement for the needs of isolated contacts – mental health issues.

Overarching system elements planning checklist	
Activity area	System element to plan
	<ul style="list-style-type: none"> • Laboratory diagnostic capability for special pathogens or collaboration agreement with other Member States <ul style="list-style-type: none"> – Appropriate Biosafety Level (BSL) facility – Accredited laboratory or validated diagnostic methods for HCIDs – Up-to-date sampling procedures – Sustainable funding, staffing and reagent procurement – Guidance for transportation of highly infectious disease samples – Communication procedures with laboratory (activation, exchange of information, risk communication.) • Coordination structure (if all-hazard approach in the generic preparedness planning, then regular crisis coordination structure should be used.) <ul style="list-style-type: none"> – Infrastructure functional – Chain of command in a public health crisis (trained coordinators) – Advisory group/committee of experts (including subject matter experts, legal, ethical) – Stakeholder focal point network – Use of new technologies (e.g. situation overview tools, community messaging, monitoring of social media, etc.) to assess and communicate the situation • Procedure to escalate to national emergency • Procedures and SOPs to communicate with international partners, ask for and accept international assistance • Consider simulation exercises to test standard operating procedures (SOPs), procedures or plans and their flexibility [21] • Consider after action review (AAR) after an actual event [22,23]. • Training material for the management of HCID cases (preferably translated to own language) <ul style="list-style-type: none"> – Consider updates regarding contact tracing, new prophylaxis and treatment options, vaccination options, safe and dignified burials. – Consider refreshing donning/doffing procedures for personal protective equipment (PPE) [10,24,25] – Social mobilisation – Tailor modules to the level of exposure and/or involvement (e.g. screening teams, first responders, ambulance staff, designated in-country transport staff or designated treatment facility staff) • Training material on infection control practices <ul style="list-style-type: none"> – Tailor modules to the level of exposure and/or involvement (e.g. screening teams, first responders, ambulance staff, designated in-country transport staff or designated treatment facility staff) • Occupational exposure modules • Training logistics/capacity for <ul style="list-style-type: none"> – Border/points of Entry (PoE) staff – Front-line health professionals – Ambulance services – Designated critical care team(s) – Contact tracing and vaccination teams.
Healthcare infrastructure	<ul style="list-style-type: none"> • Designated in-country transportation of Persons Under Investigation (PUI), probable or confirmed HCID case(s) <ul style="list-style-type: none"> – Plan for coverage of high-risk entry points, consider geography of the country – Plan which PoE would accept a possible medically evacuated HCID case (airport, airport holding space, procedures for communication to stakeholders) – Equipment requirements, including PPE. – Staffing requirements and planning – Sustainable funding to maintain capacity. • Designated treatment facility(-ies) for PUI, probable or confirmed HCID cases <ul style="list-style-type: none"> – Legislative framework, including isolation and quarantine issues – Building structure and equipment requirements, including filtering and sewage

Overarching system elements planning checklist	
Activity area	System element to plan
	<ul style="list-style-type: none"> – Technical support, including laboratory and radiology services – Staffing requirements and planning – Sustainable funding to maintain capacity.
Communication	<ul style="list-style-type: none"> • Risk communication strategy and procedures [26-30] • Dedicated staff and resources • Designated spokesperson • Assess public trust in peace time • Risk communication training in peace time for experts and stakeholders • Use of multiple communication tools: information material, public meetings, websites, social media, help lines, etc. • Use of new technologies to communicate with stakeholders and the public, monitor and dispel rumours and misinformation.

Key area A: potential first system points of contact for an unknown HCID case

A person who has been exposed to an HCID may be able to travel during the incubation period of the disease before exhibiting any symptoms. This may potentially result in the entry of an exposed person into an EU/EEA Member State before they develop symptoms and seek healthcare. It should be emphasised here for EVD that the disease cannot be transmitted from an asymptomatic person [12].

As mentioned in ECDC's rapid risk assessment for the ongoing EVD outbreak [12] and in an ECDC technical report on exit/entry screening [31], the use of entry screening for infectious diseases has not proven to be effective in preventing or delaying transmission in past epidemics. In addition, if entry screening is implemented, local authorities need to plan for the potentially significant resources needed to investigate the febrile cases identified (transport, staff, testing, isolation, etc.) Hence, current evidence supports exit screening from the affected area(s) of an outbreak rather than entry screening at selected PoE in EU/EEA countries. Consequently, entry screening is not considered in the following preparedness list.

Potential first system points of contact for an unknown suspected HCID case constitute a broad group of authorities which could include:

- Rescue services (e.g. law enforcement, border security staff, coast guard, fire brigade, etc.) that may be called to any incident or participate in rescue operations, particularly in the areas where migration flows continue to be high;
- PoE, such as airports, ports, international railway stations or land border crossings;
- Ambulance services, called for assistance in the community;
- Primary health centres (including travel medicine clinics) and hospital emergency departments.

