

Handbook for management of public health events on board ships



World Health
Organization

International Health Regulations (2005)

Handbook for management
of public health events
on board ships

Handbook for management of public health events on board ships

WHO Library Cataloguing-in-Publication Data

Handbook for management of public health events on board ships.

1. Ships. 2. Travel. 3. Disease Outbreaks. 4. Communicable Disease Control. I. World Health Organization.

ISBN 978 92 4 154946 2 (NLM classification: WA 670)

© World Health Organization 2016

All rights reserved. Publications of the World Health Organization are available on the WHO website (<http://www.who.int>) or can be purchased from WHO Press, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland (tel.: +41 22 791 3264; fax: +41 22 791 4857; email: bookorders@who.int).

Requests for permission to reproduce or translate WHO publications –whether for sale or for non-commercial distribution– should be addressed to WHO Press through the WHO website (http://www.who.int/about/licensing/copyright_form/index.html).

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health Organization be liable for damages arising from its use.

CONTENTS

EXECUTIVE SUMMARY	3
ACKNOWLEDGEMENTS	5
WHO CONTRIBUTORS	7
ACRONYMS	7
DEFINITIONS	8
1. INTRODUCTION	9
1.1 Background	9
1.2 Purpose and scope	10
1.3 Methodology	10
2. LEGAL FRAMEWORK	12
3. COMMUNICATION	13
3.1 Essential arrangements for communication available at all times	13
3.2 Communication from port to national level	14
3.3 Communication between ports	14
3.4 Communication with media	15
4. EVENT DETECTION	16
5. PRELIMINARY STANDARD RESPONSE AT THE PORT	17
5.1 Event verification	17
5.2 Ascertaining immediate arrangements – preliminary assessment and reporting	17
6. EVENT RISK ASSESSMENT AT THE PORT LEVEL	20
6.1 Risk assessment procedure at the port level	20
6.2 Assessment on board the ship	23
6.3 Update of assessment	25
6.4 Risks at the port environment or during the activities of travellers while ashore	25
7. RESPONSE MEASURES	25
7.1 Roles and responsibilities	25
7.2 Events where the competent authority should consider taking action	27
7.3 Response measures to events of infectious diseases	27
7.4 Health measures for selected situations of an infectious nature	30

7.5 Response measures to events related to risks in the environment	33
7.6 Response measures to events of unknown etiology including chemical and radiological hazards	33
7.7 Additional health measures that significantly interfere with international traffic	34
7.8 Safeguard measures of personnel involved in event management	34
8. OPTIONS FOR HEALTH MEASURES	34
8.1 Public health measures with respect to persons	34
8.2 Public health measures with respect to ships and inanimate objects	41
8.3 Use of specific health measures to ensure the safe handling and transport of human remains	44
8.4 Public health measures for affected animals	45
REFERENCES	46
Annex 1. Events of infectious diseases linked with ships based on a literature review	49
Annex 2. Disease-specific measures	50
Annex 3. Event management flowchart	58
Annex 4. Guidance on establishing public health assessment interview spaces	59

EXECUTIVE SUMMARY

With the adoption of the International Health Regulations (IHR) by the World Health Assembly in May 2005, States Parties agreed to develop, strengthen and maintain public health core capacities related to surveillance and response at designated points of entry (PoE) as specified in IHR Annex 1. Furthermore, States Parties agreed to establish and maintain public health emergency contingency plans at PoE to prevent the spread of diseases internationally. IHR assigns the World Health Organization (WHO) the responsibility to publish, in consultation with States Parties, guidelines on the development of public health response capacities. To assist States Parties in contingency planning and implementation of health measures on board ships or in ports, WHO developed a generic guidance addressing all public health risks and related rules and regulations.

According to IHR, competent authorities at ports are responsible for responding to events that pose a risk to public health. These events are identified through notifications by ships or other competent authorities, during a ship inspection or even through other informal routes such as media reports. Events may be caused by biological, chemical or radiological agents. Event management involves event identification, verification, risk assessment and response.

The decision making process can pose a challenge to competent authorities responsible for ports. Examples of such challenges were observed during the influenza A (H1N1) pandemic in 2009, where various approaches and practices were observed among countries around the world. In response, WHO published the *WHO Interim Technical Advice for Case Management of Pandemic (H1N1) 2009 on Ships*, which includes guidance on preventive measures, detection, risk assessment and case management.

A wide variety of events ranging in severity may occur on ships, requiring different responses or even no response. This document aims to provide technical advice to competent authorities at the port level for management of public health events on board ships; it is complementary to other WHO publications addressing risk assessment at the national level, contingency planning at PoE, establishment of capacities and application of emergency plans at the port level. Such advice is given in the following documents published by WHO:

- *Rapid Risk Assessment of Acute Public Health Events*
- *International Health Regulations (2005): A Guide for Public Health Emergency Contingency Planning at Designated Points of Entry*
- *WHO Manual: The Public Health Management of Chemical Incidents*
- *Human Health Risk Assessment Toolkit: Chemical Hazards*

In particular, for events related to public health risks caused by environmental hazards, this document references the *Guide to Ship Sanitation and the Handbook for Inspection of Ships and Issuance of Ship Sanitation Certificates*, while for chemical and biological hazards, the *International Convention for the Safety of Life at Sea (SOLAS)*, the *International Maritime Dangerous Goods Code* and the *International Convention for the Prevention of Pollution from Ships (MARPOL)* are cross referenced. For technical advice on health measures related to travellers, the *WHO International Travel and Health* and the *International Medical Guide for Ships (IMGS)* are cross referenced.

The development of this document was launched in 2011. While initially conceived as a concise technical document, it has evolved into a comprehensive text that draws on the scientific literature and lessons learned from recent disease outbreaks to provide substantive public health guidance. Considerable efforts have been made to consult with stakeholders through opportunities for input and feedback in 2011, 2012 and 2014, which has led to contributions to this document by public health and shipping sector stakeholders.

In the time since this guidance has been written, the global community has experienced two outbreaks. The first of which, the Ebola virus disease (EVD), was declared a “public health emergency of international concern” by the IHR Emergency Committee in August 2014. At this writing, the second outbreak, Middle East respiratory syndrome coronavirus (MERS-CoV) continues to cause infection in various Member States and regions of the world. The lessons learned from the global response to these outbreaks, particularly in relation to public health measures adopted at PoE, have been incorporated into this guidance, either as direct references or through links to relevant documents. It is anticipated that this guidance document will continue to reflect best practices in the management of public health events in shipping transport through future reviews and revisions.

ACKNOWLEDGEMENTS

This document has been produced with the financial assistance of the European Union. The views expressed herein can in no way be taken to reflect the official opinion of the European Union.

The development of this document was coordinated by the Ports, Airports and Ground Crossings team/ Support to IHR Capacity Assessment, Development and Maintenance Coordination (CAD) / Global Capacities, Alert and Response Department (GCR), Lyon, France.

Editorial Group :

Daniel Lins Menucci, Ports, Airports and Ground Crossings Team/CAD/GCR , WHO, Lyon, France.

Barbara Mouchtouri, Ports, Airports and Ground Crossings Team/CAD/GCR, WHO, Lyon, France.

Ninglan Wang, Ports, Airports and Ground Crossings Team/CAD/GCR, WHO, Lyon, France.

The following experts participated in the guideline working group and provided input to the preparation and review of the guidelines. Their contributions are gratefully acknowledged.

Lucia Alonso, Epidemiology Division, Ministry of Public Health, Uruguay

Jaret T Ames, Vessel Sanitation Program, National Center for Environmental Health, Centers for Disease Control and Prevention, USA

Blommin Bamba, Navy, Côte d'Ivoire

Nicol Black, Health Protection Agency, United Kingdom

Susan Clay, Environmental Health Bureau, Safe Environments Directorate, Health Canada

Miguel Dávila-Cornejo, Directorate general of public health and foreign health, Ministry of health, Spain

John Gardner, Environmental and Border Health, Public Health, New Zealand

Christos Hadjichristodoulou, European Union SHIPSAN TRAINET project, University of Thessaly, Faculty of Medicine, Greece

Mathias Kalkowski, Port Health Inspector, Hamburg Port Health Center, Germany

Leonardo de Oliveira Leitão, Brazilian Health Surveillance Agency, ANVISA, Brazil

Pedro Luis Bodor Nagy, Ministry of Health, Chile

Raphael John Marfo, Port Health Unit of the Ghana Health Service, Kotoka International Airport, Ghana

Maria João Martins, Health Authority, International Health Team Coordinator Lisbon and Tagus Valley, Coordenadora da USP - ACES III - Lisboa Central, Portugal

Hameed Gh HMohammad, Ports and Borders Health Division, Ministry of Health, State of Kuwait

Rosemarie Neipp, General Directorate for Public Health and Foreign Health Affairs, Ministry of Health and Social Policy, Spain

Gordon Nichols, Gastrointestinal, Emerging and Zoonotic Infections Department, Health Protection Agency, Centre for Infections, United Kingdom

Pedro Miguel Brilha Patricio, Lisbon Regional Health Administration, Portugal

Thierry Paux, Ministère du Travail, de l'Emploi et de la Santé, Direction générale de la santé, Département des urgences sanitaires, France

Murdock Ramathuba, Department of Health (Port Health Services), Ministry of Health, South Africa

Jelena Rjabinina, Bureau of Epidemiological Preparedness, Department of CD Surveillance and Control, Health Board, Estonia

Francisco Santos O'Connor, European Centre for Disease Prevention and Control, Sweden

Clara Schlaich, Hamburg Port Health Center, Central Institute for occupational and maritime health, Germany

Verrol Scott, Coordinator of the Environmental Health Program, Barbados Community College, Barbados

Douglas D Slaten, Quarantine Medical Officer, Centers for Diseases Control and Prevention, Los Angeles Quarantine Station, USA

Eirian A Thomas, Principal Health Protection Scientist, Cardiff Metropolitan University, United Kingdom

Imam Triyanto, Jakarta Port Health Office, Indonesia

Adel Mohamed Turkistani, Health Surveillance Center at Jeddah Islamic Sea Port, Directorate of Health Affairs, Jeddah Province, Ministry of Health, Kingdom of Saudi Arabia

Viviane Vilela Marques, Brazilian Health Surveillance Agency, ANVISA, Brazil

Martin Walker, Suffolk Coastal Port Health Authority, United Kingdom

Sandra Westacott, Port Health Services, Southampton City Council, United Kingdom

Lin Yuan, Qingdao Entry-Exit Inspection and Quarantine Bureau, China

He Yuping, Shanghai Bureau of Quality Supervision Inspection and Quarantine of China, China

Fang Zhiqiang, Department for supervision on health and quarantine, General Administration of Quality, Supervision, Inspection and Quarantine, China

Nicky Cohen - Associate Chief for Science, Quarantine and Border Health Services Branch CDC Division of Global Migration and Quarantine, Atlanta

WHO CONTRIBUTORS

Yves Chartier, Public Health and Environment Water, Sanitation, Hygiene and Health, WHO, Switzerland

Stephen Harte, PAHO/ECC Office, WHO Office for the Americas, Washington

Jean Y Jabbour, WHO, Regional Office for the Eastern Mediterranean, Egypt

Ailan Li, Communicable Disease Surveillance and Response, WHO, Western Pacific Regional Office, Philippines

Aalissar Rady, EM_LEB WHO, Representative's Office, Lebanon

Susan Wilburn, WHO/HQ/PHE/IHE, WHO, Switzerland

Sebastien Bruno Francois COGNAT, Laboratory Strengthening and Biorisk Management, WHO, Lyon, France

Magdi Samaan, Laboratory Strengthening and Biorisk Management, WHO, Switzerland

ACRONYMS

EVD	Ebola Virus Disease
IHR	International Health Regulations
ILI	Influenza-Like-Illness
ILO	International Labour Organization
IMDG	International Maritime Dangerous Goods
IMGS	International Medical Guide for Ships
IMO	International Maritime Organization
MARPOL	International Convention for the Prevention of Pollution from Ships
MERS-CoV	Middle East Respiratory Syndrome Coronavirus
MDH	Maritime Declaration of Health
MLC	Maritime Labour Convention
NFP	National IHR Focal Point
NGO	Nongovernmental Organization
PoE	Points of Entry
PPE	Personal Protective Equipment
SARS	Severe Acute Respiratory Syndrome
SOLAS	International Convention for the Safety of Life at Sea
SOP	Standard Operating Procedure
SSC	Ship Sanitation Certificate
UNCLOS	United Nations Convention on the Law of the Sea
VHF	Viral Haemorrhagic Fever
WHO	World Health Organization

DEFINITIONS

If not included in this section, words have the meaning as defined in the *International Health Regulations (IHR)* ⁽¹⁾. The IHR were adopted in 2005 and came into effect in 2007. This report assumes the IHR referred to are those from 2005 unless otherwise mentioned.

“Affected area” means a geographical location specifically for which health measures have been recommended by WHO under the IHR.

“Competent authority” means an authority responsible for the implementation and application of health measures under these Regulations.

“Contact” refers to a person or animal that has been in such association with an infected person or animal or a contaminated environment as to have had opportunity to acquire the infection.

“Hazard” ⁽²⁾: An agent or a source that has the potential to cause adverse health effects in exposed populations.

“Points of entry (PoE)” means 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.

“Port health” refers to health authorities responsible for public health at a specific port.

“Public health authority” means the national or local Member State’s authority to manage public health.

“Public health emergency of international concern (PHEIC)” means an extraordinary event which is determined, as provided in these Regulations:

- to constitute a public health risk to other Member States through the international spread of disease, and

- to potentially require a coordinated international response.

“Risk” is the probability or likelihood of harm or damage occurring from exposure to a hazard and the possible consequences.

“Risk assessment” ⁽²⁾: A systematic process for gathering, assessing and documenting information in order to assign to an event a particular risk to human health.

1. INTRODUCTION

1.1 Background

It is essential that competent authorities plan, prepare and respond effectively to events within the context of International Health Regulations (IHR). Examples of past events that competent authorities have confronted include the distribution of *Vibrio cholerae* from discharged ballast water and sediments of cargo ships (3, 4), the dispersal and invasion of *Aedes albopictus* mosquito through sea-borne trade into new areas (5) and outbreaks of viral gastroenteritis (6) and legionellosis (7, 8) on ships. The spread/release of hazardous material (including chemical and radiological) should also be considered. The nuclear accident in Fukushima, Japan and its impact on ship travel emphasizes the importance of an “all-hazard approach” to contingency planning at ports. Although maritime transport did not impact the transmission of the influenza A (H1N1) virus in 2009 or the Ebola virus disease (EVD) in West Africa, which started at the end of 2013, public health authorities were prepared to implement response plans in both public health emergencies of international concern.

Events occurring on ships and the risks that arise from them differ in nature. A competent authority must undertake a risk assessment as part of the decision making process, before responding to events. One issue to consider includes the type of ship: cargo ships often carry dangerous goods including explosive, corrosive and/or oxidizing materials; and on modern passenger ships, a much larger number of people can be exposed to potential health hazards than is possible on a cargo ship.

Other issues include availability of medical assistance. Medical consultation with a physician and well-equipped medical facilities and enhanced systems of disease surveillance may be available on cruise ships, but often do not exist on cargo ships or ferries. Cargo ships may travel for a long period of time without a doctor on board. Ferry voyages are shorter and may include frequent stops to ports where medical consultation ashore can be arranged. However, on all types of ships, especially those with a small crew, if a large proportion of crew fall ill and are unable to perform their duties, the safety of sailing might be affected. Another factor to consider is that vaccine status may be different among passengers and crew, according to national vaccination policies within countries and vaccine practices between ship companies.

Hazard exposure of ship travellers depends on the destination. Itineraries of ships play an important role, since endemicity of diseases differs around the world. Ports are places where travellers and workers interact. Cargo originating from different parts of the world are loaded or offloaded on ships or stored at the pier. Trains or other means of transportation load goods and transport travellers from ports to other destinations and connect ports with airports. All these activities provide opportunities for interactions among persons and their environment – and vector transmission.

Transnational transmission of a disease by ship is a perceived risk, but nowadays aeroplanes play the major role in the rapid international spread of diseases. While the propagation of infectious agents to non-affected countries through ships took place in past centuries, ships continue to play a role in transnational dispersal of vectors; in recent years the dispersal of harmful aquatic organisms and pathogens through ballast water has been well documented (9-11).

Event management on ships, therefore, needs a multidisciplinary approach and must be implemented in the context of the contingency plan, the IHR, other intergovernmental agreements and national and regional rules and regulations. This legal framework also defines the roles and responsibilities of the involved parties including the master, ship operator and port authority.

1.2 Purpose and scope

The purpose of this handbook is to assist competent authorities at the local level to manage potentially internationally significant public health events at ports. This document addresses events which have the likelihood of adversely affecting the health of the human population, may spread internationally, or may present a serious and direct danger to health. It follows an all-hazard approach, but addresses events related to biological hazards in more detail than those related to chemical and radiological hazards. This technical advice intends to assist competent authorities at ports to conduct risk assessment in the context of IHR, to respond in a consistent manner to events and to make decisions on interventions that are commensurate to the risks, while avoiding unnecessary interference with international traffic and trade.

This document targets personnel who are responsible for event management at ports, such as personnel working in public health, medical, veterinary, environmental, customs, port state control and occupational health services. This advice can be also useful to IHR National Focal Points (NFPs) and shipping companies, ship masters, officers and crew.

Medical care and treatment are beyond the scope of this document. However, the establishment of contingency plans is a prerequisite to managing events. Technical advice should be implemented in the context of existing contingency plans at PoE. Such guidance is provided in the *World Health Organization (WHO) International Health Regulations (2005): a Guide for Public Health Emergency Contingency Planning at Designated Points of Entry* (12).

Further, this handbook does not address response measures to suspected bioterrorism incidents. During a bioterrorism incident, certain information or a specific event should trigger the exchange of information between law enforcement and public health (13). Both law enforcement and public health officials need to provide information and expertise to assess an incident, investigate it and determine whether it was intentional or naturally occurring (13). To assist in the response to a bioterrorism incident at the local level, law enforcement and public health agencies should develop protocols to conduct a local bioterrorism threat assessment between agencies and jurisdictions.

1.3 Methodology

The methodology to develop this technical advice involved expert focus groups and a literature review of events that have been linked to ships.

A working group was established and four meetings with technical experts took place in Lyon: on 27–29 June 2011, 14–15 December 2011, 25–26 April 2012 and 14–17 April 2014. Four rounds of peer review by experts were conducted on four versions of the document.

The objectives of the literature review were to: a) identify public health events related to ships; and b) provide an evidence base for the guidance document.

The WHO library database was searched for all publications related to travel health, ship sanitation, core capacities development at ports, risk assessment and seafarers' health. The online databases PubMed (U.S. National Library of Medicine) and EMBASE were searched for published articles by using the following keywords:

- a) disease, infection, illness, sickness, syndrome, public health risk, public health hazard, public health event,
- b) ship, cargo ship, vessel, boat, navy ship, fishing vessel, cruise, passenger, ferryboat, ferry, yacht,
- c) virus, vector, mosquito, bug, pathogen, insect, microbe and microorganisms.

Combinations of these terms were also used.