This key area attempts to refer collectively to the first contact of a potential HCID case with a health professional or other front-line actor; therefore, addressing authorities operating under different administrations (e.g. police, border guards, rescue services) and potentially with other types of work culture (e.g. more structured hierarchy). Some prioritisation is probably warranted at the national level, as to who within this group should be optimally briefed with the checklist presented in Table 4. However, with regard to suspected HCID cases, the relevant preparedness and training activities of all the above actors should focus on:

- identifying the HCID case promptly ('identify');
- isolating the person (simple isolation room) and providing initial supportive care, while ensuring the safety of staff and others in contact with the case ('isolate');
- informing the public health authorities and coordinating the safe in-country transport of the suspected case to a designated treatment facility ('inform').

The training of the actors involved and all relevant protocols (Personal Protective Equipment (PPE), infection control practices) should take into consideration the context of emergency operations or commercial transport and the existing basic infrastructure of a primary health centre or an emergency department.

Table 4. Overview of preparedness checklist for first system contact with an unknown HCID case

First system point of contact with an unknown HCID case		
	System element to plan	Organisational competency
Suspect case recognition	<ul style="list-style-type: none"> Process for sending/receiving updates on current situation during ongoing outbreaks of concern. 	<ul style="list-style-type: none"> HCID cases may be suspected/recognised: <ul style="list-style-type: none"> In flight/en route in a vessel [32,33] On arrival By telephone call from the person who is ill By clinical exam.
Patient management and staff safety	<ul style="list-style-type: none"> Isolation capacity 	<ul style="list-style-type: none"> The suspected case can be effectively isolated from other persons, patients or staff
	<ul style="list-style-type: none"> PPE (sustainable availability) 	<ul style="list-style-type: none"> Staff are able to safely use PPE and/or are briefed about isolating cases and keeping safe distances [3],[34].
	<ul style="list-style-type: none"> Protocol and SOP for suspected HCID case reporting Plan/protocol for management of a suspected HCID case. 	<ul style="list-style-type: none"> The suspected case is promptly reported and discussed with the public health authorities. Appropriate initial care transport to the designated treatment facility.
	<ul style="list-style-type: none"> Contact tracing protocol for persons in contact with an HCID case. 	<ul style="list-style-type: none"> Contact tracing assistance to public health authorities (e.g. identification of contacts, passenger lists, staff lists, etc.)
	<ul style="list-style-type: none"> Infection control protocols. 	<ul style="list-style-type: none"> Disinfection of contaminated areas and equipment <ul style="list-style-type: none"> Decontamination of luggage, transport vessels Waste management, including sewage for the health facilities [35-37].
Planning, protocols and training	<ul style="list-style-type: none"> Plan/protocol for the management of a PUI or probable HCID case SOPs to activate service internally SOPs to inform regional/national public health focal point. 	<ul style="list-style-type: none"> Suspected case is promptly reported and decisions are taken in coordination with public health services. Suspected case is transferred safely to the designated treatment facility for diagnosis and treatment.
	<ul style="list-style-type: none"> Training material on recognition of suspected cases available for different levels of staff. 	<ul style="list-style-type: none"> Training on recognition of suspected cases and symptoms.
	<ul style="list-style-type: none"> Contact tracing protocol for persons in contact with an HCID case [1] 	<ul style="list-style-type: none"> Contact tracing of persons (including staff) in contact with suspected case is initiated with appropriate procedure for follow-up during the required period, coverage of needs and personal rights, diagnostic capability.
	<ul style="list-style-type: none"> Infection control procedures (PPE, disinfection, etc.) 	<ul style="list-style-type: none"> Procurement arrangements are in place for acquiring appropriate PPE, disinfection materials, and waste management materials PPE stock is updated [38] Disinfection of environment and equipment used Waste management [35-37].
	<ul style="list-style-type: none"> Communication plan 	<ul style="list-style-type: none"> Risk communication starts immediately after case is detected with: <ul style="list-style-type: none"> the staff the local level stakeholders (e.g. local administration) the inter-sectoral stakeholders (e.g. ministries of transport, trade, etc.) international stakeholders (e.g. airlines, etc.)

Key area B: in-country transport of a probable or confirmed HCID case

In the event that a Person Under Investigation (PUI), a probable or confirmed case of HCID needs to be transported to a designated treatment facility in the country, this needs to be organised using a designated ambulance (or equivalent) service. The same is valid for the in-country transport of a person received through a medical evacuation operation (see Key area D) that would probably require in-country transportation from the arrival airport to the designated treatment facility (see Key area C).

Key area B assumes that the status of the patient, as PUI, probable or confirmed HCID infection, is known, and that the transport is planned, as opposed to the call-for-transport of an unknown HCID case, which is covered in Key area A. In addition, since the status of the person as PUI, probable or confirmed case of HCID, is known in advance, 'case recognition' becomes 'case notification'.

Table 5. Overview of preparedness checklist for in-country transport of an HCID case

In-country transport of an HCID case		
	System element to plan	Organisational competency
Case Notification	<ul style="list-style-type: none"> Process to notify stakeholders about PUI or probable/confirmed HCID case 	<ul style="list-style-type: none"> Activate promptly the contact point in the ambulance service to prepare for transport If receiving a medevac PUI or probable/confirmed HCID case: activate the contact point at the designated airport to prepare for the reception.
Patient management and staff safety	<ul style="list-style-type: none"> Plan for safe transport of PUI or probable/confirmed HCID case [39] 	<ul style="list-style-type: none"> Designated transportation capacity/equipment (e.g. designated ambulance or ambulance with HEPA1 filtration capacity, isolators, etc.) Designated space to operate for the reception of a medically evacuated patient at the designated reception airport.
	<ul style="list-style-type: none"> PPE (sustainable availability) 	<ul style="list-style-type: none"> Appropriate/effective use of PPE (and/or isolation and distancing) during contact with suspect case [34].
Planning, protocols and training	<ul style="list-style-type: none"> Training material on the management of a PUI or probable/confirmed HCID case (or dead body). 	<ul style="list-style-type: none"> Training on the management of HCID patients in transport, including isolating equipment and supportive care. Training on handling the dead body of a patient with suspected or known HCID.
	<ul style="list-style-type: none"> SOP to activate the ambulance service SOP to inform public health focal point Protocol for contact tracing of persons in contact with a probable/confirmed HCID case [1] 	<ul style="list-style-type: none"> Decisions are taken in coordination with public health service and accepting facility. Contact tracing of staff in contact with suspected case is initiated with appropriate procedure for follow-up during the required period, coverage of needs and protection of personal data/rights, diagnostic capability.
	<ul style="list-style-type: none"> Infection control protocols, including occupational exposure 	<ul style="list-style-type: none"> PPE stock is updated [38] Disinfection of environment and equipment used Waste management [35-37].
	<ul style="list-style-type: none"> Training material on infection control procedures (PPE, disinfection, etc.) for different levels of staff. 	
	<ul style="list-style-type: none"> Communication plan 	<ul style="list-style-type: none"> Risk communication promptly initiated with staff and inter-sectoral stakeholders (crossing regional or state lines during transport may require extra steps in notification process).

¹ HEPA - High Efficiency Particulate Air

Key area C: designated treatment facility for HCID case(s)

The designated treatment facility is usually a tertiary hospital(s) capable of providing appropriate care to confirmed and/or suspected HCID patients, while ensuring the safety of staff and the environment. This is a facility that needs to be identified well in advance during 'peace-time' in order to prepare and train for the management of an HCID patient. As mentioned above, these units are usually housed in a tertiary care hospital in order to take advantage of specialised personnel and equipment. However, depending on their resources, Member States may elect to use other facilities to admit and manage a probable or confirmed HCID case, or even make arrangements bilaterally with another Member State to admit and care for their citizens with an HCID.

One of the lessons learned from the experience with imported cases in the West Africa outbreak (2013–2016) was that, in addition to known EVD cases, the designated treatment facilities needed to also manage Persons Under Investigation (PUI) [10]. This was due to the fact that if the diagnosis of EVD was confirmed these cases would soon need much more specialised care. Cases of this type actually caused significant burden to the system as they required special treatment in isolation on top of their other medical needs (e.g. pregnancy, injury, etc.)

This key area assumes that the status of the person, as PUI, probable or confirmed HCID infection, is known in advance, therefore, as is the case in Key area B, the 'case recognition' part of the capability planning will become 'case notification' [37,40,41].

Presentation of undiagnosed patients at hospital emergency departments is covered in Key area A, as a first system point of contact.

Table 6. Overview of preparedness checklist for the designated treatment facility for HCID case(s)