The focus of this literature search was traveller health and, specifically, public health issues related to traveller health during ship travel. Public health events with laboratory evidence for linking the events with ship travel, which occurred from 1975 until 2011 were included in the review. Research and guidance aimed solely at occupational health issues for seafarers were excluded from the review. A summary of the articles fulfilling the inclusion criteria is presented in Annex 1.

1.3.1 Methods used to define the scope

To decide which public health events to address in the technical advice, two criteria were used: a) previous occurrence of an event on ships based on experts' opinions and a literature review and b) severity of diseases based on case fatality rates and virulence, transmissibility, outbreak potential and availability of vaccine, prophylaxis or other measures.

Through focus groups, decisions were made regarding the public health events that are considered relevant to ships. Experts were asked to express their opinions (first independently and then in group discussion) on the events to be included in the technical advice based on their experience.

A literature review was conducted as described in section 1.3 to identify recent or historical events linked to ships.

Based on the opinions of the experts consulted, and on the events reported in the literature, a list was created including events that should be addressed in the technical advice.

1.3.2 Methods used to develop the risk assessment process and recommendations for response

Existing published WHO guidelines were reviewed with the purpose of identifying content relevant to the current technical advice and to ensure agreement with previously published guidance.

Experts employed the principles of risk assessment to agree on the criteria and parameters used to define the potential impact and probability of events and to make recommendations for public health measures. A literature review (as described in section 1.3) was used to obtain information on public health measures that have been implemented on ships in previous events and their effectiveness.

This version of the handbook has been updated to reflect advice and various guidance documents developed to support the 2014 EVD outbreak and MERS-CoV outbreaks. These terms were not included in the original literature search.

2. LEGAL FRAMEWORK

Public health risks arising from global travel and transport prompted the global community to develop international health laws. As part of public health planning and response, States Parties must consider both legal and ethical dimensions. For the purposes of this guidance document, only the primary legal authorities based on WHO and IHR are included. States Parties should refer to national and regional legal authorities for other applicable legislation.

WHO is the directing and coordinating authority for health within the United Nations system. It is responsible for providing leadership on global health matters, including responsibilities for the implementation of the IHR. WHO States Parties led the IHR revision in recognition that health is a shared responsibility, involving equitable access to essential care and collective defence against transnational threats.

The goal of the IHR is to provide a legal framework for the prevention, detection and containment of public health risks at their source, before they spread across borders, through the collaborative actions of States Parties, WHO and all relevant stakeholders. As stated above, the IHR were adopted in 2005 and came into effect in 2007. All State Parties who accepted the IHR without reservations are legally bound to implement them accordingly.

The IHR includes protection for human rights of persons and travellers, establishing the principle that “the implementation of these Regulations shall be with full respect for the dignity, human rights and fundamental freedoms of persons” (Article 3). This is in acknowledgement that public health measures that impose limits on movement or require other interventions at a personal or community level may at times be warranted for the ‘public good’, but must be balanced by ethical considerations.

Other international agreements are applicable, including the *United Nations Convention on the Law of the Sea (UNCLOS)* (14) that defines the rights of countries to apply their national sanitary laws while the ship is at port and within 24 nautical miles of land in Section 4, Articles 2-4, 19(2)g and 21(1)h.

The International Maritime Organization (IMO) is the specialized agency of the United Nations for the safety, security and environmental performance of international shipping. Its main role is the development of the regulatory framework for the shipping industry, which is adopted and implemented universally. IMO measures cover all aspects of international shipping, including ship design, construction, equipment, staffing, operation and disposal. Relevant IMO conventions are the *International Convention for the Safety of Life at Sea (SOLAS)* (15) and the *International Convention for the Prevention of Pollution from Ships (MARPOL)* (16), with provisions for maritime safety, security and prevention of marine pollution, respectively.

3. COMMUNICATION

The capability to share information in a timely fashion is required for effective management of events. Arrangements for communication are necessary to ensure the flow of information between: the ship and the competent authority at port; between the competent authority at port and other authorities at the local, intermediate and national levels; as well as between ports. All stages of event management require effective communications.

Moreover, authorities' preparedness plans should have provisions for health education of their personnel, as well as other professional groups including the maritime pilots (the mariners who assume responsibility for a ship for the purpose of navigating it through a river or channel, or from or into a port). This will help avoid incorrect perceptions that could result in exposure to health risks or overreactions on the part of the staff at PoE.

3.1 Essential arrangements for communication available at all times

IHR Annex 1 (b) describes the required core capacities that must be available at all times at ports. State Parties must provide appropriate public health emergency response by establishing and maintaining a public health emergency contingency plan (12), including the nomination of a coordinator and contact points for relevant PoE, public health and other agencies and services. The essential arrangements for communication that should be available at all times are (17):

- Procedures and means of communication for receiving health information, documents, and/or reports from ships regarding public health events or cases of illness on board, and to provide advice and advance notice of the application of control measures, as applicable. For this purpose the competent authority should:
 - a) Identify the responsible authorities and establish means of communication and procedures to report all available essential information to the health authority at local, intermediate or national levels, including communicating with the IHR NFP for public health assessment, care and response. Authorities that can be involved in the event management, depending on the situation, are: customs, veterinary, environmental, security, police, fire, immigration, agriculture, occupational health, chemical, radiological, laboratories, ambulatory services, hospitals and the local authority for death registries.
 - b) Maintain the following contact details for the above mentioned authorities: telephone, email, facsimile and mobile-text. Radio can be used to communicate information, depending on the event. In the absence of a reliable terrestrial network, alternative networks offer communication with ships in emergencies.
- Procedures and means for communication with competent authorities at other PoE to provide relevant information regarding evidence found, as well as further control measures needed on arrival of the affected ship at the next port.
- Identify and update contact details of conveyance operators, including agents or legal representatives at shore, and provide them with current contact details of the public health/competent authority for accurate and timely communication.
- Establishment of all administrative arrangements and necessary procedures for the issuance of free pratique (permission for a ship to enter a port, embark or disembark, discharge or load cargo or stores) to ship and health documents, as required.

- Identification of medical facilities/service providers and establishment of administrative arrangements for access to medical and diagnostic facilities for assessment and care of ill travellers or those suspected of being ill, as appropriate, and according to national plans and protocols.
- Establishment of administrative arrangements for communication in order to transport ill passengers to appropriate medical facilities at shore, as appropriate.
- Establishment of mechanisms to be activated when arrangements are needed to follow-up with passengers and crew members who have disembarked and are sent for treatment either in isolation units, at health care facilities or are under quarantine on shore for advice and/or adoption of further health control measures regarding the remaining travellers left on board, as applicable, according to national plans and protocols.

3.2 Communication from port to national level

Events are escalated as appropriate (e.g. to regional authorities, national surveillance centres, IHR NFPs) according to national rules and regulations. Immediate reporting of an event to the IHR NFP is necessary in the following circumstances:

- If the event involves the diseases that must be notified under Annex 2 of IHR: smallpox, poliomyelitis due to wild type poliovirus, human influenza caused by a new subtype, or severe acute respiratory syndrome (SARS), then the authority at port must immediately report the events to the IHR NFP, who in turn must notify WHO.
- If the event involves the diseases included in the algorithm in Annex 2 of IHR, then the authority at port must immediately report the events to the IHR NFP. Once it is reported, the NFP uses the decision instrument found in Annex 2 of the IHR to determine the wider health impact. Some of the diseases are: cholera, pneumonic plague, yellow fever, viral haemorrhagic fevers (VHFs) (EVD, Lassa fever, Marburg virus disease), West Nile fever and other diseases that are of special national or regional concern, e.g. dengue fever, Rift valley fever and meningococcal disease.
- If there is any information about evidence of a public health risk identified outside the territory of the country that may cause international disease spread, as manifested by exported or imported: (a) human cases; (b) vectors which carry infection or contamination; or (c) goods that are contaminated, then the authority must inform the IHR NFP as soon as possible, who in turn must notify WHO (1).
- Immediate reporting of the event to the IHR NFP might be necessary if investigation, follow-up of the event or contact tracing are needed and another country needs to be informed.

3.3 Communication between ports

As part of the event management on ships, communication among port authorities of different or the same country may be necessary. Port-to-port communication (either directly or through the IHR NFPs of two or more countries) is necessary in the following circumstances according to the IHR:

- a) when the competent authority for the point of entry is not able to carry out the control measures required in an affected ship¹ at the time of departure, they must inform the next known point of entry (IHR Articles 27 and 28);

¹ - If clinical signs or symptoms and information based on fact or evidence of a public health risk, including sources of infection and contamination, are found on board a ship, the competent authority shall consider the conveyance as affected (IHR Article 27).

b) when a follow-up inspection is required to determine the success of the vector control measures applied. The competent authorities for the next known port of call with a capacity to make such an inspection shall be informed of this requirement in advance by the competent authority advising such follow-up (IHR Annex 5);

c) when a traveller suspected of being ill is placed under public health observation upon arrival and has been allowed to continue an international voyage, provided that the traveller does not pose an imminent public health risk. The State Party that placed the traveller under observation must inform the competent authority of the point of entry at the destination, if known, of the traveller's expected arrival. On arrival, the traveller shall report to that authority (IHR Article 30);

d) when samples for laboratory analysis have been taken, and based on the results obtained, a re-inspection is required. In this case, the competent authority should inform the next appropriate port of call coinciding with the re-inspection date specified in the Ship Sanitation Certificate (SSC) (IHR Annex 3).

If investigation of an event requires contact tracing, then communication with previous ports would be necessary. Follow up of events and updating of event progress would involve communication with next and previous ports of call as appropriate.

3.4 Communication with media

Public health events often attract media attention and health officers might be asked to communicate with media. Communication with media is part of the communication strategy of an authority and it is the responsibility of senior management or designated authority (18). Trained health authorities should be assigned this task. Media influence public perception and effective media communication requires good preparation, timely, accurate, clear, concise and credible messages. Any rumours, inaccuracies and misperceptions should be addressed as early as possible. Coordination with all authorities involved in the event helps ensure consistency when messages are delivered to the public. The information given to media should fulfil information requests and help to eliminate or reduce public fear or inappropriate behaviour. Further information can be found in the WHO handbook for *Effective Media Communication During Public Health Emergencies* (18).

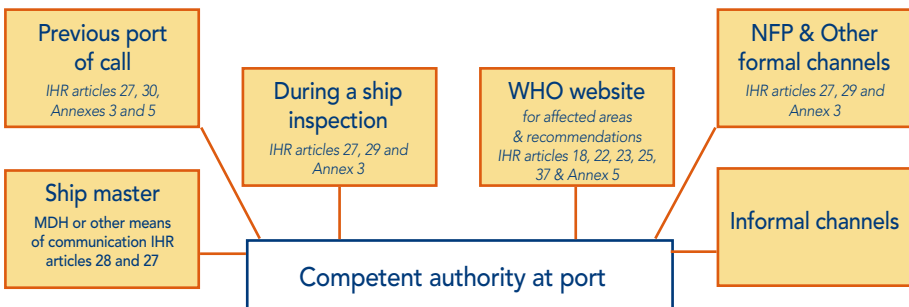
4. EVENT DETECTION

Early detection of events allows for timely implementation of public health measures, containment of hazards and prevention of further potential exposure. Elements essential to event detection include: surveillance, the capacity to receive notifications sent by ships and the capacity to communicate with authorities at both local and national levels, as described in section 3.

Authorities detect events related to ships through the following ways (Figure 1 and Annex 3):

- The master of the ship or other designated officer notifies the competent authority about public health risks including infectious diseases, chemical, biological or radiological hazards on board the ship. Depending on the situation and the legislative framework for notification of each country, this information can be declared through the Maritime Declaration of Health (MDH) (IHR Article 37), or by making it known to the port by other means (IHR Article 28).
- The competent authority at port receives information about a public health risk on a ship by another authority (usually at the previous port of call of the ship) for the following reasons: (a) the ship is considered an affected conveyance (IHR Article 27) and a follow-up inspection is required to determine the success of the control measures applied, including vector control measures according to IHR Annex 5; (b) a traveller is under health observation (IHR Article 30); (c) when samples for laboratory analysis have been taken and based on the results obtained, a re-inspection is required (IHR Annex 3).
- The competent authority identifies a public health risk during a ship inspection. The findings are recorded in the SSC (IHR Articles 27, 28 and Annex 3).
- Ships coming from affected areas can potentially carry a public health risk, therefore information regarding affected areas, as well as temporary and standing recommendations issued by WHO can help identify events and decide on the application of health measures (IHR Articles 18, 22, 23, 25, 37 and Annex 5).
- Other formal channels of information (IHR Article 44) including the NFP (IHR Article 4). For example, some of the communicable diseases with a long incubation period can be diagnosed after disembarkation. Such events can become known through national surveillance systems and later connected to travel aboard ship.
- Events can be identified through informal channels such as media, travellers' complaints and nongovernmental organizations (NGOs).

Figure 1. Detecting events through various sources of information



5. PRELIMINARY STANDARD RESPONSE AT THE PORT

5.1 Event verification

As described above, events can be detected through formal and informal channels. Confirmation of the event by collecting accurate information is important and part of the standard preliminary response of the competent authority. The information collected will be used in the public health risk assessment to ascertain what level, if any, of intervention is required. To verify the event, further information can be asked by the ship agent, ship master, other designated crew or the authority that reported the event. Event verification requires arrangements for communications that should be available at ports at all times (see section 3).

5.2 Ascertaining immediate arrangements – preliminary assessment and reporting

The competent authorities can make a preliminary assessment based on basic information such as type of event, level of severity, trend and hazard level concerning the public health event, and use that to decide whether or not to trigger the contingency plan (12). Initial questions as part of the standard first response and options for actions are listed in Box 1.

Basic information about the conveyance collected could include: conveyance type, flag, number of travellers (crew, passengers, voyage number, itinerary, loading port of food and drinking water, etc.). Basic information about the event could include: any indication about the causative agent (Box 2 includes a list of event types), time of occurrence and whether it is still ongoing, name and contact details of reporter, persons involved, main symptoms, any deaths, measures taken, the reserving of specimens from patients such as vomit, secretions or excreta.

After the initial communication, the competent authority may decide on actions that need to be taken immediately and before a full risk assessment of the event has been undertaken, such as evacuation of ill travellers or immediate medical support. Indicative options for such actions are presented in Box 1.

At this stage, even if the causative agent is unknown, a preliminary report to the next level of authorities may be needed, at least including the name of the public health event, types and characteristics of the public health event based on preliminary assessment, where and when it happened, number of patients and deaths, main symptoms, measures taken, reporting organizations and reporters' contact information.

Box 1. Preliminary standard response by the competent authority at port: Indicative options for action

Question	Specific indicative options for action
<ul style="list-style-type: none"> • Is a human life in danger (clinical signs and symptoms among travellers and severity)? 	<ul style="list-style-type: none"> • Evacuation of ill traveller • Medical support • Ambulance arrangement • Identification of the medical facility to send the patient ashore
<ul style="list-style-type: none"> • Has any death been linked with the event? 	<ul style="list-style-type: none"> • Investigate cause of death; ensure that autopsy has been arranged, if necessary; ensure IIMGS (17) has been followed, and check if contact tracing is needed; ensure that death has been registered
<ul style="list-style-type: none"> • Is there a doctor on board? 	<ul style="list-style-type: none"> • Ensure access to radio medical support • Send doctor to board the ship en route or upon arrival of the ship at the port
<ul style="list-style-type: none"> • Is the event an immediate risk to health? • Is there a potential for spread on board or ashore or in the environment? 	<ul style="list-style-type: none"> • Consider activating the contingency plan at the port if necessary • Consider if contact tracing is needed
<ul style="list-style-type: none"> • Are special measures needed upon arrival at the port? • Does the ship need any supplies? 	<ul style="list-style-type: none"> • Arrange delivery of supplies that the ship may need (e.g. PPE, medicines)
<ul style="list-style-type: none"> • Are any precautions for disembarkation of ill and healthy travellers needed? 	<ul style="list-style-type: none"> • Communicate with the terminal station staff and start preparing arrangements
<ul style="list-style-type: none"> • Is the event related to a hazard where other authorities/experts should be involved (clinicians, epidemiologists, environmentalists, experts on responding to chemical or radiological events)? 	<ul style="list-style-type: none"> • Communicate with other authorities/experts • If appropriate, report the event to the NFP for further assessment and notification to WHO if necessary
<ul style="list-style-type: none"> • Is the ship coming from an affected area where WHO has recommended measures in place? 	<ul style="list-style-type: none"> • Consult WHO website for recommendations on health measures • If appropriate, report the event to the NFP for further assessment and notification to WHO if necessary
<ul style="list-style-type: none"> • Have clinical specimens or environmental samples been collected or do officers of the competent authority need to collect them? 	<ul style="list-style-type: none"> • Arrange collection of clinical specimens or environmental samples • Arrange transport and delivery of clinical specimens to an appropriate laboratory • Communicate data related to the sample and its shipment to appropriate authorities.

Source: Guidance on Regulations for the Transport of Infectious Substances 2015-2016, http://www.who.int/ihp/publications/who_hse_ihp_20152/en/.

Box 2. Preliminary standard response by the competent authority at port: define the type of event

- Event of unknown origin
- Infectious disease
- Vectors or infestations
- Environmental with public health impact and potential for international spread (e.g. unsanitary conditions, contaminated ballast water)
- Chemical
- Radiological
- Other type of event

6. EVENT RISK ASSESSMENT AT THE PORT LEVEL

The risk assessment process will be used to decide: the level of response; the public health measures that may need to be taken that are appropriate for the specific event; and whether any additional information is needed. Communication and information sharing may be needed between the competent authority at the port and other authorities at the local, intermediate or national level.

6.1 Risk assessment procedure at the port level

Steps that can form the basis of the risk assessment process at the port level include: event description, primary overview of the event, assessment of the impact of the event, the potential for spread, and the preventability of the event. Table 1 describes the steps for the risk assessment process and cross references sources that can be consulted. It should be noted that the list in Table 1 is not exhaustive and other additional questions can be added, depending on the situation.

In addition to the steps described in Table 1, the competent authority at the port level can consider the following:

- Is there any recommendation issued by WHO regarding the specific event?
 - If yes, then the competent authority should consider implementing the measures recommended by WHO and the IHR NFP.
- Is the event among the diseases that must be notified under Annex 2 of IHR: smallpox, poliomyelitis due to wild type poliovirus, human influenza caused by a new subtype, SARS?
 - If yes, then the authority must report the events to the IHR NFP as described in section 3.2.
- Is the event among the diseases included in Annex 2 of IHR where the algorithm should always be used: cholera, pneumonic plague, yellow fever, VHF (EVD, Lassa fever, Marburg virus disease), West Nile fever, other disease that are of special national or regional concern, e.g. dengue fever, Rift valley fever and meningococcal disease?
 - If yes, then the authority must report the events to the IHR NFP as described in section 3.2.
- Are there any immediate response actions that can be taken by the ship master and crew on the ship?
 - If yes, then these control measures should be shared with the ship master in advance.
- Does the authority have the capacity to treat the event, especially in the case of severe diseases or a serious condition?
 - If no, then the Ship master must be informed and the ship may be allowed to depart, provided that (a) the competent authority at the time of departure will inform the competent authority at the next known point of entry about any known information related to the event as well as (b) the evidence found; and the control measures required shall be noted in the SSC.
- What will happen if the authority will not take action?
 - The competent authority should consider what the consequences would be if no action will be taken by the authority.