Designated treatment facility		
	System element to plan	Organisational competency
Case notification	<ul style="list-style-type: none"> Process to receive updates on current situation Process to notify stakeholders about probable/confirmed HCID case to be admitted. 	<ul style="list-style-type: none"> Activate promptly the hospital/facility contact point to prepare for the HCID case admission.
Patient management and staff safety	<ul style="list-style-type: none"> Protocol for the clinical management of probable/confirmed HCID case(s) 	<ul style="list-style-type: none"> Designated staff at appropriate levels <ul style="list-style-type: none"> Limited, but sufficient, numbers involved Voluntary vs. mandatory staffing Support the clinical management with laboratory and radiology services, as well as other specialties and ancillary staff (e.g. cleaning, IT and technical support). Designated treatment team able to offer critical care level supportive care (telemetry, equipment, specialty) <ul style="list-style-type: none"> Appropriate care at all levels, including post-mortem care. Definition of discharge status Appropriate handling of the dead body of a patient with probable/confirmed HCID.
	<ul style="list-style-type: none"> PPE (sustainable availability) 	<ul style="list-style-type: none"> Appropriate/effective use of PPE (and/or isolation and distancing) during clinical contact with case(s), including safe donning/decontamination/doffing and procedures for emergencies (such as needle stick injuries).
	<ul style="list-style-type: none"> Reference laboratory designated 	<ul style="list-style-type: none"> Designated reference laboratory for HCIDs able to support the diagnosis and follow up laboratory tests (see also Table 3) Guidance on storage, handling, and shipping of samples.
	<ul style="list-style-type: none"> Protocol for the use of experimental treatments and/or vaccines 	<ul style="list-style-type: none"> Augmented supportive care provided [42-47]. May need to contribute to research or knowledge gathering at international level

Designated treatment facility		
	System element to plan	Organisational competency
		(e.g. emerging disease, new treatment or vaccine efficacy trials)
Planning, protocols and training	<ul style="list-style-type: none"> Facility structure. 	<ul style="list-style-type: none"> Facility conforming to high isolation standards (HEPA filtration, changes/hour, ante-room, etc.) [48,49]
	<ul style="list-style-type: none"> Legal framework for isolation and quarantine reviewed 	<ul style="list-style-type: none"> Staff, with emphasis on public health staff, are aware of existing legislation on isolation and quarantine and its limitations.
	<ul style="list-style-type: none"> Training material on the management of an HCID case [49] <ul style="list-style-type: none"> Include critical care procedures [50] Post mortem care [51,52] Include new treatments and vaccines potentially available. 	<ul style="list-style-type: none"> Training on management of HCID patients in the designated unit, including supportive care needed, and use of new treatments <ul style="list-style-type: none"> Procedures for diagnostics, laboratory tests, and protocols for provision of care Post mortem care of dead body, including burial.
	<ul style="list-style-type: none"> Protocols to communicate case and inform public health focal points Protocols to notify EU and international public health community Advisory group of experts to support <ul style="list-style-type: none"> Ethical approval committees involved Contact tracing protocol for persons in contact with an HCID case <ul style="list-style-type: none"> Include the possibility of post-exposure immunisation. 	<ul style="list-style-type: none"> Decisions are taken in coordination with public health service (and possibly other national experts). International reporting procedure according to Decision 1082/2013/EU (EWRS) and IHR Contact tracing of staff in contact with an HCID case is initiated, with appropriate procedure for follow-up during the required period, coverage of their needs and protection of personal data/rights, diagnostic capability. <ul style="list-style-type: none"> Procedure for reporting of contacts is based upon degree of exposure and accounts for different scenarios (e.g. self-reporting via telephone; home-based isolation; hospital isolation). Specific decisions/agreements may be needed via fast-track procedures to import and facilitate the use of experimental treatments and/or vaccines.
	<ul style="list-style-type: none"> Infection control protocols <ul style="list-style-type: none"> Include occupational exposures. 	<ul style="list-style-type: none"> PPE stock is updated [38,53] Disinfection of treatment environment and equipment used
	<ul style="list-style-type: none"> Training material on infection control procedures (PPE, disinfection, etc.) for different levels of staff. 	<ul style="list-style-type: none"> Occupational exposures are managed appropriately and followed up Waste management from the treatment area (including sewage water) is strictly implemented [35-37]
	<ul style="list-style-type: none"> Mental health support 	<ul style="list-style-type: none"> Mental health support <ul style="list-style-type: none"> Staff Patient and family Contacts and families
	<ul style="list-style-type: none"> Communication plan. 	<ul style="list-style-type: none"> Risk communication promptly initiated with staff, inter-sectoral stakeholders, international stakeholders and the public. SOP for international reporting procedure according to Decision 1082/2013/EU (EWRS) and IHR.

Key area D: medical evacuation of an HCID case

This area refers to the organised and pre-arranged medical evacuation (medevac) of a known contact of an HCID case or a probable/confirmed HCID case from an affected area with an ongoing outbreak of the disease to an EU/EEA country. In particular, the operation refers to EU/EEA nationals exposed in the affected area as a result of their profession (humanitarian workers or health professionals).

A medical evacuation of a probable or confirmed HCID case is a complex and time-consuming process which necessitates planning and collaboration at many levels well in advance. Experience from the large outbreak of EVD in West Africa (2013–2016) showed that a very limited number of EU Member States have (or can develop) their own capacity for medical evacuation of such potentially highly infectious cases. At the time this checklist is being developed (August 2019) in the context of an ongoing outbreak of EVD in the DRC [12], and according to current information [54], which may change, the majority of EU/EEA Member States have no arrangements in place for the medical evacuation of nationals from the affected area.

In the context of the ongoing EVD outbreak in DRC, the European Commission and WHO have developed operating procedures for requesting medical evacuation in humanitarian contexts for a VHF case. This includes illnesses such as the Ebola virus disease, Marburg virus disease, Rift Valley fever (RVF), etc. The evacuation system is managed by WHO, while the European Commission provides support and facilitates the process by identifying EU/EEA Member States with the capability to receive and treat the person requiring medical evacuation [54]. Consequently, a medically evacuated person may be accepted in their own country of citizenship or another Member State, depending on capacity for treatment.

This key area assumes that the status of the evacuee, as contact of a VHF case, PUI, probable or confirmed VHF infection, is known in advance, therefore, the 'case recognition' part of the capability planning becomes 'case notification'. In addition, since medical evacuation operations usually imply flights from an affected area to an EU/EEA country, the evacuated person will also need to be transported in-country (Key area B) to the accepting designated treatment facility (Key area C). Finally, given the information above on the capacity of the majority of EU/EEA countries to medically evacuate HCID or VHF cases, the approach in this checklist stresses the need to plan to procure the service from a commercial medevac operator or request assistance for the evacuation rather than organising the medical evacuation operation of an HCID case, which is a highly complex operation [55].

Table 7. Overview of preparedness checklist for medical evacuation of a HCID case

Medical evacuation of HCID case, in particular a VHF case		
	System element to plan	Organisational competency
Case notification	<ul style="list-style-type: none"> Process to receive notification of probable/confirmed HCID case that requires evacuation. Process and SOP to notify national stakeholders of probable/confirmed HCID case that requires evacuation. <ul style="list-style-type: none"> Advisory committee, incl. financial commitments [4] <p>OR</p> <ul style="list-style-type: none"> SOP to request assistance for a national that requires medical evacuation from an affected area. 	<ul style="list-style-type: none"> National operational focal point for receiving notifications of evacuation and contact point for further arrangements. Prompt activation of the process and SOP for the procurement of medevac operator. Submit to WHO promptly a request for assistance with a national requiring medevac, if this pertains a VHF case. <p>For the Member State accepting a medically evacuated person, probable/confirmed HCID case:</p> <ul style="list-style-type: none"> Prompt activation of designated airport to prepare arrival area, ambulance service contact point to prepare for in-country transport (Key area B) and designated treatment facility accepting the patient (Key area C).
Planning, protocols and training	<ul style="list-style-type: none"> Protocol/procedure for the management of nationals deployed in affected areas. Protocols and SOPs to notify and request assistance for the medical evacuation of a probable/confirmed HCID case. 	<ul style="list-style-type: none"> Overview of deployed personnel and their need for follow-up (e.g. contact tracing). <ul style="list-style-type: none"> Liaise with non-governmental organisations Coordination of the medevac operation with all stakeholders involved, including at international level (WHO, European Commission, other Member States).
	<ul style="list-style-type: none"> Protocol/process for arrival and in-country transport of the medevac person to the designated treatment facility. 	<p>For the Member State accepting a medically evacuated person, probable/confirmed HCID case:</p>

Medical evacuation of HCID case, in particular a VHF case	
System element to plan	Organisational competency
<ul style="list-style-type: none"> Consider common training courses with stakeholders and/or exercise once the protocol is ready. 	<ul style="list-style-type: none"> Pre-designation of airport for the arrival of a medevac HCID case in collaboration with civil or military aviation <ul style="list-style-type: none"> Designated contact point at civil/military aviation Designated parking space and route for the medevac aircraft. Transfer of care to in-country ambulance transport to designated treatment facility (see Key area B)
<ul style="list-style-type: none"> Infection control protocols during acceptance of a medevac patient. 	<ul style="list-style-type: none"> PPE stock in updated. Disinfection of environment (incl. as needed at airport, ambulance etc.) and equipment used (see Key area B) [4]. Waste management [35-37].
<ul style="list-style-type: none"> Training material on infection control procedures (PPE, disinfection, etc.) for different levels of staff, including airport staff. 	
<ul style="list-style-type: none"> Communication plan. 	<ul style="list-style-type: none"> Risk communication promptly initiated with inter-sectoral stakeholders at the national (aviation, ambulance, hospital etc.) and international levels, protecting the personal data of the evacuated person.