Table 1. Risk assessment steps at the port level

Step	Question	Sources/references of information
<p>a. Preliminary standard response (see also section 5)</p>	<ul style="list-style-type: none"> - Is a human life in danger (clinical signs and symptoms among travellers and severity)? - Is there a doctor on board? - Are immediate special measures or supplies needed upon arrival at the port? - Is the event related to a hazard where other authorities/experts should be involved (IHR NFP, clinicians, epidemiologists, environmentalists)? - Have clinical specimens or environmental samples been collected or do officers of the competent authority need to collect them? 	<p>Reporter and designated crew of the ship</p>
<p>b. Event description</p>	<ul style="list-style-type: none"> - What is the type of event? Is the causative agent known (biological, chemical, radiological, vectors or infestations, unsanitary conditions, event of unknown origin, other)? Is an investigation of the event needed? - Were travellers affected (number of affected passengers/crew, proportion of affected passengers/crew out of the total)? - What was the time/date of illness onset or start of event and is it still ongoing? - Has any death occurred? 	<p>Conveyance operators, their owners or agents, designated crew, MDH, passengers, or other persons, other authority</p>
<p>c. Primary overview of the event</p>	<ul style="list-style-type: none"> - Are the characteristics of the hazard known? 	<p>WHO IMGS (19), IMDG Code (20), International Travel and Health (21), Control of Communicable Diseases Manual (22), Handbook for Inspection of Ships and Issuance of Ship Sanitation Certificates (23), Guide to Ship Sanitation (24)</p>
	<ul style="list-style-type: none"> - Is the event unusual or unexpected? 	<p>IHR Annex 2 WHO guidance for use of Annex 2 of IHR (25)</p>

Table 1. Risk assessment steps at the port level

Step	Question	Sources/references of information
d. Primary assessment of the impact of the event	<ul style="list-style-type: none"> - Can the event be characterized as serious? - Does the public health hazard have the potential to affect a large number of people (e.g. outbreak) on board or ashore or in the environment? - Is there a risk for introduction of the agent (e.g. disease, vector) in the country (if not already endemic or present)? - Does the event have the potential to interfere with international transport and trade? - Is there evidence that this event has had adverse consequences in public health in the past? 	<p>IHR Annex 2 WHO guidance for use of Annex 2 of IHR (25), Annex 1</p>
e. Assessment of the ability to contain the event	<ul style="list-style-type: none"> - What is the likelihood of spread? 	<ul style="list-style-type: none"> i. For infectious agents, transmissibility and reproduction (R₀) number is to be taken into consideration. ii. For chemical or radiological agents, the ability to contain the release, residual exposure, exposure pathways and potential pollution affecting the surrounding area is to be taken into consideration. iii. For vectors harbourage, reproduction and establishment on board is to be considered. iv. Environmental:
	<ul style="list-style-type: none"> - Have the appropriate measures already been taken on the ship? - Based on available means and previous experience, can the event be contained? - Are there any additional control measures that must be taken on the ship that can mitigate the risk? - Is traceability of food/water, etc. necessary? 	<p>IHR Annex 2 and WHO Guidance for use of Annex 2 of IHR (25)</p> <p>Refer to Appendix 2 for Case by case assessment</p>

6.2 Assessment on board the ship

Personnel working for competent authorities may decide to board the ship, conduct a risk assessment on board and, if necessary, initiate an investigation of the event. Detailed guidance on ship inspection is given in the *Handbook for Inspection of Ships and issuance of Ship Sanitation Certificates* (23).

Depending on the nature of the events and the hazards identified, relevant national guidance of the contingency plan may be implemented, including:

- outbreak management plan
- chemical/radiological incident management plan
- major incident plan
- other.

Cases of illness or outbreaks of disease of unknown etiology may be associated with exposure to chemical, biological and radiological hazards. Therefore, the investigation should consider an “all-hazard” approach until the causative agent is identified or potential hazards are eliminated from the investigation.

Pre-boarding arrangements

Before initiating an activity on board, the public health officials responsible for health assessment should plan in advance and take into account the following:

- Planning in a timely manner the likely flow of assessments on board, according to the size, type and estimated time of arrival of a ship, required personnel available (taking into account knowledge and skills needed) for this activity and its previous record regarding public health risks, based on the information received from the ship master/medical staff or their agent/representatives, such as, but not limited to: Information from the MDH and its attachment (with health questions, identification of sick persons, age, sex, nationality, port of embarkation and details of illness and treatment given) according to the model provided in IHR Annex 8.
- Promoting administrative arrangements for appropriate staff identification and security clearance/permission to board ship in order to guarantee adequate, timely and safe activity on board. Language barriers may be a problem and an interpreter/translator may be part of these arrangements.
- Ensuring that correct forms, unique seals/stamps to authenticate certificates and other administrative supplies are accessible and in good operational condition.
- Ensuring availability of tools and equipment necessary for assessment and control measures, including personal protective equipment (PPE), sampling equipment, communication means (such as radio communication), medical devices, etc. More details about the inspection equipment can be found in the *Handbook for Inspection of Ships and Issuance of Ship Sanitation Certificates* (23).

Assessment of event once on board

It may be necessary to implement the actions described below in parallel rather than in a specific sequence:

- Develop the communication strategy on board with the master or designated officer to achieve cooperation among all travellers for accomplishing the risk assessment in a safe and timely manner.
- Check if measures advised in the WHO IMGS (19) have been implemented as described in.
- Advise/request implementation of additional measures, if necessary.
- Supervise disembarking of ill travellers and those suspected of being ill, as appropriate.
- Decide if an investigation of the event is necessary and feasible to conduct. If so, then a comprehensive, systematic approach would be appropriate to avoid ineffectiveness and to keep the situation under control.
- Identify close contacts of persons exposed, and where appropriate, ensure they receive information about the health measures being taken.
- Review documentation (this is not an exhaustive list):
 - MDH;
 - SSC;
 - Medical log book, including information regarding the health status of passengers and crew members, health control measures including medical treatment and prophylaxis taken on board;
 - Guides for management of outbreaks (*norovirus*, *Legionella*, etc.);
 - List of medicines according to national regulations, etc.
- Discuss (consult/interview) with the ship master, ship medical staff and, if necessary, travellers who are in quarantine or isolation.
- Collect clinical specimens and/or environmental samples according to national practice, taking into account international standards.
- Keep records of the findings and take note of the evidence found (e.g. infection on board/ hazards identified) and measures taken in order to comply with existing SSE/SSCs, according to IHR Article 39 paragraph 5.
- Brief the ship master /representative crew member; provide a summary of the issues which are deemed relevant to prevent and control cases; give advice for each action, as appropriate.
- Seek specialist advice where appropriate, to assess the risk, to protect public health and determine the necessary control measures and evaluate their effectiveness. Depending on the nature and scale of the event, experts may include: microbiologist, virologist, epidemiologist, toxicologist, chemical and radiological adviser, engineer, etc. It may be necessary to work with different agencies, organizations and regulators who can offer specialist support and advice (analytical capacity, environmental monitoring and assessment, decontamination, etc.). This is not an exhaustive list, but indicates the scope and range of disciplines which might be called upon to assist with risk assessment.
- Member States who may not have access to specialist services should discuss their requirements with WHO, which will provide advice and assistance in such circumstances.

After the on board assessment

- Establish communication if necessary with the national IHR NFP and/or national surveillance system and other authorities at the local or intermediate level, according to national plans and protocols.

- Establish communication, nationally or internationally, with competent authorities at the next known port to inform them in a timely manner if unable to carry out the required control measures at the port, or if a follow-up on whether the control measures have been effectively carried out is needed (see section 3). Certain public health events may require the implementation of health measures that could result in the delay of a ship's departure. In such cases, information must be communicated to the Ship master in a timely manner. There are special provisions that must be followed if health measures will result in delaying the departure of the ship, which are described in section 7.8.

6.3 Update of assessment

An update of the assessment is necessary since events can change rapidly in scope, nature and impact. An update is needed when new information becomes available to the competent authority, as well as at regular intervals and according to the event.

6.4 Risks at the port environment or during the activities of travellers while ashore

The ship is often the place that disease symptoms become apparent, but the source might not be related to the ship. Exposure can occur prior to boarding or while ashore. When the ship passes through an area where environmental pollution has taken place, it may pose a risk to travellers. This handbook does not address risk assessment on land, risks from the travellers' activities while ashore or environmental pollution. It must be recognized that there is the potential for the introduction of a hazard on board while the ship is in port (e.g. contaminated food or contaminated water ongoing local outbreak and/or disrupted infrastructure). Risk assessments should be undertaken by relevant competent authorities (on shore). However, the risk assessment should include whether the exposure occurred on board or prior to boarding while ashore. The risk assessment should also assess the potential for further on board transmission due to person-to-person spread or contamination of the ship environment.

7. RESPONSE MEASURES

7.1 Roles and responsibilities

Health measures must be implemented by competent authorities responding to events on ships in the context of the local, regional, national, intergovernmental and international legal framework.

The main parts of IHR describing processes and response measures are listed below:

- Article 13 requires states parties to have the capacity to respond promptly and effectively to public health risks.
- Article 15 lists health measures that can be issued as temporary recommendations by WHO.
- Article 18 describes recommendations with respect to persons, baggage, cargo, containers, conveyances, goods and postal parcels.
- Article 23 describes health measures on arrival and departure.

- Article 43 includes additional measures such as delaying departure of a ship for more than 24 hours and the obligations of authorities in such a case.
- Annex 1 describes the core capacities requirement for response at ports.
- Annex 5 includes specific measures for vector-borne diseases.

The United Nations Convention on the Law of the Sea (UNCLOS) (14) defines the rights of countries to apply their national sanitary laws while the ship is at port and in a distance within 24 nautical miles of land in section 4, Articles 2-4, 19(2)g and 21(1)h. In particular, Article 33 defines «contiguous zone» as:

In a zone contiguous to its territorial sea, described as the contiguous zone, the coastal State may exercise the control necessary to (a) prevent infringement of its sanitary laws and regulations within its territory or territorial sea; (b) punish infringement of the above laws and regulations committed within its territory or territorial sea. The contiguous zone may not extend beyond 24 nautical miles from the baselines from which the breadth of the territorial sea is measured (14).

Event management requires collaboration among competent port authorities and ship operators or designated officers and crew. Therefore, it is important that roles and responsibilities are acknowledged by both sides.

Competent authorities, in relation to health measures applied on ships, are responsible for:

- Supervising or applying health measures on a ship when evidence for public health risk exists;
- Advising ship operators, as far in advance as possible, of their intent to apply control measures to a ship, and shall provide, where available, written information concerning the methods to be employed;
- Indicating in writing the measures applied to cargo, containers or conveyances, the parts treated, the methods employed and the reasons for their application;
- Monitoring ships, baggage, cargo, containers, goods, postal parcels and human remains departing and arriving from affected areas to ensure they are free from sources of infection or contamination (including vectors and reservoirs);
- Performing inspection and issuing SSCs (IHR Articles 22, 27, 39).

Ship operators or officers of ships are responsible for:

- Permanently keeping the ships for which they are responsible free from sources of infection or contamination, including vectors and reservoirs (the application of measures to control sources of infection or contamination may be required if evidence is found);
- Making known to the port of destination before arrival any cases of illness indicative of a disease of an infectious nature or evidence of a public health risk (arising from all types of hazards including chemical, radiological and other) on board;
- Facilitating inspections, medical examinations of persons on board and application of other health measures;
- Providing relevant public health information requested by the authority, including a valid SSC;
- Complying with the health measures recommended by WHO and adopted by the country of the port of call;
- Informing travellers of the health measures recommended by WHO and adopted by the country of the port of call (IHR Articles 24, 28, 37 and Annex 7).

7.2 Events where the competent authority should consider taking action

Depending on the nature of the event and the risk assessment results, the competent authority may decide to respond to an event in a way that is proportionate to the risk, such as:

- Seeking specialist advice, where appropriate, to assess the risk to protect public health and determine the necessary control measures and evaluate their effectiveness. Depending on the nature and scale of the event, experts may include: microbiologist, virologist, epidemiologist, toxicologist, chemical and radiological adviser, engineer, etc. It may be necessary to work with different agencies, organizations and regulators who can offer specialist support and advice (analytical capacity, environmental monitoring and assessment, decontamination, etc.). This is not an exhaustive list, but indicates the scope and range of disciplines which might be called upon to assist with risk assessment.
- Member States that may not have access to specialist services should discuss their requirement with WHO, which will provide advice and assistance in such circumstances.
- When standing or temporary recommendations have been issued by WHO and the State Party has adopted them.
- If the authority has been asked by another previous port of call to follow-up health measures advised at an earlier stage.

Detailed responses to events of an infectious nature, vectors, unsanitary conditions and chemical and radiological agents are described in the following sections.

7.3 Response measures to events of infectious diseases

Events of infectious diseases can occur among travellers during a ship's voyage. In this case, the initial detection of such an event will be based on clinical signs and symptoms. Diagnosis by a doctor will not always be possible and laboratory confirmation of a diagnosis is not always feasible, since there are not many reliable microbiological examination methods that can be conducted on board a ship or in due time on land.

Events of infectious diseases can also become apparent after disembarkation. In this case, the information will reach the competent authority at port through another authority, often involving communication of events at a national level among countries and the IHR NFP.

Annex 3 presents a flowchart of actions to be followed after the detection of an event. Initial health measures are guided by the WHO *IMGS* and lists the sources for seeking information on health measures for specific diseases and syndromes in the WHO website.

Persons developing any sign/symptom of an infectious disease (Table 2) should be placed in isolation in a cabin and the following standard precautions should be applied by any person dealing with the patient who enters the cabin:

- a) hand washing and antiseptics (hand hygiene);
- b) use of appropriate PPE (see section 7.9) when handling blood, body substances, excretions and secretions;
- c) appropriate handling of patient care equipment and soiled linen;
- d) prevention of needle-stick/sharp injuries;

- e) environmental cleaning and spills-management; and
- f) appropriate handling of waste.

In addition to standard precautions, depending on the suspected or confirmed diagnosis, specific measures for syndrome or disease should be applied. Annex 2 presents specific measures based on the WHO *IMGS* for syndromes and infectious diseases (19). Section 7.4 describes health measures for selected situations.

Table 2. Examples of situations that may trigger a response from a competent authority

Event/syndrome/signs and symptoms	Definition
<ul style="list-style-type: none"> Persistent fever 	Fever [§] lasting more than 48 hours.
<ul style="list-style-type: none"> Bloody diarrhoea 	Three or more loose or watery stools in 24 hours and blood in stool.
<ul style="list-style-type: none"> Severe diarrhoea 	Diarrhoea (3 or more loose or watery stools in 24 hours) accompanied by signs of dehydration*.
<ul style="list-style-type: none"> Cluster or outbreak of diarrhoea cases 	Two or more cases with diarrhoea (3 or more loose or watery stools in 24 hours).
<ul style="list-style-type: none"> skin rash 	Areas on the skin with multiple red bumps; red, flat spots; or blister-like bumps filled with fluid or pus that are intact or partly crusted over. Rashes may be discrete, may run together and may include one or more areas of the body.
<ul style="list-style-type: none"> glandular swelling 	Enlargements of glands located in the head, neck, or groin, notably of salivary or parotid glands or lymph nodes.
<ul style="list-style-type: none"> severe vomiting 	Vomiting accompanied by signs of dehydration.
<ul style="list-style-type: none"> jaundice 	Yellowish discoloration of skin, eyes and/or other bodily tissues or fluids.
<ul style="list-style-type: none"> convulsion 	Intense, paroxysmal, involuntary muscular contraction or a series of such contractions.
<ul style="list-style-type: none"> bleeding 	Noticeable and unusual bruising or bleeding from the gums, ears and nose or on areas of skin for which there is no obvious explanation.
<ul style="list-style-type: none"> recent paralysis 	New or recently occurring weakness or partial or complete inability to move the arms, legs, or the muscles used for swallowing or breathing.
<ul style="list-style-type: none"> cough 	For >2 weeks or cough with bloody sputum.
<ul style="list-style-type: none"> headache with neck stiffness 	
<ul style="list-style-type: none"> decreased level of consciousness 	Condition of an ill person when he or she is not fully aware of what is going on around himself or herself; person may appear confused, or may be unusually difficult to awaken. An ill person with decreased consciousness may not know the date or their name.
<ul style="list-style-type: none"> prostration 	Total exhaustion or weakness; collapse.
<ul style="list-style-type: none"> shortness of breath 	Gasping for air; unable to catch his or her breath; breathing too fast and struggling to get enough air.
<ul style="list-style-type: none"> Respiratory symptoms (influenza-like-illness, ILI) 	ILI: A person with sudden onset of fever [§] and cough or sore throat in the absence of other diagnoses.
<ul style="list-style-type: none"> Non-traumatic deaths 	Deaths as a result of something other than an accident.
<ul style="list-style-type: none"> Any cluster of unusual illnesses 	

§ Fever is defined as temperature of $\geq 38^{\circ}\text{C}$ (100°F); * Signs of dry mouth, skin, or lips; weakness or light-headedness particularly when standing; tenting of skin or loss of turgor so that skin may shrivel and wrinkle; production of less urine; or abnormally dark urine.

7.4 Health measures for selected situations of an infectious nature

7.4.1 Management of suspected cases of VHF on ships and at ports

The following sections briefly describe measures to be applied in the event that a case of highly infectious disease such as VHF (e.g. from Marburg virus, Ebola virus, Crimean-Congo haemorrhagic fever virus, and Lassa virus) is suspected or diagnosed among travellers. The viruses are spread from human to human through direct contact with infected blood, secretions, organs and semen (26, 27).

7.4.2 Outbreaks of VHFs

Outbreaks of VHFs occur in specific parts of the world, including central Africa, and in West Africa due to Ebola Virus disease. During Ebola outbreak in West Africa seven countries (Italy, Mali, Nigeria, Senegal, Spain, the United Kingdom, and the United States of America) have previously reported a case or cases imported from a country with widespread and intense transmission². Outbreaks have happened as well in a shipment of animals transported from the Philippines to the United States (28, 29). Authorities at PoE and on board conveyances should be prepared to deal with a suspected case of VHF (Crimean-Congo haemorrhagic fever, EVD, Marburg virus disease), even if this event is considered extremely rare.

7.4.3 Measures on board ships

Persons in contact with an ill person can become infected and die. Measures must be taken so as to avoid contact with the bodily fluids of a person suspected of having VHF, as well as with materials that have been contaminated by bodily fluids. Only a few particles of the virus are enough to cause infection. The virus can survive on environmental surfaces for several days. It can be inactivated at a temperature of 60 C when exposed for 30 to 60 minutes and in boiling water after 5 minutes (30, 31). Therefore, any surface or material (linens, waste, clothes, eating utensils, medical equipment) in contact with the virus must be properly handled to kill the pathogen.

The following precautions must be applied on board the ship (32):

- Ensure the ship's master, doctor or crew member appointed for health issues on board is fully informed and educated about the risks of VHF, and the precautions and protective measures to be taken by crew members to prevent them from contracting the virus. In the case of a crew member or passenger exhibiting symptoms compatible with VHF (fever, weakness, muscle pain, headache, sore throat, vomiting, diarrhoea, bleeding) on board a ship, the following precautions should be applied:
 - o Keep the affected person's cabin doors closed, if not placed in an isolation room on board;
 - o Provide information about the risk of VHFs transmission to persons who will take care of the patient or enter their cabin or isolation room and minimize the number of caregivers;
 - o Maintain a log listing all people entering the cabin or isolation room, all of whom should be considered contacts unless a diagnostic test is reported as negative;
 - o Ensure that anyone who enters the cabin or isolation room to provide care to the affected person or to clean the cabin uses PPE as follows:

2 - <http://apps.who.int/ebola/current-situation/ebola-situation-report-14-october-2015>

- non-sterile examination gloves or surgical gloves (cleaners should preferably use heavy duty/rubber gloves);
 - a disposable impermeable long-sleeved gown to cover clothing and exposed skin, a medical mask and eye protection (eye visor or goggles or face shield) when coming in close contact with the affected person and/or if any exposure to blood or bodily fluids is expected; if unavailable, a waterproof apron should be worn over a non-impermeable gown; rubber boots or closed, puncture- and fluid-resistant shoes with overshoes. Before exiting the cabin or isolation room PPE should be removed in such a way as to avoid contact with the soiled items and any area of the face (26).
- o Anyone providing care to the person in isolation should perform hand hygiene by hand-rubbing with an alcohol-based hand sanitizer solution for about 20-30 seconds or hand-washing with soap and water for about 40-60 seconds if hands are visibly dirty, before putting on gloves, after any direct contact with the affected passenger, or with his/her personal belongings or any objects/surface potentially contaminated with his/her blood or bodily fluids and after removing PPE.
 - o Limit the movement and transport of the affected person from the cabin or isolation room to essential purposes only. If transport is necessary, the affected person should wear a medical mask.
 - o Clean and disinfect spills without spraying or using an aerosol. Used linen, clothes, eating utensils, laundry and any other item in contact with a patient's bodily fluids should be collected separately and disinfected in such a way as to avoid any contact with persons or contamination of the environment.
 - o Surfaces or objects contaminated with blood, other bodily fluids, secretions or excretions should be cleaned and disinfected as soon as possible using standard detergents/disinfectants (e.g. a 0.5% chlorine solution or a solution containing 1000 ppm available free chlorine) with a recommended contact time of 30 minutes. Application of disinfectants should be preceded by cleaning to prevent inactivation of disinfectants by organic matter. Soiled linen and clothes should not be reused and should be disposed of in infectious waste bags.
 - o All waste produced in the cabin or isolation room should be handled according to the protocol of the ship for clinical infectious waste. If an incinerator is available on board, waste should be incinerated. If waste must be delivered ashore, special precautions are needed and the port authority should be informed before waste delivery.
- Begin contact tracing immediately. PPE is not necessary when interviewing asymptomatic individuals when a distance of one metre is maintained.
 - Close contacts of the affected persons (e.g. passengers, crew members or cleaning staff) should be identified and assessed for any symptoms for their specific level of exposure. Based on the interview outcome, travellers who fulfil the criteria of a contact and are symptomatic must be immediately isolated and transferred to a designated medical facility for further assessment, laboratory diagnosis and treatment. Asymptomatic close contacts could be quarantined or put under public health observation. Travellers who were characterized as non-contacts can be given advice about recognizing and reporting symptoms and asked to perform temperature checks twice a day. In particular, they could be asked to do passive self-monitoring of temperature (e.g. monitoring temperature only if feeling feverish) and symptoms or active self-monitoring (e.g. by regular temperature measurement twice a day for 21 days).

7.4.4 Measures at the port

In the event of a suspected diagnosis of VHF on a ship, immediate expert medical opinion should be sought. The event must be reported as soon as possible to the next port of call by the Ship master. The competent authority at port must inform the IHR NFP. The competent authority at port may need to arrange medical evacuation or special arrangements for disembarkation and hospitalization of the patient and laboratory diagnosis, depending on the situation. Personnel in contact with the affected individual during the medical evacuation should wear a special, high filtration, particulate respirator (e.g. N 95) mask and PPE. Case finding and contact tracing as well as quarantine of those who are asymptomatic may need to be arranged by the competent authority at port. For reporting the case to the national level, see section 3.2. The patient should disembark in a way to avoid any contact with healthy travellers and wear a medical mask. Personnel in contact with the patient during the medical evacuation should wear a special, high filtration, particulate respirator (e.g. N 95) mask and PPE.

At the mandatory request of a governmental port health authority, shipping companies shall facilitate obtaining itinerary information and contact details of some or all persons on board if there is reason to believe that they may have been exposed to infection on the ship. Countries may require arriving ships to complete and deliver the MDH (IHR Annex 8). Measures taken on board should also be noted on the existing IHR SSC (IHR Annex 3) attached to an evidence report form³ Response measures to events related to vectors and infestation on ships

Arthropods and rodents can gain access directly from the ships' open spaces, can be carried in cargo and shiploads, or can be found on humans or animals as ectoparasites. Vectors on board ships may contaminate stored foods, transmit illness on board, or introduce diseases and species in new areas. There are a number of reported cases of port malaria among people who had no recent travels or blood transfusions, but worked or lived close to harbours. A variety of species such as cockroaches, flies, mosquitoes, bedbugs, fleas, bees, mites, ants, beetles, pests of stored products, fruit flies and rodents have been found on ships or in their loads.

A conveyance may be regarded as suspect and should be inspected for vectors and reservoirs if a possible or confirmed case of vector-borne disease has occurred on board during an international voyage; or it has left an affected area within a period of time where on board vectors could still carry disease (IHR Annex 5). Inspection will identify infestation and conditions favouring harbourage.

If there are designated locations at the port, the ship can be asked to anchor in those parts of the dock in order to avoid the escape and further spread of vectors and support the application of control measures.

Response measures to vector infestation of ships include disinsection, deratting, cleaning and disinfection of the ship environment or other objects such as containers, cargo, goods, baggage and postal parcels. IHR Annex 5 describes measures for vector control. Structural alterations of the ship spaces may be necessary to prevent harbourage and entry of vectors. The competent authority can either implement vector control measures or supervise their application. See the specific relevant measures in section 8.2.4.

Preventive applications of disinsection and deratting are also suggested by WHO when the ship leaves from a port where vector control is recommended. The *WHO International Travel and Health* book can be referenced to identify areas where vector-borne diseases are endemic (21).

³ - Evidence Report Form refers to Annex 7 of WHO Handbook for Inspection of Ships and Issuance of Ship Sanitation Certificates http://www.who.int/ihr/publications/handbook_ships_inspection/en/

7.5 Response measures to events related to risks in the environment

Risks in the environment can be caused by unsanitary conditions, contamination of ballast water, etc. Unsanitary conditions can be caused due to inappropriate food, water or waste handling or cleaning of the environment on the ship. The *WHO Handbook for Ship Inspections and Issuance of Ship Sanitation Certificates (23)* lists control measures to be applied when signs of inadequate sanitary measures are found on a ship. See also specific relevant health measures in section 8.2. The competent authority should ensure that the control measures are satisfactorily implemented in response to the unsanitary conditions.

7.6 Response measures to events of unknown etiology including chemical and radiological hazards

Events reported to the competent authority may be of unknown etiology, until the causative agent is identified. In the event of a chemical or radiological incident, a multi-agency response is needed. Management of chemical and radiological hazards is usually beyond the responsibilities of most health authorities and interventions should be done in consultation with other competent parties. National guidelines might be available and should be followed.

WHO has developed guidance related to chemical hazards and incidents (33, 34). For specific relevant health measures see section 8.2.4.3.

Carriage of chemicals in bulk is covered by regulations in SOLAS Chapter VII – Carriage of dangerous goods – and MARPOL Annex II – Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk (15, 16). The IMDG Code lays down basic principles; detailed recommendations for individual substances, materials and articles and a number of recommendations for good operational practice including advice on terminology, packing, labelling, stowage, segregation and handling and emergency response action (20).

7.7 Additional health measures that significantly interfere with international traffic

Significant interference with international traffic generally means refusal of entry or departure of international travellers, baggage, cargo, containers, conveyances, goods and the like, or their delay, for more than 24 hours.

If clinical signs or symptoms and information based on fact or evidence of a public health risk, including sources of infection and contamination, are found on board a ship, the competent authority may implement additional health measures, including isolation of the conveyances, as necessary, to prevent the risk. Examples of such events are: release of radioactive materials on the ship which carry a risk for contamination of the surrounding environment and/or risk of exposure to the population at port, possible or confirmed case or outbreak of an unusual or unexpected disease such as smallpox, EVD, Lassa virus or Marburg virus.

If a competent port authority implements additional health measures which significantly interfere with international traffic, then:

- Such additional measures should be reported to the IHR NFP (IHR Article 27).
- NFP shall inform WHO within 48 hours of implementation of such measures.
- NFP must provide to WHO the public health rationale and relevant scientific information for

these measures, unless they are covered by a temporary or standing recommendation.

Following these actions, WHO must share this information with other States Parties. After assessing information provided pursuant to paragraphs 3 and 5 of IHR Article 43 and other relevant information, WHO may request that the State Party concerned reconsider the application of the measures (IHR Article 43).

7.8 Safeguard measures of personnel involved in event management

Personnel involved in event management might be exposed to hazards when performing their duties. Inspecting an area after a chemical accident, collecting samples and interviewing ill travellers are examples of activities requiring special precautions and correct use of PPE. Only officers who have been trained to apply precautionary measures and use PPE should be allowed to be involved in activities that pose a risk. General safety precautions for persons boarding a ship are given in the *Handbook for Inspection of Ships and Issuance of Ship Sanitation Certificates* (23).

Depending on the situation and the hazard involved, special precautions might be necessary when dealing with events due to biological, chemical or radiological agents. For safeguard measures of personnel exposed to chemical agents, the *WHO manual dealing with public health management of chemical incidents* (34) includes details about safe practices to be applied by personnel working on terminating the release and preventing the spread of chemical agents.

For safeguard measures of personnel exposed to biological agents, details on hand washing and antisepsis, principles of using PPE including gloves, goggles, mask, apron, gown, shoe covers and cap/hair covers can be found in *WHO Practical Guidelines for Infection Control in Health Care Facilities* (35).

8. OPTIONS FOR HEALTH MEASURES

This section describes points to be taken into consideration when implementing specific health measures. An evidence-informed approach in deciding on health measures ensures optimal response, avoids overreaction and implements measures that are commensurate to the risk. Studies examining evidence on effectiveness and impact of health measures can inform intervention decisions. Health measures are implemented in the policy and legislative context of the country.

8.1 Public health measures with respect to persons

8.1.1 Review travel history in affected areas

An affected area is the geographical location for which health measures have been recommended by WHO under the IHR. This information is published on the WHO website. Authorities may decide to review travel history in affected areas of travellers by checking their travel itinerary before boarding the ship and by reviewing the port of call list. The purpose is to ascertain if there was any travel in or near an affected area or other possible contacts with infection or contamination prior to arrival.

If affected areas have been visited, then, depending on the event, it may be necessary to

collect further information about passengers and crew who visited affected areas. This information can be collected by checking the passenger and crew list, the ship log, the medical log, information about ashore activities and contacts, any patient notes available and other health documents such as certificates of vaccination.

8.1.2 Review proof of medical examination and any laboratory analysis

Competent authorities at port may decide to review proof of medical examination of travellers. This information can be asked of all travellers on the ship, travellers arriving from selected areas (e.g. affected areas) or only symptomatic travellers. Travellers who have developed symptoms should be recorded in the MDH. For all other travellers, this information can be collected through interviews or by using questionnaires or other types of forms. Documents to be reviewed are: patient notes, rapid diagnostic testing results, or laboratory results, X-rays and other medical examination results. The inspector should review the medical examination results or diagnosis certificate by the doctor and the laboratory analysis results to make sure that there is no risk to public health.

8.1.3 Medical examinations

Medical examinations are a measure implemented by authorities to determine the traveller's health status and the potential public health risk to others. If the authority conducts medical examinations of only symptomatic travellers, then prior screening can help to identify those who will undergo a medical examination.

Medical examinations can take place on board or ashore; on arrival or departure. By June 2012, point of entries must have the capacity to provide access to medical service including diagnostic facilities located in areas that allow the prompt assessment and care of ill travellers with adequate staff, equipment and premises (Annex 4 provides guidance about this provision).

IHR distinguishes medical examinations as:

- Non-invasive: medical examination of the ear, nose and mouth, temperature assessment using an ear, oral or cutaneous thermometer, or thermal imaging; medical inspection; auscultation; external palpation; retinoscopy; external collection of urine, faeces or saliva samples; external measurement of blood pressure; and electrocardiography. These can be required of travellers as a condition of entry or exit to a country.
- Invasive: the puncture or incision of the skin or insertion of an instrument or foreign material into the body or the examination of a body cavity. Invasive medical examination shall not be required as a condition of entry of any traveller to a country, but there are exceptions such as: on the basis of evidence of public health risk, when it is necessary to determine whether a public health risk exists or as a condition of entry for any travellers seeking temporary or permanent residence.

Any medical examination must be performed after the agreement of the traveller or his/her parents or guardians, following the rules of IHR and national legislation for safety standards, respecting human rights and any other rules of implementation (except according to IHR Article 31, paragraph 2). Further details related to medical examinations are described in IHR Article 23 (safety standards), Article 32 (treatment of travellers) and Article 40 (charges for health measures).

8.1.4 Review of proof of vaccination or other prophylaxis

To review proof of vaccination or other prophylaxis, a competent authority can check documents such as vaccination certificates, vaccination lists of crew members, physical evidence e.g. bacille Calmette–Guérin (BCG) scar and personal documents of travellers showing a history of having had the illness, thus acquiring physical immunity.

Proof of vaccination or prophylaxis may be required for travellers as a condition of entry to a country only in the case of yellow fever and in special circumstances such as: on the basis of evidence of public health risk, when it is necessary to determine whether a public health risk exists or as a condition of entry for any travellers seeking temporary or permanent residence.

A traveller in possession of a certificate of vaccination or other prophylaxis issued in conformity with IHR Annexes 6 and 7, shall not be denied entry as a consequence of the disease to which the certificate refers, even if coming from an affected area, unless the competent authority has verifiable indications and/or evidence that the vaccination or other prophylaxis was not effective.

If the ship's voyage includes an affected area, the certificate or records of prophylaxis shall be reviewed if they are available.

8.1.5 Requirement of vaccination or other prophylaxis

Vaccination or prophylaxis may be required for travellers as a condition of entry to a country in special circumstances such as: on the basis of evidence of public health risk or as a condition of entry for any travellers seeking temporary or permanent residence. Vaccination for yellow fever may be required for travellers as a condition of entry to a country. Vaccination against yellow fever may be required of any traveller leaving an area where WHO has determined that a risk of yellow fever transmission is present.

Vaccination or other prophylaxis may only be administered after the agreement of the traveller or his/her parents or guardians. IHR Article 31 paragraph 2 describes what should happen if the traveller refuses to receive vaccination or other prophylaxis. Further requirements related to vaccination or other prophylaxis can be found in IHR Article 23 (safety standards), Article 32, paragraph 5 (treatment of travellers) and Article 40 (charges for health measures).

Vaccines and prophylaxis for travellers administered under the IHR must be of suitable quality and approved by WHO. Vaccination certificates issued must conform to provisions of IHR Annexes 6 and 7.

Information on vaccination or prophylaxis for specific infectious diseases can be found in Annex 2.

International Labour Organization (ILO) Maritime Labour Convention (MLC) 2006 regulates issues related to health of crew. Vaccination or prophylaxis as a health measure to contain infectious diseases on board ships can be based on ILO MLC 2006 where applicable (36).

8.1.6 Placement of persons suspected of exposure under public health observation

A competent authority may decide to monitor the health status of a traveller over time who has been exposed, or possibly exposed, to a public health risk that could be a possible source of spreading disease. The traveller may continue an international voyage as long as the tra-

veller is not posing an imminent public health risk and the country informs the competent authority of the point of entry at destination, if known, of the traveller's expected arrival. On arrival, the traveller shall report to that authority.

Identification of travellers suspected of exposure can take place on arrival or departure at a port, on board or ashore through interviews or completion of questionnaires. Personnel and facilities at ports should be available for that purpose.

8.1.7 Quarantine for travellers suspected of exposure

Following identification of travellers who are suspected of exposure, the decision to quarantine them for a period of time may be made to ensure that there is no risk of spreading infection or contamination. For infectious diseases, the length of quarantine is usually equal to the period of incubation and communicability of the disease. For other agents (e.g. chemical) it may be very short, for example, until the traveller takes a shower and decontaminates clothing. Quarantine can take place on board in a cabin or ashore in a hotel, a health care facility, other institution or at home.

It may be necessary for quarantine to take place in an area with special arrangements for food delivery, waste management, laundry services and infection control procedures, depending on the event. Specific people should be assigned as caregivers. Quarantine measures implemented on board by designated crew are reported in the MDH. Advice on quarantine measures for specific infectious diseases is described in Annex 2.

8.1.8 Isolation and treatment of affected persons

Symptomatic or contaminated travellers can be isolated for a period of time to ensure that there is no risk of spreading infection or contamination. For infectious diseases, the length of isolation is usually equal to the period of communicability of the disease. For highly infectious diseases, measures included in section 7.4 must be applied. For some infections, it may be necessary for the isolation room to have independent ventilation and/or negative pressure. Detailed description for infectious disease isolation procedures and length of quarantine can be found in Annex 2.

For other agents (e.g. chemical) isolation may be very short, for example, until the traveller takes a shower and decontaminates clothing. Guidance on decontaminating individuals can be found in the *WHO Manual: The Public Health Management of Chemical Incidents* (34).

Isolation measures implemented on board by designated crew should be reported in the MDH. Isolation can take place on board, in a cabin or ashore in a health care facility or other institution. Appropriate precautions must be taken when transferring persons in isolation from the ship to land-based establishments.

According to IHR Article 32, crew and passengers "shall be treated with respect for their dignity, human rights and fundamental freedoms and minimize any discomfort or distress associated with such measures". IHR Article 40 describes provisions related to charges for health measures regarding travellers.

8.1.9 Contact tracing of suspected or affected persons

The purpose of contact tracing is to identify travellers who have or might have been exposed to a public health risk. A competent authority can require information from travellers on arrival or departure about possible contacts with infection or contamination. Except for interviews and

questionnaires to collect such information, other documents that would be useful are cabin list, crew list, table assignment and registration in group activities. Before deciding on contact tracing, the health authority should consider the availability and feasibility of implementation of measures to contacts, as well as their expected effect. Personal data must be kept confidential as per IHR Article 45. Specific guidance on contact tracing for infectious diseases can be found in Annex 2. The definition of “contact” may be different, depending on the event and the causative agent. Examples of the definition of “contacts” are: travellers sharing the same cabin with the patient, anyone directly in contact with bodily fluids of a patient, etc.