References

1. European Centre for Disease Prevention and Control (ECDC). Investigation and public health management of people with possible Ebola virus disease infection. Stockholm: ECDC; 2019 [cited 31 July 2019]. Available from: https://ecdc.europa.eu/sites/portal/files/documents/Technical_Report_EVD-management-July-2019_0.pdf
2. European Centre for Disease Prevention and Control (ECDC). HEPESA – health emergency preparedness self-assessment tool, User Guide. Stockholm: ECDC; 2018 [cited 29 September 2019]. Available from: <https://ecdc.europa.eu/sites/portal/files/documents/Technical-Doc-HEPSA-tool-update-dec-18.pdf>
3. European Centre for Disease Prevention and Control (ECDC). Use of personal protective equipment for safe first assessment of Persons Under Investigation of Ebola virus disease in the EU/EEA. Stockholm: ECDC; 2014 [cited 29 September 2019]. Available from: <https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/Use-of-PPE-for-safe-first-assessment.pdf>
4. European Centre for Disease Prevention and Control (ECDC). Assessing and planning medical evacuation flights to Europe for patients with Ebola virus disease and people exposed to Ebola virus. Stockholm: ECDC; 2014 [cited 29 September 2019]. Available from: <https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/ebola-guidance-air-transport-update-decontamination.pdf>
5. European Centre for Disease Prevention and Control (ECDC). Ebola virus disease ad hoc case definition for reporting in the EU. Stockholm: ECDC; 2015 [updated 13 Feb 2019] [cited 29 September 2019]. Available from: <https://ecdc.europa.eu/en/all-topics-zebola-and-marburg-feversthrats-and-outbreaksebola-outbreak-west-africa-2013-2016/ebola>
6. World Health Organization (WHO) Regional Office for Europe. Points of entry: IHR, Annex 1b and relevant articles 2012 [cited 29 September 2012]. Available from: <http://www.euro.who.int/en/health-topics/emergencies/international-health-regulations/points-of-entry>.
7. European Centre for Disease Prevention and Control (ECDC). Ebola emergency preparedness in EU Member States – Conclusions from peer-review visits to Belgium, Portugal and Romania. Stockholm: ECDC; 2015 [cited 24 July 2019]. Available from: <https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/ebola-emergency-preparedness-belgium-portugal-romania.pdf>
8. European Centre for Disease Prevention and Control (ECDC). Public health emergency preparedness for cases of viral haemorrhagic fever (Ebola) in Belgium: a peer review 16–19 March 2015. Stockholm: ECDC; 2015 [cited 24 July 2019]. Available from: <https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/ebola-preparedness-belgium.pdf>
9. World Health Organization (WHO). Ebola Virus Disease - Consolidated Preparedness Checklist 2015 [updated 15 January 2015] [cited 15 August 2019]. Geneva: WHO; 2015. Available from: https://apps.who.int/iris/bitstream/handle/10665/137096/WHO_EVD_Preparedness_14_eng.pdf?sequence=1
10. European Centre for Disease Prevention and Control (ECDC). Safe use of personal protective equipment in the treatment of infectious diseases of high consequence [updated 2 Dec 2014] [cited 5 August 2019]. Stockholm: ECDC; 2014. Available from: <https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/safe-use-of-ppe.pdf>
11. Public Health England (PHE). High consequence infectious diseases (HCID) [updated 13 May 2019] [cited 15 August 2019]. Available from: <https://www.gov.uk/guidance/high-consequence-infectious-diseases-hcid>
12. European Centre for Disease Prevention and Control (ECDC). Rapid risk assessment: Ebola virus disease outbreak in North Kivu and Ituri Provinces, Democratic Republic of the Congo – sixth update – 7 August 2019. Stockholm: ECDC; 2019 [cited 28 August 2019]. Available from: <https://ecdc.europa.eu/sites/portal/files/documents/update-6-Ebola-haemorrhagic-fever-DRC-7-August-2019.pdf>
13. World Health Organization (WHO). Ebola outbreak in the Democratic Republic of the Congo declared a Public Health Emergency of International Concern 2019 [updated 17 July 2019; cited 2019 24 July]. Available from: <https://www.who.int/news-room/detail/17-07-2019-ebola-outbreak-in-the-democratic-republic-of-the-congo-declared-a-public-health-emergency-of-international-concern>
14. Toner E, Shearer M, Sell TK, Meyer D, Chandler H, Schoch-Spana M. Health sector resilience checklist for high-consequence infectious diseases - informed by the domestic US Ebola response: Johns Hopkins Center for Health Security and US Centers for Disease Control and Prevention; 2017. Available from: http://www.centerforhealthsecurity.org/our-work/pubs_archive/pubs-pdfs/2017/HCID_Final_Report_05.23.2017.pdf
15. US National Ebola Training and Education Center (NETEC). NETEC Resource Repository [cited 31 July 2019]. Available from: <https://repository.netecweb.org/>
16. WHO Ebola Response Team. After Ebola in West Africa—unpredictable risks, preventable epidemics. *New England Journal of Medicine*. 2016;375(6):587-96.
17. Manet G, Bédubourg G, Velut G, de Laval F, Mayet A, Dia A, et al. Monitoring of returnees from Ebola-affected areas: lessons learned based on the experience of French armed forces deployed in Guinea, 2015. *Journal of Public Health*. 2017;40(3):639-45.
18. Otu A, Ameh S, Osifo-Dawodu E, Alade E, Ekuri S, Idris J. An account of the Ebola virus disease outbreak in Nigeria: implications and lessons learnt. *BMC Public Health*. 2018;18(1):3.
19. Bell BP. Overview, control strategies, and lessons learned in the CDC response to the 2014–2016 Ebola epidemic. *MMWR supplements*. 2016;65.
20. European Commission. Conference summary report - Conference "Lessons learned for public health from the Ebola outbreak in West Africa – how to improve preparedness and response in the EU for future outbreaks" 2015 [cited 9 August 2019]. Available from: https://ec.europa.eu/health/sites/health/files/preparedness_response/docs/ev_20151012_sr_en.pdf

21. European Centre for Disease Prevention and Control (ECDC). Handbook on simulation exercises in EU public health settings. How to develop simulation exercises within the framework of public health response to communicable diseases. Stockholm: ECDC; 2014 [cited 2 August 2019]. Available from: <https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/Simulation-exercise-manual.pdf>
22. European Centre for Disease Prevention and Control (ECDC). Best practice recommendations for conducting after-action reviews to enhance public health preparedness. Stockholm: ECDC; 2018 [cited 2 August 2019]. Available from: <https://ecdc.europa.eu/sites/portal/files/documents/public-health-preparedness-best-practice-recommendations.pdf>
23. World Health Organization (WHO). After Action Review [cited 2 August 2019]. Available from: <https://extranet.who.int/sph/after-action-review>
24. European Centre for Disease Prevention and Control (ECDC). Tutorial on the safe use of personal protective equipment. Available from: <https://www.ecdc.europa.eu/en/publications-data/tutorial-safe-use-personal-protective-equipment>
25. World Health Organization (WHO). ePROTECT 2018 Health and safety training (EN) [cited 5 August 2019]. Available from: <https://openwho.org/courses/e-protect>
26. US Centers for Disease Control and Prevention (US CDC). Crisis & Emergency Risk Communication (CERC) [updated 23 January 2018] [cited 2 August 2019]. Available from: <https://www.emergency.cdc.gov/cerc/index.asp>
27. European Centre for Disease Prevention and Control (ECDC). Risk communication [cited 2 August 2019]. Available from: <https://ecdc.europa.eu/en/health-communication/risk-communication>
28. World Health Organization (WHO). Emergency risk communication training [cited 2 August 2019]. Available from: <https://www.who.int/risk-communication/training/module-b/en/>
29. European Centre for Disease Prevention and Control (ECDC). Crisis communication [cited 2019 2 August]. Available from: <https://ecdc.europa.eu/en/health-communication/crisis-communication>
30. European Centre for Disease Prevention and Control (ECDC). Outbreak communication [cited 2 August 2019]. Available from: <https://ecdc.europa.eu/en/health-communication/outbreak-communication>
31. European Centre for Disease Prevention and Control (ECDC). Infection prevention and control measures for Ebola virus disease - Entry and exit screening measures. Stockholm: ECDC; 2014 [cited 31 July 2019]. Available from: <https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/Ebola-outbreak-technicalreport-exit-entry-screening-13Oct2014.pdf>
32. European Centre for Disease Prevention and Control (ECDC). Risk assessment guidelines for diseases transmitted on aircraft (RAGIDA) - Part 2: Operational guidelines for assisting the evaluation of risk for transmission by disease. Stockholm: ECDC; 2009 [cited 31 July 2019]. Available from: http://ecdc.europa.eu/en/publications/publications/1012_gui_ragida_2.pdf
33. EU Shipsan. Questions and answers about Ebola virus disease for maritime transport [cited 1 August 2019]. Available from: <http://www.shipsan.eu/Home/AdhocForumforEbola.aspx>
34. Isakov A, Miles W, Gibbs S, Lowe J, Jamison A, Swansiger R. Transport and management of patients with confirmed or suspected Ebola virus disease. *Annals of Emergency Medicine*. 2015;66(3):297-305.
35. US Centers for Disease Control and Prevention. Ebola-Associated Waste Management [updated 3 April 2019] [cited 31 July 2019]. Available from: <https://www.cdc.gov/vhf/ebola/clinicians/cleaning/waste-management.html>
36. United Nations Children's Fund (UNICEF). Ebola Virus Disease: Waste Management Guidance [updated 5 November 2014] [cited 5 August 2019]. Available from: https://www.unicef.org/supply/index_76045.html
37. Garibaldi BT, Reimers M, Ernst N, Bova G, Nowakowski E, Bukowski J, et al. Validation of autoclave protocols for successful decontamination of category a medical waste generated from care of patients with serious communicable diseases. *Journal of Clinical Microbiology*. 2017;55(2):545-51.
38. US National Ebola Training and Education Center (NETEC). PPE Calculator for Hospitals [updated 1 August 2015] [cited 31 July 2019]. Available from: <https://repository.netecweb.org/exhibits/show/leadership/item/215>
39. Ewington I, Nicol E, Adam M, Cox A, Green A. Transferring patients with Ebola by land and air: the British military experience. *Journal of the Royal Army Medical Corps*. 2016;162(3):217-21.
40. EMORY Healthcare. Ebola preparedness protocols - Message from the Emory Healthcare Executive Team [cited 1 August 2019]. Available from: <http://www.emoryhealthcare.org/ebola-protocol/ehc-message.html>
41. Nebraska Medicine. Ebola - Qualified and Prepared [cited 1 August 2019]. Available from: <https://www.nebraskamed.com/biocontainment/ebola>
42. Martin D, Howard J, Agarwal B, Rajalingam Y, Athan B, Bhagani S, et al. Ebola virus disease: the UK critical care perspective. *British Journal of Anaesthesia*. 2016;116(5):590-6.
43. Rodríguez-Caravaca G, Timermans R, Parra-Ramírez JM, Domínguez-Hernández FJ, Algora-Weber A, Delgado-Iribarren A, et al. Health-care management of an unexpected case of Ebola virus disease at the Alcorcon Foundation University Teaching Hospital. *Enfermedades infecciosas y microbiología clínica*. 2015;33(4):228-32.
44. Cieslak TJ, Evans L, Kortepeter MG, Grindle A, Aigbivbalu L, Boulter K, et al. Perspectives on the management of children in a biocontainment unit: Report of the NETEC pediatric workgroup. *Health Security*. 2019;17(1):11-7.
45. Garibaldi BT, Chertow DS. High-containment pathogen preparation in the intensive care unit. *Infectious Disease Clinics*. 2017;31(3):561-76.
46. Hewlett AL, Varkey JB, Smith PW, Ribner BS. Ebola virus disease: preparedness and infection control lessons learned from two biocontainment units. *Current Opinion in Infectious Diseases*. 2015;28(4):343.
47. Uyeki TM, Mehta AK, Davey Jr RT, Liddell AM, Wolf T, Vetter P, et al. Clinical management of Ebola virus disease in the United States and Europe. *New England Journal of Medicine*. 2016;374(7):636-46.