8.1.10 Restriction/refusal of entry or exit of travellers

To prevent the international spread of disease and depending on the situation: a) entry or exit of a suspected or affected person can be denied; b) unaffected persons can be refused entry to affected areas; and c) exit screening can be implemented to persons leaving affected areas (e.g. areas affected by a nuclear and radiation accident). Entry screening takes place as travellers disembark from a ship; exit screening takes place before travellers’ embarkation to the ship.

According to IHR Article 43, refusal of entry or departure of international travellers or their delay for more than 24 hours is considered significant interference with international traffic and procedures described in section 7.8 must be applied.

A competent authority may deny a traveller entry to the country if she or he does not comply with health measures required as a condition of entry (e.g. medical examination), or if she or he refuses to provide the required information or documents (IHR Articles 30 and 31).

Health authorities can consider embarkation and disembarkation screening for health reasons, which are decided and conducted by the ship operators. The Ship master has the right to refuse embarkation of a traveller, or to disembark at any port any traveller on board the ship, whose health is in such a conditions that does not allow the continuation of the voyage or whose behaviour represents a danger or a serious disturbance to the other passengers or the crew. Any passenger on board the vessel is subject to the disciplinary power of the master for all matters concerning safety and security.

8.1.11 Exit and entry screening at ports

If exit or entry screening is introduced, the aim should be to:

- identify ill travellers who may have signs and symptoms, travellers who may have been exposed to a hazard and their close contacts;
- identify appropriate public health measures, such as travel restrictions, treatment and isolation, that are commensurate with the risks and do not unduly interfere with international travel;
- ensure proper collection of information and reporting.

Exit screening prevents boarding of symptomatic or exposed persons and exportation of disease, while entry screening facilitates monitoring of potentially exposed people.

Prior to the implementation of exit or entry screening, a standard operating procedure (SOP) should be developed in consultation with stakeholders and responsible parties. Suggested parties include, but are not limited to: government entities with jurisdiction (such as cus-

toms and immigration), public health authorities, maritime authorities, port authorities and managers, conveyance operators and security personnel. These entities will lead the implementation of the exit screening process and manage available resources. Separate SOPs may be required for port facilities.

8.1.11.1 Exit screening

Exit screening is a public health intervention to identify persons with possible symptoms of, or risk of exposure to, a hazard (37). Screening measures are based upon symptoms and/or exposure assessment and can be adapted at ports. Exit screening can take place at an affected country to prevent the exportation of a disease to other countries and protect travellers and crew. It can also take place after implementing public health measures to symptomatic or exposed travellers. Effective exit screening helps prevent the introduction and spread of disease to other areas. Laboratory testing can also be part of exit screening, depending on the disease.

8.1.11.2 Identifying PoE terminals and locations for exit screening

As part of the development of the SOP, an assessment should be conducted to determine the following:

- which terminals (particularly for international destinations) at PoE warrant exit screening;
- what is the best location to conduct primary (identifies travellers with signs, symptoms, or risk of exposure) and secondary (further assessment of identified travellers to determine if travel restriction or referral for medical evaluation is needed) screening; and
- how best to fulfil staffing and training needs, and necessary supplies such as non-contact thermometers, PPE and communication materials.

As a general principle, travellers should be subject to exit screening control as early as possible upon arrival at the port facility, in conjunction with existing security procedures.

- If feasible, port authorities may restrict entry to the facility to travellers only and conduct exit screening close to the PoE prior to check-in and baggage drop-off.
- In facilities without security at entry, exit screening should be conducted in front of or near the security systems at embarkation. The legal mechanisms for exit screening, including the necessary authority to issue travel restrictions, should be considered while developing the SOP. Plans should be developed with regard to local, national, and international public health, customs, border protection and travel entities. This should be done in conjunction with the completion of IHR core capacity assessments at PoE.

8.1.11.3 Entry screening

Entry screening could be implemented as a health measure either alone or as a supplementary measure to exit screening. It should be noted that when exit screening is implemented effectively in the affected countries/areas, entry screening could be of limited value if the trip has a short duration. However, entry screening could be considered when exit screening is suboptimal or when the time between the exit screening and the entry screening is long and diseases could incubate aboard the conveyances.

8.1.11.4 Identifying PoE and travellers to be screened during entry

The entry screening process should include an extensive public health communications campaign to educate travellers and the travel industry. These messages should provide important health information about the disease, as well as the intent to screen travellers for signs of disease and risk of exposure to the disease.

Entry screening may apply to passengers or crew of conveyances:

- arriving directly from affected countries;
- arriving indirectly after stopping at some point in a non-affected country;
- carrying travellers with signs and symptoms consistent with the disease of interest, or known to have visited an affected area, based on information provided in the public health documents or to the competent authority at the point of entry prior to arrival.

Travellers' itineraries, potential exposure history and other information obtained prior to arrival at the destination country may assist in identifying travellers suitable for screening. This could reduce indiscriminate screening of travellers arriving at the point of entry and increase the likelihood of a traveller's cooperation.

Exit or entry screening usually involves two steps

STEP ONE: primary screening

Primary screening identifies travellers who may be symptomatic or were possibly exposed. Primary screening consists of the following:

- a) Completion of a traveller public health questionnaire consisting of short questions about illness and possible instances of exposure. Completed questionnaires are then reviewed by primary screening staff.
- b) Visual assessments for signs and symptoms of illness (e.g. fever).
- c) Assessment of symptoms or exposure using instruments (e.g. thermometers or other scanners) for the detection of chemical or radioactive materials.

Primary screening staff may refer ill travellers or travellers with possible exposure for secondary screening.

The following information should be included in the Traveller Public Health Declaration: ship/IMO number, name, cabin number, passport country and number, arrival date, birth date, gender, email address, telephone number, home address, addresses for a specified number of days, public health information for symptoms including a list of symptoms for the disease of concern and a list of risks of exposure (e.g. contact with ill people, visits in affected countries, exposure to a hazardous agent).

STEP TWO: secondary screening

Travellers who have been referred for secondary screening should undergo an in-depth interview conducted by a public health or medical professional. Their responses to the Traveller Public Health Declaration will be verified and a focused medical examination will be conducted.

Following this interview and examination, the officer conducting the secondary screening will make a determination about the need for public health measures. These may include travel

restrictions for ill travellers and/or close contacts of ill travellers, transport to a medical facility for further evaluation, testing and/or treatment, public health observation or self-monitoring information at the exit or entry screening point.

The following information should be included in the **secondary screening form**:

- Section 1: Traveller information: name, age, birth date, gender, passport country and number, country of residence, location where the traveller became ill or had exposure and date of exposure.
- Section 2: Clinical signs and symptoms: list of symptoms, onset of symptoms, underlying or chronic illnesses of the traveller.
- Section 3: Exposure and risk factors: list of risk factors or instances of exposure.
- Section 4: Triage and response:

Travel intervention by competent authority (check one)

- Allowed to continue travelling (board aircraft, ship or train)
- Provide health information about the disease
- Not allowed to continue to travel

Medical assessment and intervention (check all that apply)

- Transported to hospital/health/care facility
- Referred home for symptom watch
- Provide health information about the disease

Data management

As part of the exit and entry screening at the PoE, the storing and recording of data during screening is important for evaluation purposes and for estimating performance indicators. Therefore, it is advised that the following information be systematically recorded:

- Number of travellers screened (primary screening)
- Number of travellers having been referred to a secondary screening
- Number of travellers characterized as suspected cases via a secondary screening
- Number of travellers identified as suspected cases via a secondary screening on whom a type of health measure has been implemented (e.g. public health observation, isolation, decontamination, referral to medical facility, quarantine, vaccination)
- Number of travellers identified as confirmed cases
- Number of targeted travellers for screening.

8.2 Public health measures with respect to ships and inanimate objects

8.2.1 Inspections

Inspection may be required by competent authorities on arrival or departure of a ship for public health purposes (IHR Article 23). Inspections are also conducted routinely with the purpose to issue SSCs (IHR Article 39). In any case, all inspection findings and health measures must be recorded in the SSC.

During inspection, trained personnel examine areas, baggage, containers, conveyances, facilities and goods or postal parcels, including relevant data and documentation, to determine if a public health risk exists. Based on evidence of inspection findings, the competent authority can decide on implementation of further public health measures such as disinfection, decontamination, dissection or deratting (IHR Article 27).

States Parties may subject the granting of free pratique (permission for a ship to enter a port, embark or disembark, discharge or load cargo or stores) to inspection (IHR Article 28).

Depending on the purpose of inspection and the nature of the event (e.g. outbreak investigation, chemical spill, presence of vectors) a focused inspection might be necessary. In this case, the competent authority may seek support from experts and other relevant authorities to better assess public health risks. Detailed guidance on inspection of ships is given in the *Handbook for Inspection of Ships and Issuance of Ship Sanitation Certificates* (23).

8.2.2 Review of manifest and routing

It might be necessary for a competent authority to review documents of the ship and their loads as part of the process of identifying evidence of a public health risk and, if necessary, conduct routing. Review of travel history in affected areas of ships might also be necessary.

The IMO General Declaration includes previous and next ports of call.

The MDH lists:

- ports of call from commencement of voyage along with days of departure, or within the past thirty days, whichever is shorter;
- ports and dates of visit in affected areas.

Ship routes can be viewed on public websites, but this information is not available for all ships.

Depending on the event, it might be necessary to collect further information about cargo and other objects that were loaded onto the ship. The ship's log, dangerous goods manifest, cargo declaration, ship's stores declaration, ballast water record book and other available documents can be reviewed. Evidence from customs or other border authorities can be used and shipping agents (in a case by case basis) might be contacted, depending on the event and situation.

8.2.3 Review of proof of measures taken on departure or in transit to eliminate infection or contamination

A competent authority may decide to review the proof of measures taken on departure from a previous port or while the ship or its loads were in transit. The SSC records the evidence found and the control measures required/taken according to IHR Article 24. Review of proof of measures taken might also involve examination of conveyances maintenance documents – e.g. cleaning programmes, water safety records, pest management plans, food safety programme, waste management records, health records and decontamination/cleansing activities.

8.2.4 Disinfection, decontamination and vector control

These health measures can be applied to baggage, cargo, containers, conveyances, goods, postal parcels or human remains. Dissection, deratting, disinfection, decontamination and other sanitary procedures shall be carried out so as to avoid injury and, as far as possible, discomfort

to persons, or damage to the environment in a way which impacts public health or damage to baggage, cargo, containers, conveyances, goods and postal parcels (IHR Article 22). After the implementation of control measures, the competent authority should verify their effectiveness.

8.2.4.1 Disinsection and deratting

Every conveyance leaving a point of entry situated in an area where vector control is recommended should be disinsected and kept free of vectors (IHR Annex 5). A country may apply vector control measures to conveyances arriving from an area affected by a vector-borne disease if the vectors for the foregoing disease are present in its territory.

Below are the key points to be considered by the competent authority regarding vector control measures:

1. All activities must be carried out safely according to:
 - a) United Nations International Maritime Organisation (IMO) *Safety of Life at Sea (SOLAS) Convention (15)*.
 - b) The *Recommendations on the Safe Use of Pesticides in Ships* published by the IMO (38).
 - c) Requirements of national or regional regulations.
 - d) The *IMO International Maritime Dangerous Goods (IMDG) Code*, fumigation of packaged goods (20).
 - e) The *International Maritime Fumigation Organisation (IMFO) Code of Practice (39)*.
2. The vector control measures must be applied by licensed and competent specialists.
3. The method of vector control and the pesticides used must be appropriate for the location and type of cargo. For example, methyl bromide should never be used for fumigation in transit.
4. Written documentation must be given to certify the process applied.

The Ship master must apply all required measures (e.g. in case of fumigation application, ensure that crew is briefed on the application process and appoint crew members to act as representatives of the ship master, etc.).

8.2.4.2 Disinfection

Disinfection is used to kill infectious agents. There are several instances where disinfection can be applied such as: on surfaces of a room where a patient stays; on articles that have been contaminated by infectious discharges including linens, baggage, eating utensils; on environmental surfaces as a measure to control an unsanitary condition; in water and water distribution systems. Different disinfection methods (physical or chemical) and products can be used. The competent authority must ensure that the methods are appropriately applied and are effective to kill the infectious agents. For example, if chemical disinfection is applied: the active substance of the disinfection product and the concentration used must be effective to kill the infectious agent; the disinfectant is applied using the methods and tools recommended by the manufacturer; the product has been approved by a competent body according to the national legislation; and the product is suitable for the material to be disinfected. In case of physical disinfection (heat, radiation and filtration): the equipment is used according to manufacturer instructions and the temperature has reached the required levels.

8.2.4.3 Decontamination

According to the IHR definition, decontamination is the process where health measures are taken “to eliminate an infectious or toxic agent or matter on a human or animal body surface, in or on a product prepared for consumption or on other inanimate objects, including conveyances that may constitute a public health risk”.

Methods applied depend on the type of the agent. Specialized personnel of competent authorities should make the decision on method and agents to be used. In case of a chemical event, the ship maintains data sheets for all chemicals carried on board which includes spill-handling procedures.

Decontamination can take place, for example, by destroying chemical agents through chemical modification, by physically removing agents by washing, absorption, or evaporation or by physically scraping off the agents so that they cause no damage (40).

8.3 Use of specific health measures to ensure the safe handling and transport of human remains

Guidance to be followed after a death at sea can be found in the *IMGS (19)*. As described in preliminary standard response (section 5), a risk assessment of the cause of death should be conducted to determine the appropriate public health response. Specific measures might be necessary for the safe handling and transport of human remains. Repatriation and safeguarding of property of the deceased must be implemented according to ILO MLC 2006 (36). IATA regulations must be consulted in case of air transportation of cadavers.

8.3.1 Isolation and quarantine

If isolation or quarantine of a ship causes a delay in the ship’s schedule of more than 24 hours, then these are considered additional health measures and the provisions of IHR Article 43 apply (see section 7.8).

Isolation or quarantine of a ship can be decided by a competent authority on an affected ship when there is a public health risk on board that can affect the environment, other conveyances around the ship or the population ashore. In such a case, the affected conveyance can be quarantined or isolated in a designated location at the port until health measures can be implemented. When exposure is suspected, the ship will be placed initially in quarantine until further assessment can identify if the ship is indeed affected. When there is proof that the ship is affected the ship may be placed in isolation until health measures can be satisfactorily implemented.

8.3.2 Seizure and destruction of infected or contaminated ships and other inanimate objects

If there is no available treatment of infected or contaminated baggage, cargo, containers, conveyances, goods or postal parcels, these objects can be seized and destroyed under controlled conditions. For some public risks that cannot be eliminated with feasible health measures, incineration is a good choice.

8.3.3 Supervision of removal and safe disposal of contaminated matter from a ship

Special arrangements might be needed for removal and safe disposal of any contaminated water or food, human or animal excreta, ballast water, wastewater or any other contaminated matter from ships. Before or after the removal of the contaminated matter, treatment might need to be applied to the matter, the ship and/or the equipment used. In any case, the competent authority must supervise the procedures and ensure that there are no risks to public health or the environment.

8.3.4 Refuse departure or entry of a ship

According to IHR Article 28, “ships shall not be refused free pratique for public health reasons; in particular they must not be prevented from embarking or disembarking, discharging or loading cargo or stores, or taking on fuel, water, food and supplies”. However, competent authorities can allow free pratique with the condition that the ship will be inspected and after implementation of necessary health measures.

Additionally, a competent authority must not refuse departure of an affected ship if it is not able to carry out the control measures in the affected ship. In this case, the ship must be allowed to depart, provided that the competent authority of the next known point of entry will be informed and that the evidence found as well as the required control measures will be noted in the SSC (IHR Article 27). Affected conveyances must be permitted to take on fuel, water, food and supplies under the supervision of the competent authority.

Refusal of departure or entry of a ship is considered an additional health measure (IHR Article 43) and the provisions mentioned in section 7.8 are applicable.

8.4 Public health measures for affected animals

Live animals, including dogs, cats, ferrets, reptiles, rodents, non-human primates, horses, poultry, captive birds, bovines, porcines, ovines and caprines, can be transferred by ships. Some of these animals also may be inadvertent stowaways and arrive dead trapped in containers or elsewhere on the ship. Anthroozoonosis may be transmitted to passengers and crew members from animals carried aboard ships. Special measures during transportation are required to ensure the welfare of animals in transit and to prevent the transmission of diseases among animals and between animals and humans.

Specific measures should be taken for the control of imported live animals and pets carried aboard ships. An authority should have the capacity to provide assessment of potentially affected animals and to be able to provide care of them if needed. This is usually a responsibility for another dedicated authority such as the ministries of agriculture, wildlife resources and veterinary.

It is important that competent authorities are able to determine the need for isolation and quarantine of animals and be able to provide logistic support for the implementation of such measures as well as access to health services for the animals. Documents such as vaccination and veterinary certificates could be also considered in the assessment.

The isolated animal shall stay in an appointed place to receive treatment and the owner of the animal shall be informed in advance.

REFERENCES

- (1) International Health Regulations (2005). 2nd ed. Geneva: World Health Organization; 2008.
- (2) Rapid risk assessment of acute public health events. Geneva: World Health Organization; 2012.
- (3) Lovell SJ, Drake LA. Tiny stowaways: analyzing the economic benefits of a U.S. Environmental Protection Agency permit regulating ballast water discharges. *Environ Manage* 2009 Mar;43(3):546-55.
- (4) McCarthy SA, Khambaty FM. International dissemination of epidemic *Vibrio cholerae* by cargo ship ballast and other nonpotable waters. *Appl Environ Microbiol* 1994 Jul;60(7):2597-601.
- (5) Tatem AJ, Hay SI, Rogers DJ. Global traffic and disease vector dispersal. *Proc Natl Acad Sci U S A* 2006 Apr 18;103(16):6242-7.
- (6) Cramer EH, Blanton CJ, Blanton LH, Vaughan GH, Jr., Bopp CA, Forney DL. Epidemiology of gastroenteritis on cruise ships, 2001-2004. *Am J Prev Med* 2006 Mar;30(3):252-7.
- (7) Cayla JA, Maldonado R, Gonzalez J, Pellicer T, Ferrer D, Pelaz C, et al. A small outbreak of Legionnaires' disease in a cargo ship under repair. *Eur Respir J* 2001 Jun;17(6):1322-7.
- (8) Kura F, memura-Maekawa J, Yagita K, Endo T, Ikeno M, Tsuji H, et al. Outbreak of Legionnaires' disease on a cruise ship linked to spa-bath filter stones contaminated with *Legionella pneumophila* serogroup 5. *Epidemiol Infect* 2006 Apr;134(2):385-91.
- (9) Cohen NJ, Slaten DD, Marano N, Tappero JW, Wellman M, Albert RJ, et al. Preventing maritime transfer of toxigenic *Vibrio cholerae*. *Emerg Infect Dis* 2012 Oct;18(10):1680-2.
- (10) McCarthy SA, Khambaty FM. International dissemination of epidemic *Vibrio cholerae* by cargo ship ballast and other nonpotable waters. *Appl Environ Microbiol* 1994 Jul;60(7):2597-601.
- (11) Rivera IN, Souza KM, Souza CP, Lopes RM. Free-living and plankton-associated vibrios: assessment in ballast water, harbor areas, and coastal ecosystems in Brazil. *Front Microbiol* 2012;3:443.
- (12) International Health Regulations (2005): a guide for public health emergency contingency planning at designated points of entry. Manila: World Health Organization Regional Office for the Western Pacific; 2012.
- (13) Criminal and epidemiological investigation handbook. U.S. Department of Justice Federal Bureau of Investigation; 2011.
- (14) United Nations Convention on the Law of the Sea. http://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf 2013 March 31.
- (15) International Convention for the Safety of Life at Sea (SOLAS), 1974 [https://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-\(SOLAS\)-1974.aspx](https://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS)-1974.aspx), accessed 12 October 2015).

- (16) International Convention for the Prevention of Pollution from Ships (MARPOL) [https://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-\(MARPOL\).aspx](https://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx), accessed 12 October 2015).
- (17) Interim WHO technical advice for case management of pandemic (H1N1) 2009 on ships. Geneva: World Health Organization; 2009.
- (18) Hyer RN, Covello VT. Effective media communication during public health emergencies. A WHO handbook. Geneva: World Health Organization; 2005.
- (19) International medical guide for ships: including the ship's medicine chest. 3rd ed. Geneva: World Health Organization; 2007.
- (20) International Maritime Dangerous Goods (IMDG) Code (<http://www.imo.org/Publications/IMDGCode/Pages/Default.aspx>, accessed 15 October 2015).
- (21) International travel and health. Geneva: World Health Organization; 2012.
- (22) Heymann DL, editor. Control of communicable diseases manual. 20 ed. Washington, DC: American Public Health Association Publications; 2015.
- (23) Handbook for inspection of ships and issuance of Ship Sanitation Certificates. Geneva: World Health Organization; 2011.
- (24) Guide to ship sanitation. 3rd ed. Geneva: World Health Organization; 2011.
- (25) WHO guidance for the use of Annex 2 of the International Health Regulations (2005). Decision instrument for the assessment and notification of events that may constitute a public health emergency of international concern. Geneva: World Health Organization; 2008.
- (26) Interim infection prevention and control guidance for care of patients with suspected or confirmed Filovirus haemorrhagic fever in health-care settings, with focus on Ebola. World Health Organization; 2014.
- (27) Ebola haemorrhagic fever. WHO Fact sheet No 103. August 2012 (<http://www.who.int/mediacentre/factsheets/fs103/en/> 2012).
- (28) Jahrling PB, Geisbert TW, Dalgard DW, Johnson ED, Ksiazek TG, Hall WC, et al. Preliminary report: isolation of Ebola virus from monkeys imported to USA. *Lancet* 1990 Mar 3;335(8688):502-5.
- (29) Rollin PE, Williams RJ, Bressler DS, Pearson S, Cottingham M, Pucak G, et al. Ebola (subtype Reston) virus among quarantined nonhuman primates recently imported from the Philippines to the United States. *J Infect Dis* 1999 Feb;179 Suppl 1:S108-S114.
- (30) Mahanty S, Kalwar R, Rollin PE. Cytokine measurement in biological samples after physicochemical treatment for inactivation of biosafety level 4 viral agents. *J Med Virol* 1999 Nov;59(3):341-5.
- (31) Mitchell SW, McCormick JB. Physicochemical inactivation of Lassa, Ebola, and Marburg viruses and effect on clinical laboratory analyses. *J Clin Microbiol* 1984 Sep;20(3):486-9.

- (32) WHO. Interim guidance: travel and transport risk assessment: Interim guidance for public health authorities and the transport sector. Geneva: World Health Organization; 2014.
- (33) Human health risk assessment toolkit: chemical hazards. Geneva: World Health Organization; 2010 (http://www.who.int/ipcs/methods/harmonization/areas/ra_toolkit/en/index.html, accessed 13 October 2015).
- (34) WHO manual: the public health management of chemical incidents. Geneva: World Health Organization; 2009 (http://www.who.int/environmental_health_emergencies/publications/Manual_Chemical_Incidents/en/, accessed 13 October 2015).
- (35) Practical guidelines for infection control in health care facilities. Geneva: World Health Organization; 2004 (http://www.who.int/water_sanitation_health/emergencies/inf-control/en/, accessed 3 October 2015).
- (36) International Labour Organization. Maritime Labour Convention 2006. Geneva: 2006.
- (37) WHO. WHO interim guidance for Ebola virus disease: exit screening at airports, ports and land crossings. Geneva: World Health Organization; 2014.
- (38) International Maritime Organization. Recommendations on the safe use of pesticides in ships. London, 2013.
- (39) International Maritime Fumigation Organisation. Buenos Aires, http://www.imfo.com/IMFO_Code_of_Practice.pdf, 2010.
- (40) US National Academy of Sciences. 2004. News & terrorism Communicating in a Crisis. A fact sheet from the National Academies and the U.S. Department of Homeland Security. Chemical Attack warfare agents, Industrial Chemicals, and Toxins.

Annex 1. Events of infectious diseases linked with ships based on a literature review

The following table presents ship-associated cases/outbreaks of infectious diseases. Events included in the following table involved at least one laboratory-confirmed case.

Disease	No. of cases	No. of cases hospitalized	No. of deaths	Location	Type of ship	Type of event	Reference
Viral GI due to norovirus	2859	0	0	America, Europe, Asia	Passenger ships, navy ship	18 outbreaks	(A1-A9)
Bacterial GI due to <i>Vibrio parahaemolyticus</i>	62	0	0	America	Passenger ship	1 outbreak	(A10)
Shigellosis	330	8	0	Europe	Passenger ship	1 outbreak	(A11)
Salmonellosis	112	2	0	Europe	Passenger ship	1 outbreak	(A12)
<i>Staphylococcal</i> poisoning	215	0	0	America	Passenger ship	1 outbreak	(A13)
Tuberculosis (TB)	196	4		America, Asia, Europe, Africa	Aircraft carrier, navy ships	3 outbreaks	(A14-A16)
Legionellosis	118	10	2	Europe, America, Asia	Passenger ships	1 case, 2 clusters, 6 outbreaks	(A-17-A24)
Outbreaks involving more than one pathogen (GI)	2752	1	0	America, Asia, Oceania	Passenger ship, navy ship, cargo ship	12 outbreaks	(A25-A34)
Outbreaks involving more than one pathogen (rubella, measles, varicella)	40	0	0	America	Passenger ship	3 outbreaks	(A35;A36)
Outbreaks involving more than one pathogen (respiratory)	1048	28	0	Asia, Europe, Africa, America	Passenger ship, navy ship	7 outbreaks	(A37-A40)
Influenza-like-illness (ILI) (among other respiratory viruses)	682	42	2	Oceania, America, Europe, Asia	Passenger ship, navy ship	5 outbreaks	(A41-A45)
Ciguatera fish poisoning	26	0	0	America, Europe	Cargo ship	2 outbreaks	(A46, A47)
Meningitis	1	0	0	Between Europe and America	Navy ship	1 case	(A48)
Botulism	8	7	0	Asia	Passenger ship	1 outbreak	(A49)
Hepatitis E	228	0	0	Europe, America, Asia	Passenger ship	1 outbreak	(A50)
GI, gastrointestinal							

Annex 2. Disease-specific measures

This annex summarizes disease-specific measures to prevent the spread of diseases on board ships as recommended in the WHO *IMGs (19)* and the *Control of Communicable Diseases Manual (22)*. This annex does not refer to medical assessment of infectious diseases

Anthrax

WHO, *Guidelines for the Surveillance and Control of Anthrax in Humans and Animals*, 1998.
http://www.who.int/csr/resources/publications/anthrax/WHO_EMZ_ZDI_98_6/en/

WHO-OIE-FAO, *Anthrax in humans and animals*, 4th Edition, 2008.
http://apps.who.int/iris/bitstream/10665/97503/1/9789241547536_eng.pdf?ua=1

Heymann DL, editor. *Control of communicable diseases manual*. 20 ed. Washington, DC: American Public Health Association Publications; 2015

Botulism

WHO, Fact Sheet N° 270, Revised August 2013.
<http://www.who.int/mediacentre/factsheets/fs270/en/>

WHO, *From farm to plate, make food safe*, 2015.
<http://www.who.int/iris/handle/10665/160169#sthash.wX6P8Neq.dpuf>

Heymann DL, editor. *Control of communicable diseases manual*. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Cholera

WHO, *A field manual - Communicable disease control in emergencies*, page 133, 2005.
http://www.who.int/diseasecontrol_emergencies/publications/9241546166/en/

WHO, Fact Sheet N° 107, Revised February 2014.
<http://www.who.int/mediacentre/factsheets/fs107/en/>

WHO, *First steps for managing an outbreak of acute diarrhoea*, 2010.
<http://www.who.int/cholera/publications/firststeps/en/>

WHO, *Cholera outbreak: assessing the outbreak response and improving preparedness*, 2010.
<http://www.who.int/cholera/publications/OutbreakAssessment/en/>

Heymann DL, editor. *Control of communicable diseases manual*. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Dengue

WHO, *A field manual - Communicable disease control in emergencies*, page 139, 2005.
http://www.who.int/diseasecontrol_emergencies/publications/9241546166/en/

WHO, Dengue and Severe Dengue, Fact Sheet N° 117, Revised May 2015.
<http://www.who.int/mediacentre/factsheets/fs117/en/>

WHO, *Dengue, Guidelines for Diagnosis, Treatment, Prevention and Control*, 2009.
http://whqlibdoc.who.int/publications/2009/9789241547871_eng.pdf?ua=1

Heymann DL, editor. *Control of communicable diseases manual*. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Diphtheria

WHO, *A field manual - Communicable disease control in emergencies*, page 140, 2005.
http://www.who.int/diseasecontrol_emergencies/publications/9241546166/en/

WHO, *Manual for quality control of diphtheria, tetanus, pertussis and combined vaccines*, 2013.
http://www.who.int/immunization/documents/WHO_IVB_11.11/en/

Heymann DL, editor. *Control of communicable diseases manual*. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Gastroenteritis

WHO, *Consultation to Develop a Strategy to Estimate the Global Burden of Foodborne Diseases*, 2007.
http://www.who.int/foodsafety/publications/burden_sept06/en/

Heymann DL, editor. *Control of communicable diseases manual*. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Hepatitis A

WHO, *A field manual - Communicable disease control in emergencies*, page 142, 2005.
http://www.who.int/diseasecontrol_emergencies/publications/9241546166/en/

WHO, Fact Sheet N° 204, Revised March 2015.
<http://www.who.int/mediacentre/factsheets/fs204/en/>

Heymann DL, editor. *Control of communicable diseases manual*. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Hepatitis B

WHO, Fact Sheet N° 204, Revised March 2015.

<http://www.who.int/mediacentre/factsheets/fs204/en/>

Heymann DL, editor. Control of communicable diseases manual. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Hepatitis E

WHO, *A field manual - Communicable disease control in emergencies*, page 142, 2005.

http://www.who.int/diseasecontrol_emergencies/publications/9241546166/en/

WHO, Fact Sheet N° 280, Updated July 2015

<http://www.who.int/mediacentre/factsheets/fs280/en/>

Heymann DL, editor. Control of communicable diseases manual. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Influenza-like-illness (ILI)

WHO. Interim Protocol: Rapid Operations to Contain the Initial Emergence of Pandemic Influenza, 2007

http://www.who.int/influenza/resources/documents/rapid_protocol_pandemic_10_2007/en, accessed 14 October 2015.

WHO. Fact Sheet N° 211. Revised March 2014

<http://www.who.int/mediacentre/factsheets/fs211/en/>, accessed 14 October 2015.

Legionnaires' disease

WHO. Fact Sheet N°331. Revised November 2014

<http://www.who.int/mediacentre/factsheets/fs331/en/>, accessed 14 October 2015).

WHO. Revised WHO Classification and Treatment of Childhood Pneumonia at Health Facilities – Evidence Summaries, 2014

http://apps.who.int/iris/bitstream/10665/137319/1/9789241507813_eng.pdf?ua=1, accessed 14 October 2015.

Heymann DL, editor. Control of communicable diseases manual. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Malaria

WHO, *A field manual - Communicable disease control in emergencies*, page 155, 2005.
http://www.who.int/diseasecontrol_emergencies/publications/9241546166/en/

WHO, Fact Sheet N° 94, Revised April 2015.
<http://www.who.int/mediacentre/factsheets/fs094/en/>

Heymann DL, editor. *Control of communicable diseases manual*. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Measles

WHO, *A field manual - Communicable disease control in emergencies*, page 162, 2005.
http://www.who.int/diseasecontrol_emergencies/publications/9241546166/en/

WHO, Fact Sheet N° 286, Revised February 2015.
<http://www.who.int/mediacentre/factsheets/fs286/en/>

WHO, *guidelines for epidemic preparedness and response to measles outbreaks*, 1999.
http://www.who.int/csr/resources/publications/measles/WHO_CDS_CSR_ISR_99_1/en/

WHO, *Global measles and rubella – Strategic plan (2012-2020)*, 2012.
http://www.who.int/immunization/newsroom/Measles_Rubella_StrategicPlan_2012_2020.pdf

Heymann DL, editor. *Control of communicable diseases manual*. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Meningococcal meningitis

WHO, *A field manual - Communicable disease control in emergencies*, page 166, 2005.
http://www.who.int/diseasecontrol_emergencies/publications/9241546166/en/

WHO, Fact Sheet N° 141, Revised February 2015.
<http://www.who.int/mediacentre/factsheets/fs141/en/>

WHO, *Control of epidemic meningococcal disease. WHO practical guidelines*. 2nd edition, 1998.
http://www.who.int/csr/resources/publications/meningitis/WHO_EM_C_BAC_98_3_EN/en/

Heymann DL, editor. *Control of communicable diseases manual*. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Mumps

WHO, Immunization, Vaccines and biologicals: Description and prevention: Mumps.
http://www.who.int/immunization/monitoring_surveillance/burden/vpd/surveillance_type/passive/mumps/en/

WHO, *The immunological basis for immunization series, module 16: Mumps*, 2010.
http://apps.who.int/iris/bitstream/10665/97885/1/9789241500661_eng.pdf?ua=1

Heymann DL, editor. Control of communicable diseases manual. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Pertussis

WHO, Immunization, Vaccines and Biologicals : Description and prevention: Pertussis.
http://www.who.int/immunization/monitoring_surveillance/burden/vpd/surveillance_type/passive/pertussis/en/

WHO, *Manual for quality control of diphtheria, tetanus, pertussis and combined vaccines*, 2013.
http://www.who.int/immunization/documents/WHO_IVB_11.11/en/

Heymann DL, editor. Control of communicable diseases manual. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Plague

WHO, Fact sheet N° 267, Revised November 2014.
<http://www.who.int/mediacentre/factsheets/fs267/en/>

WHO, *Plague manual: epidemiology, distribution, surveillance and control*, 1999.
http://www.who.int/csr/resources/publications/plague/WHO_CDS_CSR_EDC_99_2_EN/en/

WHO, *Interregional meeting on prevention and control of plague*, Antananarivo, Madagascar, 1-11 April 2006.
http://www.who.int/csr/resources/publications/WHO_HSE_EPR_2008_3/en/

Heymann DL, editor. Control of communicable diseases manual. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Severe acute respiratory syndrome (SARS)

WHO. A Field Manual – Communicable Disease Control in Emergencies. 2005
http://www.who.int/diseasecontrol_emergencies/publications/9241546166/en/, accessed 15 October 2015).

WHO. Guidelines for the Global Surveillance of Severe Acute Respiratory Syndrome (SARS). Updated Recommendations. 2004
http://www.who.int/csr/resources/publications/WHO_CDS_CSR_ARO_2004_1/en/, accessed 15 October 2015.

WHO. WHO SARS Risk Assessment and Preparedness Framework October 2004
http://www.who.int/csr/resources/publications/WHO_CDS_CSR_ARO_2004_2/en/, accessed 15 October 2015.

Heymann DL, editor. Control of communicable diseases manual. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Rabies

WHO, Fact Sheet N° 99, Updated September 2015.
<http://www.who.int/mediacentre/factsheets/fs099/en/>

WHO, *The immunological basis for immunization series, module 17: Rabies*, 2011.
http://apps.who.int/iris/bitstream/10665/44517/1/9789241501088_eng.pdf?ua=1

Heymann DL, editor. Control of communicable diseases manual. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Scabies

WHO, *A field manual - Communicable disease control in emergencies*, page 171, 2005.
http://www.who.int/diseasecontrol_emergencies/publications/9241546166/en/

WHO, Neglected tropical diseases: Scabies.
http://www.who.int/neglected_diseases/diseases/scabies/en/

Heymann DL, editor. Control of communicable diseases manual. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Shingles (varicella zoster virus)

WHO, International travel and health: varicella
<http://www.who.int/ith/diseases/varicella/en/>

WHO, Immunization, Vaccines and Biologicals: Varicella
<http://www.who.int/immunization/diseases/varicella/en/>

Heymann DL, editor. Control of communicable diseases manual. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Staphylococcal poisoning

WHO, *From farm to plate, make food safe*, 2015.
<http://www.who.int/iris/handle/10665/160169#sthash.wX6P8Neq.dpuf>

Heymann DL, editor. Control of communicable diseases manual. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Tetanus

WHO, *Manual for quality control of diphtheria, tetanus, pertussis and combined vaccines*, 2013.
http://www.who.int/immunization/documents/WHO_IVB_11.11/en/

WHO WPRO, Fact Sheet, Revised March 2012.
http://www.wpro.who.int/mediacentre/factsheets/fs_20120307_tetanus/en/

WHO, *Current recommendations for treatment of tetanus during humanitarian emergencies*, 2010.
http://apps.who.int/iris/bitstream/10665/70219/1/WHO_HSE_GAR_DCE_2010.2_eng.pdf?ua=1

WHO, *The immunological basis for immunization series, Module 3: Tetanus*, 2006.
http://apps.who.int/iris/bitstream/10665/43687/1/9789241595551_eng.pdf?ua=1

Heymann DL, editor. Control of communicable diseases manual. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Trichinosis

Heymann DL, editor. Control of communicable diseases manual. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Tuberculosis (TB)

WHO, *A field manual - Communicable disease control in emergencies*, page 181, 2005.
http://www.who.int/diseasecontrol_emergencies/publications/9241546166/en/

WHO, Fact Sheet N° 104, Revised March 2015.
<http://www.who.int/mediacentre/factsheets/fs104/en/>

Heymann DL, editor. *Control of communicable diseases manual*. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Varicella zoster virus

WHO, *International travel and health: Varicella*.
<http://www.who.int/ith/diseases/varicella/en/>

WHO, *Immunization, Vaccines and Biologicals: Varicella*.
<http://www.who.int/immunization/documents/ISBN9789241596770/en/>

WHO, *Information sheet: observed rate of vaccine reactions, varicella zoster virus vaccine*, 2012.
http://www.who.int/vaccine_safety/initiative/tools/Varicella_Zoster_Vaccine_rates_information_sheet.pdf?ua=1

Heymann DL, editor. *Control of communicable diseases manual*. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Yellow fever