48. Bannister B, Puro V, Fusco FM, Heptonstall J, Ippolito G, EUNID Working Group. Framework for the design and operation of high-level isolation units: consensus of the European Network of Infectious Diseases. *The Lancet Infectious Diseases*. 2009;9(1):45-56.
49. Belfroid E, van Steenberghe J, Timen A, Ellerbroek P, Huis A, Hulscher M. Preparedness and the importance of meeting the needs of healthcare workers: a qualitative study on Ebola. *Journal of Hospital Infection*. 2018;98(2):212-8.
50. Leligdowicz A, Fischer WA, Uyeki TM, Fletcher TE, Adhikari NKJ, Portella G, et al. Ebola virus disease and critical illness. *Critical Care*. 2016;20(1):217.
51. World Health Organization (WHO). How to conduct safe and dignified burial of a patient who has died from suspected or confirmed Ebola or Marburg virus disease. Geneva: WHO; 2017 [cited 28 August 2019]. Available from: <https://www.who.int/csr/resources/publications/ebola/safe-burial-protocol/en/>
52. Leditschke J, Rose T, Cordner S, Woodford N, Pollanen M. The development of a protocol for post-mortem management of Ebola virus disease in the setting of developed countries. *Forensic Science, Medicine and Pathology*. 2015;11(2):262-7.
53. Coignard-Biehler H, Rapp C, Chaplain JM, Hoen B, Che D, Berthelot P, et al. The French Infectious Diseases Society's readiness and response to epidemic or biological risk—the current situation following the Middle East respiratory syndrome coronavirus and Ebola virus disease alerts. *Medecine et maladies infectieuses*. 2018;48(2):95-102.
54. European Commission. Flash report of the Plenary Meeting of the Health Security Committee 3-4 July 2019, Senningen/Luxembourg: EC; 2019 [cited 26 August 2019]. Available from: https://ec.europa.eu/health/sites/health/files/preparedness_response/docs/ev_20190703_flash_en.pdf
55. US Centers for Disease Control and Prevention. Guidance on Air Medical Transport (AMT) for Patients with Ebola Virus Disease (EVD) [updated 27 January 2015] [cited 2 August 2019]. Available from: <https://www.cdc.gov/vhf/ebola/clinicians/emergency-services/air-medical-transport.html>

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