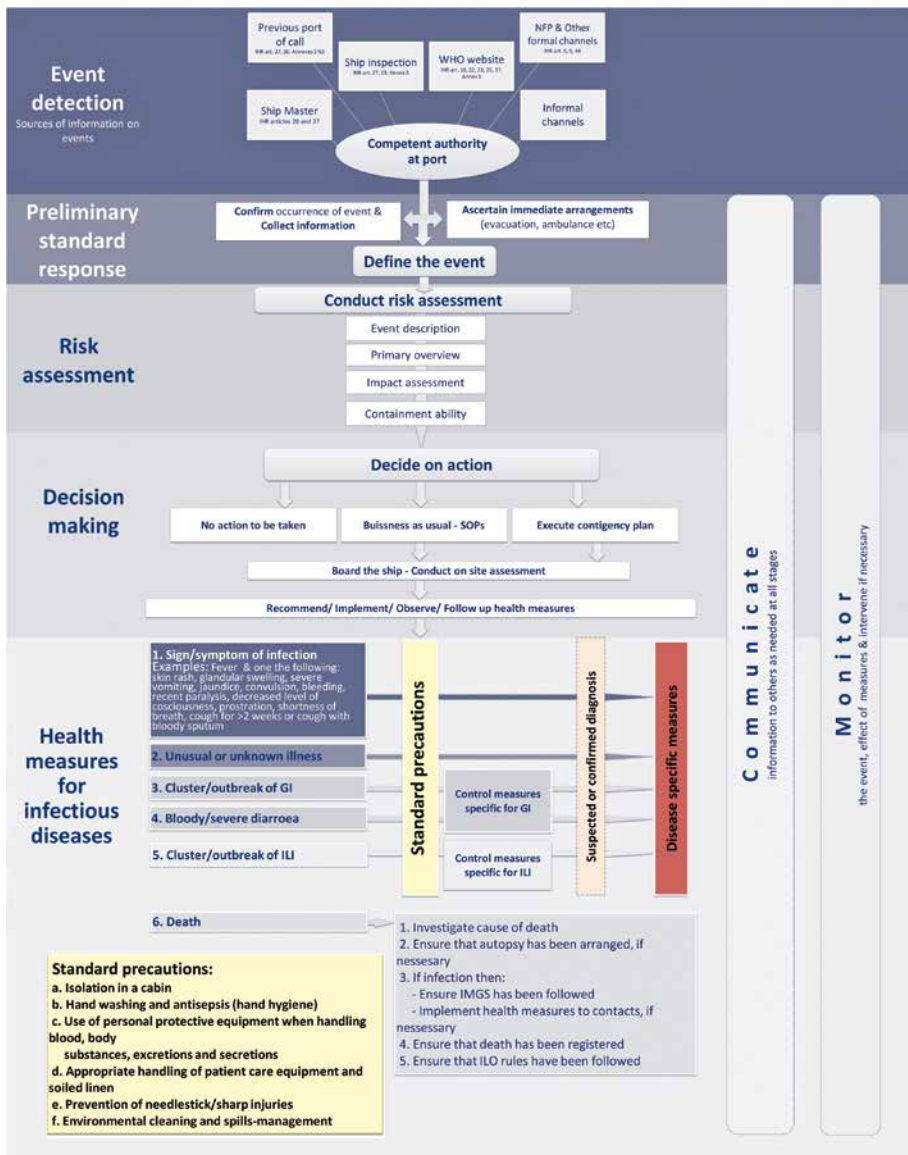
WHO, *A field manual - Communicable disease control in emergencies*, page 194, 2005.
http://www.who.int/diseasecontrol_emergencies/publications/9241546166/en/

WHO, Fact Sheet N° 100, Revised March 2014.
<http://www.who.int/mediacentre/factsheets/fs100/en/>

WHO, *Risk assessment on yellow fever virus circulation in endemic countries*, 2014.
http://www.who.int/csr/disease/yellowfev/risk_assessment/en/

Heymann DL, editor. *Control of communicable diseases manual*. 20 ed. Washington, DC: American Public Health Association Publications; 2015.

Annex 3. Event management flowchart



Annex 4. WHO EMRO Guidance on establishing public health assessment interview spaces

TABLE OF CONTENTS

EXECUTIVE SUMMARY	60
ACKNOWLEDGEMENTS	61
ACRONYMS	62
GLOSSARY	63
1. BACKGROUND	63
1.1 Core capacities requirements for designated PoE related to public health interview and assessment space, excerpted from the IHR (2005)	63
2. PLANNING FOR A PUBLIC HEALTH INTERVIEW/ASSESSMENT SPACE	64
2.1 Permanent facilities	64
2.2 Temporary arrangements during events with increased traveller volumes	65
2.3 During public health emergency of international concern – Forecast of extended time period and high volume of travellers to be screened (e.g. current EVD situation)	65
3. KEY BUILDING AND CONSTRUCTION SPECIFICATIONS FOR PUBLIC HEALTH INTERVIEW SPACE	66
3.1 Basic attributes	66
3.2 Other related facilities	66
3.3 Short-term quarantine or isolation space	66
4. STAFFING CONSIDERATIONS	67
4.1 Overall considerations	67
4.2 Recommended minimum staffing requirements at a designated point of entry	68
5. CONSIDERATIONS FOR EQUIPPING AND ADMINISTERING PUBLIC HEALTH INTERVIEW SPACE	68
5.1 Cleaning and disinfection	68
5.1.1 Routine cleaning and disinfection	68
5.1.2 Enhanced cleaning and disinfection	69
5.2 Interview and related equipment	69
5.3 Personal protective equipment	70
5.4 Operational agreements	70
6. BIBLIOGRAPHY	71
Annex references	72

EXECUTIVE SUMMARY

Over the past decade, countries have committed substantial resources and efforts to the development of core capacities for managing public health events at points of entry (PoE) in accordance with the requirements prescribed in the 2005 International Health Regulations (IHR). The aim of this material is to set out guidance to support State Parties to meet and sustain the core capacity for a public health assessment and interview space in accordance with IHR, namely to (a) identify appropriate interview space at PoE and (b) establish, equip and administer the space during routine or public health emergencies of international concern (PHEIC) under Annex 1B of the IHR.

With the arrival of two recent health emergencies – Middle East respiratory syndrome coronavirus (MERS-CoV) and Ebola virus disease (EVD) – the WHO Eastern Mediterranean Region conducted a region-wide assessment in 2014, one of the objectives of which was to identify and develop approaches to address those IHR core capacities that were limited or required strengthening. During the mission, two particular gaps were identified: a) setting up appropriate interview space at points of entry and b) establishing, equipping and administering the space during routine or public health emergencies as stipulated under Annex 1B of the IHR. In response to those gaps and the continuing outbreaks the WHO Eastern Mediterranean Region prepared the following guidance.

This draft guidance was presented in a series of four *Emergency Workshops to Enhance the Capacity of Points of Entry for Preparedness and Response to Ebola Virus Disease*, held from 16 March to 3 May 2015 in four countries within the WHO Eastern Mediterranean Region. Public health professionals from all countries in the region attended, as did the experts and regional representatives from the International Civil Aviation Organization (ICAO). Feedback received from both the public health and aviation sectors during and after the workshops has been incorporated into the guidance.

This document developed by WHO Regional Office for the Eastern Mediterranean addresses a gap identified during WHO assessment missions conducted in 2014, one of the objectives of which was to identify and develop approaches to address those IHR core capacities that were limited or required strengthening. The content of this guidance was presented in a series of four *Emergency Workshops to Enhance the Capacity of Points of Entry for Preparedness and Response to Ebola Virus Disease*, held from March 16 to May 3, 2015 in the countries of the WHO Eastern Mediterranean Region. The dialogue and feedback received during the workshops has been incorporated into the guidance.

Recognizing that planning, operation and maintenance of appropriate space for public health assessment and interviews at points of entry is a common challenge, this guidance might be beneficial to countries outside the Eastern Mediterranean Region as well.

ACKNOWLEDGEMENTS

Participants and facilitators in the *Emergency Workshops to Enhance the Capacity of Points of Entry for Preparedness and Response to Ebola Virus Disease*, hosted by the WHO Regional Office of Eastern Mediterranean (16 March–3 May 2015), whose input and feedback throughout the workshops clarified and enhanced the content of this guidance note.

WHO Regional Office for the Eastern Mediterranean

Dalia Samhouri, Epidemiologist, Epidemiology Surveillance and International Health Regulations (ESI), Department of Communicable Disease & Control

Dr Moussif Mohamed, Temporary Advisor

Dr KM Khalil, Temporary Advisor

Susan Clay, WHO consultant

WHO Global Capacities, Alert & Response Support to IHR Capacity Assessment, Development and Maintenance (CAD) Ports, Airports and Ground Crossings

Dr Daniel Menucci, Team Leader, Ports, Airports and Ground Crossings

Dr Ninglan Wang, Technical Officer

WHO Collaborating Centre for the International Health Regulations: points of entry at University of Thessaly, Greece

Christos Hadjichristodoulou, MD, PhD, Professor of Hygiene and Epidemiology, WHO Collaborating Centre for the International Health Regulations: points of entry at University of Thessaly, Greece

Barbara Mouchtouri, MSc, PhD, Public Health Specialist, WHO Collaborating Centre for the International Health Regulations: points of entry at University of Thessaly, Greece

ACRONYMS

EVD	Ebola Virus Disease
IHR	International Health Regulations (2005)
MERS-CoV	Middle East respiratory syndrome coronavirus
NFP	National Focal Point
PHEIC	Public Health Emergency of International Concern
PoE	Points of Entry
SARS	Severe Acute Respiratory Syndrome
SOP	Standard Operating Procedure
WHO	World Health Organization

GLOSSARY

'isolation' means separation of ill or contaminated persons or affected baggage, containers, conveyances, goods or postal parcels from others in such a manner as to prevent the spread of infection or contamination;

'medical examination' means the preliminary assessment of a person by an authorized health worker or by a person under the direct supervision of the competent authority, to determine the person's health status and potential public health risk to others, and may include the scrutiny of health documents, and a physical examination when justified by the circumstances of the individual case;

'point of entry' means 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;

'public health event of international concern' means an extraordinary event which is determined, as provided in these Regulations:

- i. to constitute a public health risk to other Member States through the international spread of disease and
- ii. to potentially require a coordinated international response;

'quarantine' means the restriction of activities and/or separation from others of persons who are ill or suspected of being ill or of suspect baggage, containers, conveyances or goods in such a manner as to prevent the possible spread of infection or contamination.

1. BACKGROUND

Persons travelling through a point of entry may be ill or be suspected of being affected or at risk of illness from a serious communicable disease or other condition arising from a public health event. The competent authority of a point of entry needs adequate space to assess ill travellers or those suspected of being ill in a manner that limits potential exposure to other travellers, the public and staff working at points of entry (PoE). This public health interview space is not intended to meet the requirements for the diagnosis and/or treatment of ill travellers, long-term quarantine of contacts or isolation of cases.

Distinction between public health interview/assessment space and a medical clinic

This guidance note refers to the specifications for a public health interview space at PoE, as required by the IHR. It does not set out specifications for a medical clinic that may deliver a variety of medical and/or occupational health services to PoE or travel industry staff, traveller health clinics or to the public. In some PoE, the medical clinic may support public health services; in others, it may operate as a completely independent, private medical facility. In the event that a medical clinic is involved in the public health response (under the direct supervision of the competent authority at the PoE), communication protocols that include the ministry of health and IHR National Focal Points (NFP) must be in place.

1.1 Core capacities requirements for designated PoE related to public health interview and assessment space, excerpted from the IHR (2005)

At all times, each designated PoE should have the following capacities (IHR Annex 1B 1)

The capacities:

- (a) to provide access to (i) an appropriate medical service including diagnostic facilities located so as to allow the prompt assessment and care of ill travellers, and (ii) adequate staff, equipment and premises;
- (b) to provide access to equipment and personnel for the transport of ill travellers to an appropriate medical facility;

For responding to events that may constitute a public health emergency of international concern (IHR Annex 1B 2)

The capacities:

- (c) to provide appropriate space, separate from other travellers, to interview suspect or affected persons;
- (d) to provide for the assessment and, if required, quarantine of suspect travellers, preferably in facilities away from the point of entry;
- (g) to provide access to specially designated equipment, and to trained personnel with appropriate personal protection, for the transfer of travellers who may carry infection or contamination.

Treatment of travellers: Article 32

- (c) providing or arranging for adequate food and water, appropriate accommodation and clothing, protection for baggage and other possessions, appropriate medical treatment, means of necessary communication if possible in a language that they can understand and other appropriate assistance for travellers who are quarantined, isolated or subject to medical examinations or other procedures for public health purposes.

2. PLANNING FOR A PUBLIC HEALTH INTERVIEW/ASSESSMENT SPACE

The space or spaces should be identified in advance (prior to an event) during the construction or renovation of PoE facilities or as part of the development of the public health emergency preparedness plan. This planning should be done in cooperation with PoE operators, customs and immigration, security services and other stakeholders at the PoE or related ministries (i.e. civil aviation, transport).

During planning, consider scenarios when small or large numbers of travellers may need to be interviewed/assessed.

- During normal circumstances, the designated public health interview/assessment space described in this document will be sufficient.
- In the event of a large number of travellers to be screened, interviewed/assessed, planning should consider creating a temporary space for travellers to complete screening forms and await interviews.
 - o For travellers who will depart/embark from the PoE, this temporary space may be created by establishing a health check-in counter prior to airline/ship company check-in.
 - o For travellers who are disembarking from a conveyance at the PoE, this temporary space may be created by designating an arrivals hall, separate from other arriving travellers, or by establishing a separate area through the use of screens, moveable walls, curtains or similar devices.

2.1 Permanent facilities

Ideally, the permanent space for public health interviews/assessments should be located within the PoE such that it:

- a. is accessible for the users of the facility;
- b. is in a location that will facilitate communication and collaboration between competent authorities (i.e. health, immigration, security services);
- c. can be securely accessed by paramedic/first responders for travellers who require first aid or transport to a medical facility (Note: those travellers arriving ill and requiring immediate medical attention may be assessed by first responders at the arrivals gate and transported directly to a medical facility);

- d. has preferably two doors – one for entry and one for exit including medical transport.
- e. includes wheelchair /stretcher accessible doors (i.e. self-closing doors)
- f. includes seating space close to the public health interview space for travellers waiting to be interviewed or family/travel companions.
- g. is located on an outside wall to facilitate natural lighting and ventilation, if feasible.

2.2 Temporary arrangements during events with increased traveller volumes

During a single event – When an affected conveyance arrives with a single or several ill or suspect travellers or due to information based on fact or evidence of a public health risk, including sources of infection and contamination, are found on board, the public health interview process may begin away from the established interview space.

- a. Meet conveyance at gate, and triage on board if possible with the agreement of the conveyance operator, removing traveller(s) who require emergency medical care and transport to a medical facility.
- b. Distribute passenger locator forms or questionnaires to travellers who have been identified for possible contact tracing on board or upon disembarking from the conveyance.
- c. Use arrivals hall or designated area to separate obviously ill travellers and those travellers identified for public health interview from others who will not be detained for interviews or further assessment.
- d. Use privacy screens or queue lines to conduct interviews with potential contacts.
- e. Accompany ill travellers or those suspected of being ill to the public health interview/assessment space.
- f. Where feasible, separate travellers from the concerned conveyance from other arrivals during border control screening: ensure border control and other relevant stakeholders are aware of the situation.

2.3 During public health emergency of international concern – Forecast of extended time period and high volume of travellers to be screened (e.g. current EVD situation)

- Collaborate with terminal facility to identify and occupy space temporarily near established public health interview space, where feasible.
- Review operational considerations for WHO technical notes on exit and entry screening as applicable according to WHO recommendations or national guidance

3. KEY BUILDING AND CONSTRUCTION SPECIFICATIONS FOR PUBLIC HEALTH INTERVIEW SPACE

3.1 Basic attributes

Consider that this space may also act as office space for public health staff at PoE. The dimensions will depend upon national building code or public health staff requirements. The space should be large enough to accommodate a desk with telephone/fax/computer/printer and chair; examination table; several chairs for staff and traveller(s); secure, lockable file storage for health records; storage shelving for paper supplies; shelving for assessment equipment (thermometers, syringes, etc.).

- a) Walls, floors and ceilings should be in good repair and have a smooth, washable finish.
- b) Lighting should meet international or national standards, with sufficient overhead and task lighting. Natural lighting (windows) may facilitate medical examination (i.e. to determine the nature of skin rashes, bruising, etc.).
- c) Hand washing sink should be equipped with hot and cold potable running water (separate from toilet facilities); a soap dispenser, towel dispenser and covered waste basket as well as hand antiseptics should be available for use.
- d) Separate hand washing facility with toilet connected to a sewage system should also be available; the hand basin should be equipped with hot and cold running potable water; a soap dispenser, towel dispenser and covered waste basket should also be available.
- e) Ventilation within the interview area and separate washroom should be controllable in order to reduce the potential for transmission of airborne illnesses, in accordance with international or national ventilation standards.
- f) Furnishings (desk, chairs, general waste basket, examination table) should be of a sort that can be easily cleaned and disinfected
- g) Sharps and biohazard waste disposal should be available.
- h) Internet access should be possible.
- i) Health education materials should be available.

3.2 Other related facilities

- j) A storage space is required for personal protective equipment (PPE) including masks, gloves, gowns and other PPE (see section 5.3) that may be recommended. The PPE may be stored within the public health interview space or in an easily accessible storage area nearby.
- k) Cleaning and disinfecting supplies will be required on a routine basis and should be stored nearby. Special disinfectants effective for specific pathogens will be needed depending on the etiological agent of emergency events.

3.3 Short-term quarantine or isolation space

Quarantine space

A PoE may also provide an onsite, short-term quarantine space. Long-term quarantine accom-

modation, however, has complex needs including security, sleeping accommodation, delivery of food and hygiene supplies: this type of accommodation may be more appropriately provided in designated housing (e.g. guest housing/hotels, hospitals, private housing). The IHR recommends that long-term quarantine be located away from PoE.

Isolation space

A point of entry may provide short-term isolation while the ill traveller is awaiting transport to a medical facility. The basic requirements for isolation space include separation from other travellers, interview or office space and good natural (windows open to outdoors) or engineered ventilation.

WHO recommendations for managing in-patients with sudden acute respiratory syndrome (SARS)⁴ may be a useful guide for consideration in managing short-term isolation. With respect to SARS, the following guidance is given. Probable SARS cases should be isolated and accommodated as follows in descending order of preference:

- o negative pressure rooms with the door closed
- o single rooms with their own bathroom facilities
- o cohort placement in an area with an independent air supply, exhaust system and bathroom facilities.

Turning off air conditioning and opening windows for good ventilation is recommended if an independent air supply is unfeasible. Please ensure that if windows are opened they are away from public places.

4. STAFFING CONSIDERATIONS

4.1 Overall considerations

Staffing for a point of entry public health interview space will depend on a number of factors, including the following.

• Duties of public health personnel:

- o In addition to public health interviews, the public health space may be the full or part time office for environmental health officers, epidemiologists, port health officers/specialists or public health/medical staff. The type and quantity of instruments and other equipment will be derived from the duties and educational background of public health staff that will work at the point of entry (e.g. if personnel are conducting rapid tests, they will require specific equipment).

• Complexity and volume of operations at PoE:

- o An airport that is a transport hub with significant traveller volume may require a larger, more diverse staff to meet the needs of travellers. In the largest airports with multiple terminals, there may need to be more than one public health interview space, coordinated by the competent authority.
- o A port used for cruise ships only may need a limited public health interview space because ill travellers or those suspected of being ill may have been assessed or diagnosed by the onboard medical clinic prior to arrival. Port health staff may have interviewed

4. <http://www.who.int/ihr/lyon/surveillance/infectioncontrol/en/>

these travellers onboard prior to disembarkation, in consultation with the cruise ship company. This may be decided on a case-by-case basis, avoiding unnecessary delays of departure, but is preferable because of the reduced exposure to other travellers, workers or the public.

o A port used exclusively by cargo vessels may also require a small public health interview space due to the small numbers of crew associated with cargo operations.

- Location of PoE:

o A ground crossing or air/marine point of entry located some distance from a medical facility may need additional space to hold ill travellers or those suspected of being ill until transport can be arranged.

4.2 Recommended minimum staffing requirements at a designated point of entry

As a minimum, there should be one or more port health officers onsite or available and reachable during the operational hours of the point of entry. These officers should have training in public health. If the ill traveller requires clinical assessment, diagnosis, laboratory testing or isolation, they will be transported to a designated medical facility for follow-up.

Larger facilities may retain medical professional staff members (nurses or physicians) who are able to conduct a non-invasive medical examination (as defined by IHR) or offer vaccinations. This level of staffing will require additional space and equipment.

A point of entry with a complex or high volume of travellers may decide to include isolation space or laboratory facilities for diagnosis of clinical specimens. The IHR states that appropriate service including diagnostic facilities should be located so as to allow the prompt assessment and care of ill travelers, without specifying the requirement of proximity. If a point of entry provides these spaces, they should consider the following:

- o Isolation space should meet all related requirements (please refer to bibliography.)

- o Laboratory facilities should be established, equipped and operated in accordance with national or international guidelines including external accreditation or evaluation.

5. CONSIDERATIONS FOR EQUIPPING AND ADMINISTERING PUBLIC HEALTH INTERVIEW SPACE

5.1 Cleaning and disinfection

Public health facilities require routine cleaning and disinfection at all times. The point of entry operator or third party contractors may provide this service. The frequency of cleaning and disinfection should be described in written arrangements between the port's competent authority(s) and the service provider.

5.1.1 Routine cleaning and disinfection

- Services will include cleaning and disinfecting of toilet and hand washing facilities; cleaning and disinfection of floors and soiled walls or ceilings; cleaning and disinfection of furnishings used

by ill or affected travellers; regular removal of general solid waste for appropriate handling and disposal.

- Cleaning and disinfecting agents should be licensed for use in the country. Service providers should have received training in their safe and effective use.
- Linens or towels must be replaced between travellers. It is preferable to use single use items where possible. If linens are used, they must be machine washed, handled in accordance with hospital infection control procedures following use and stored in a clean cupboard.
- All biohazard and waste contaminated by body fluids must be handled and disposed through appropriate hygiene services according to the States Parties guidelines for hospital waste management.
- Cleaning logs should be maintained for each area of the public health interview/assessment space.

5.1.2 Enhanced cleaning and disinfection

When a PHEIC has been declared or when the number of ill or affected travellers with a serious communicable disease is noted, hygiene services should be increased in accordance with ministry of health or other agency recommendations. Written instructions for enhanced cleaning and disinfection should be agreed between the port's competent authority(s), the point of entry operator, and service providers.

- Specific chemical disinfection agents determined to be effective against the infective or contaminating agent may be recommended for application. Service providers may require additional training in the preparation, handling and application of these products.
- Any contaminated items must be handled appropriately to mitigate the risk of transmission.
 - Disposable items (hand towels, gloves, tissues) should be double bagged and sent to incineration or similar final disposal, according to the States Parties guidelines for hospital waste management.
 - Reusable items that can be washed and treated/disinfected (gowns or linens) must be tagged and sent to facility for washing and treatment as recommended according to hospital infection control procedures, depending on the type of contamination/infectious agent, if known.

5.2 Interview and related equipment

- All instruments used during interview/assessment should be single use or constructed to withstand disinfection or sterilization in accordance with national or international codes. Note: WHO has recently recommended the use of "smart syringes" to prevent disease transmission especially for medical workers⁵.
- Where possible, non-contact temperature measuring devices should be used and if contaminated, they must be discarded or disinfected in accordance with manufacturer's instructions.
- There should be a written SOP for routine disinfection of equipment.
- Any dated equipment or consumable supplies must be stored with a 'first in/first out' stock rotation and checked on a yearly or bi-annual basis.

5 - <http://www.who.int/mediacentre/news/releases/2015/injection-safety/en/>

5.3 Personal protective equipment

The public health interview space should include or have access to a full range of PPE that may be necessary for conducting screening and interviews of ill travellers or those suspected of being ill. All staff should be trained in the use and handling of PPE. The following PPE are recommended as described in the EVD screening guidance document⁶ :

- o disposable gloves
- o long sleeved impermeable gown
- o face mask
- o eye protection (face shield or goggles)
- o close-toed shoes with shoe coverings or gum boots (optional)

Depending on the job duties performed at the point of entry, personnel may also require respirators or other appropriate equipment for environmental assessments. Note that the use of many respirators (i.e. N95) requires initial and routine fit testing for each individual that may be required to use it.

5.4 Operational agreements

The port's competent authority (s) and the point of entry operator should have a written agreement that outlines their respective responsibilities related to ongoing maintenance of the public health interview/assessment space. This document should include routine inspections of the physical facility and a procedure for making any repairs and improvements that may be required. The point of entry operator and the port's health department should ensure all such inspections or maintenance are documented. A specific SOP should be established for all related procedures (i.e. cleaning and disinfection).

6 - WHO. Exit screening at airports, ports and land crossings: interim guidance for Ebola virus disease. Geneva: World Health Organization; 2014 (http://apps.who.int/iris/bitstream/10665/139691/1/WHO_EVD_Guidance_PoE_14.2_eng.pdf?ua=1).

6. BIBLIOGRAPHY

ASHRAE/ASHE Standard 170, *Ventilation of Health Care Facilities*. 2008, updated 2014 Accessed online 20150225 at

http://www.resilienthouse.com/RH/HVAC/ASHRAE_HealthCareVentilation.pdf1.1

CIBSE. Lighting Guide 02: Hospitals and Health Care Building

<http://www.cibse.org/Knowledge/CIBSE-LG/Lighting-Guide-02-Hospitals-and-Health-Care-Buildi>

ICAO Guidelines For States Concerning The Management of Communicable Disease posing a serious Public Health Risk accessed online 20150224 at

<http://www.capsca.org/Documentation/ICAOHealthRelatedSARPsandguidelines.pdf>

Ninomura P, Bartley J. New Ventilation Guidelines For Health-Care Facilities. Accessed online 20150507

@ http://www.mintie.com/assets/img/resources/ASHRAE_Article-on-VentilationChanges.pdf

WHO International Health Regulations (2005) Core Capacity Requirements for Designated Airports, Ports and Ground Crossings

Hospital infection control guidance for Severe Acute Respiratory Syndrome (SARS). Accessed online 11 June 2015 @ <http://www.who.int/ihr/lyon/surveillance/infectioncontrol/en/>

WHO Natural ventilation for infection control in health-care settings. 2009. Accessed online 20150507 @ http://www.who.int/water_sanitation_health/publications/natural_ventilation/en/

WHO Exit screening at airports, ports and land crossings: Interim guidance for Ebola virus disease, accessed online 20150507 @ <http://who.int/csr/resources/publications/ebola/event-management-poe/en/>

UK Department of Health. Specialized ventilation for health-care facilities. Accessed online 20150225 at

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/144029/HTM_03-01_Part_A.pdf

ANNEX REFERENCES

- (A1) Anon. Norovirus activity--United States, 2002. *MMWR Morb Mortal Wkly Rep* 2003 Jan 24;52(3):41-5.
- (A2) Chimonas MA, Vaughan GH, Andre Z, Ames JT, Tarling GA, Beard S, et al. Passenger behaviors associated with norovirus infection on board a cruise ship--Alaska, May to June 2004. *J Travel Med* 2008 May;15(3):177-83.
- (A3) Isakbaeva ET, Widdowson MA, Beard RS, Bulens SN, Mullins J, Monroe SS, et al. Norovirus transmission on cruise ship. *Emerg Infect Dis* 2005 Jan;11(1):154-8.
- (A4) Verhoef L, Depoortere E, Boxman I, Duizer E, van DY, Harris J, et al. Emergence of new Norovirus variants on spring cruise ships and prediction of winter epidemics. *Emerg Infect Dis* 2008 Feb;14(2):238-43.
- (A5) Vivancos R, Keenan A, Sopwith W, Smith K, Quigley C, Mutton K, et al. Norovirus outbreak in a cruise ship sailing around the British Isles: investigation and multi-agency management of an international outbreak. *J Infect* 2010 Mar; 60(6):478-485.
- (A6) Wikswo ME, Cortes J, Hall AJ, Vaughan G, Howard C, Gregoricus N, et al. Disease transmission and passenger behaviors during a high morbidity Norovirus outbreak on a cruise ship, January 2009. *Clin Infect Dis* 2011 May;52(9):1116-22.
- (A7) Corwin AL, Soderquist R, Edwards M, White A, Beecham J, Mills P, et al. Shipboard impact of a probable Norwalk virus outbreak from coastal Japan. *Am J Trop Med Hyg* 1999 Dec;61(6):898-903.
- (A8) Herwaldt BL, Lew JF, Moe CL, Lewis DC, Humphrey CD, Monroe SS, et al. Characterization of a variant strain of Norwalk virus from a food-borne outbreak of gastroenteritis on a cruise ship in Hawaii. *J Clin Microbiol* 1994 Apr;32(4):861-6.
- (A9) Khan AS, Moe CL, Glass RI, Monroe SS, Estes MK, Chapman LE, et al. Norwalk virus-associated gastroenteritis traced to ice consumption aboard a cruise ship in Hawaii: comparison and application of molecular method-based assays. *J Clin Microbiol* 1994 Feb;32(2):318-22.
- (A10) McLaughlin JB, DePaola A, Bopp CA, Martinek KA, Napolilli NP, Allison CG, et al. Outbreak of *Vibrio parahaemolyticus* gastroenteritis associated with Alaskan oysters. *N Engl J Med* 2005 Oct 6;353(14):1463-70.
- (A11) Gikas A, Padiaditis J, Giti Z, Papadakis J, Tselentis Y. Shigellosis on an Italian cruise ship. *Lancet* 1996 Dec 7;348(9041):1593-4.
- (A12) MacDonald N, Cowden J. Salmonellosis outbreak on a cruise ship travelling from Germany around the UK. *Euro Surveill* 2004;8(37):pii=2541.
- (A13) Waterman SH, Demarcus TA, Wells JG, Blake PA. Staphylococcal food poisoning on a cruise ship. *Epidemiol Infect* 1987 Oct;99(2):349-53.

- (A14) Latent tuberculosis infection among sailors and civilians aboard U.S.S. Ronald Reagan--United States, January-July 2006. *MMWR Morb Mortal Wkly Rep* 2007 Jan 5;55(51-52):1381-2.
- (A15) Foote FO. A tuberculosis event on a Navy assault ship. *Mil Med* 2006 Dec;171(12):1198-200.
- (A16) Penman AD, Kohn MA, Fowler M. A shipboard outbreak of tuberculosis in Mississippi and Louisiana, 1993 to 1994. *Am J Public Health* 1997 Jul;87(7):1234.
- (A17) Anon. From the Centers for Disease Control and Prevention. Update: outbreak of Legionnaires' Disease associated with a cruise ship, 1994. *JAMA* 1994 Sep 28;272(12):915.
- (A18) Anon. Legionella on board a cruise ship. *Commun Dis Rep CDR Wkly* 1998 Jul 3;8(27):237.
- (A19) Beyrer K, Lai S, Dreesman J, Lee JV, Joseph C, Harrison T, et al. Legionnaires' disease outbreak associated with a cruise liner, August 2003: epidemiological and microbiological findings. *Epidemiol Infect* 2007 Jul;135(5):802-10.
- (A20) Castellani PM, Lo MR, Goldoni P, Mentore B, Balestra G, Ciceroni L, et al. Legionnaires' disease on a cruise ship linked to the water supply system: clinical and public health implications. *Clin Infect Dis* 1999 Jan;28(1):33-8.
- (A21) Jernigan DB, Hofmann J, Cetron MS, Genese CA, Nuorti JP, Fields BS, et al. Outbreak of Legionnaires' disease among cruise ship passengers exposed to a contaminated whirlpool spa. *Lancet* 1996 Feb 24;347(9000):494-9.
- (A22) Kobayashi A, Yamamoto Y, Chou S, Hashimoto S. Severe Legionella pneumophila pneumonia associated with the public bath on a cruise ship in Japan. *J Anesth* 2004;18(2):129-31.
- (A23) Kura F, memura-Maekawa J, Yagita K, Endo T, Ikeno M, Tsuji H, et al. Outbreak of Legionnaires' disease on a cruise ship linked to spa-bath filter stones contaminated with Legionella pneumophila serogroup 5. *Epidemiol Infect* 2006 Apr;134(2):385-91.
- (A24) Regan CM, McCann B, Syed Q, Christie P, Joseph C, Colligan J, et al. Outbreak of Legionnaires' disease on a cruise ship: lessons for international surveillance and control. *Commun Dis Public Health* 2003 Jun;6(2):152-6.
- (A25) Sedgwick J, Joseph C, Chandrakumar M, Harrison T, Lee J, de JB. Outbreak of respiratory infection on a cruise ship. *Euro Surveill* 2007 Aug;12(8):E070809.
- (A26) Anon. Leads from the MMWR. Gastroenteritis on two Caribbean cruise ships. *JAMA* 1986 Jul 25;256(4):447-8.
- (A27) Berkelman RL, Cohen ML, Yashuk J, Barrett T, Wells JG, Blake PA. Traveler's diarrhea at sea: two multi-pathogen outbreaks caused by food eaten on shore visits. *Am J Public Health* 1983 Jul;73(7):770-2.

- (A28) Gallimore CI, Pipkin C, Shrimpton H, Green AD, Pickford Y, McCartney C, et al. Detection of multiple enteric virus strains within a foodborne outbreak of gastroenteritis: an indication of the source of contamination. *Epidemiol Infect* 2005 Feb;133(1):41-7.
- (A29) Gonzaga VE, Ramos M, Maves RC, Freeman R, Montgomery JM. Concurrent outbreak of norovirus genotype I and enterotoxigenic *Escherichia coli* on a U.S. Navy ship following a Visit to Lima, Peru. *PLoS One* 2011;6(6):e20822.
- (A30) Gupta L, Towel B, Frommer M. Investigation of an outbreak of gastroenteritis on a container ship returning from Asia. *New South Wales Public Health Bulletin* 1994;5(6):61-2.
- (A31) Mintz ED, Weber JT, Guris D, Puhf N, Wells JG, Yashuk JC, et al. An outbreak of Brainerd diarrhea among travelers to the Galapagos Islands. *J Infect Dis* 1998 Apr;177(4):1041-5.
- (A32) O'Mahony M, Noah ND, Evans B, Harper D, Rowe B, Lowes JA, et al. An outbreak of gastroenteritis on a passenger cruise ship. *J Hyg (Lond)* 1986 Oct;97(2):229-36.
- (A33) Oyofe BA, Soderquist R, Lesmana M, Subekti D, Tjaniadi P, Fryauff DJ, et al. Norwalk-like virus and bacterial pathogens associated with cases of gastroenteritis onboard a US Navy ship. *Am J Trop Med Hyg* 1999 Dec;61(6):904-8.
- (A34) Whittaker DR, Campbell JT, McCarten MD. Viral gastroenteritis: the USS THEODORE ROOSEVELT experience. *Mil Med* 2004 Sep;169(9):747-50.
- (A35) Anon. Rubella among crew members of commercial cruise ships—Florida, 1997. *MMWR Morb Mortal Wkly Rep* 1998 Jan 9;46(52-53):1247-50.
- (A36) Mitruka K, Felsen CB, Tomianovic D, Inman B, Street K, Yambor P, et al. Measles, rubella, and varicella among the crew of a cruise ship sailing from Florida, United States, 2006. *J Travel Med* 2012 Jul;19(4):233-7.
- (A37) Anon. Influenza - United States, 1987-88 season. *MMWR Morb Mortal Wkly Rep* 1988 Aug 19;37(32):497-503.
- (A38) Christenson B, Lidin-Janson G, Kallings I. Outbreak of respiratory illness on board a ship cruising to ports in southern Europe and northern Africa. *J Infect* 1987 May;14(3):247-54.
- (A39) Miller JM, Tam TW, Maloney S, Fukuda K, Cox N, Hockin J, et al. Cruise ships: high-risk passengers and the global spread of new influenza viruses. *Clin Infect Dis* 2000 Aug;31(2):433-8.
- (A40) Sliman JA, Metzgar D, Asseff DC, Coon RG, Faix DJ, Lizewski S. Outbreak of acute respiratory disease caused by *Mycoplasma pneumoniae* on board a deployed U.S. navy ship. *J Clin Microbiol* 2009 Dec;47(12):4121-3.
- (A41) Outbreak of 2009 pandemic influenza A (H1N1) on a Peruvian Navy ship - June-July 2009. *MMWR Morb Mortal Wkly Rep* 2010 Feb 19;59(6):162-5.

- (A42) Brotherton JM, Delpech VC, Gilbert GL, Hatzi S, Paraskevopoulos PD, McAnulty JM. A large outbreak of influenza A and B on a cruise ship causing widespread morbidity. *Epidemiol Infect* 2003 Apr;130(2):263-71.
- (A43) Earhart KC, Beadle C, Miller LK, Pruss MW, Gray GC, Ledbetter EK, et al. Outbreak of influenza in highly vaccinated crew of U.S. Navy ship. *Emerg Infect Dis* 2001 May;7(3):463-5.
- (A44) Ferson M, Paraskevopoulos P, Hatzi S, Yankos P, Fennell M, Condylis A. Presumptive summer influenza A: an outbreak on a trans-Tasman cruise. *Commun Dis Intell* 2000 Mar 16;24(3):45-7.
- (A45) Tarabbo M, Lapa D, Castilletti C, Tommaselli P, Guarducci R, Luca G, et al. Retrospective investigation of an influenza A/H1N1pdm outbreak in an Italian military ship cruising in the Mediterranean Sea, May-September 2009. *PLoS One* 2011;6(1):e15933.
- (A46) Kipping R, Eastcott H, Sarangi J. Tropical fish poisoning in temperate climates: food poisoning from ciguatera toxin presenting in Avonmouth. *J Public Health (Oxf)* 2006 Dec;28(4):343-6.
- (A47) Schlaich C, Hagelstein JG, Burchard GD, Schmiedel S. Outbreak of ciguatera fish poisoning on a cargo ship in the port of hamburg. *J Travel Med* 2012 Jul;19(4):238-42.
- (A48) Farr W, Gonzalez MJ, Garbauskas H, Zinderman CE, LaMar JE. Suspected meningococcal meningitis on an aircraft carrier. *Mil Med* 2004 Sep;169(9):684-6.
- (A49) Swaan CM, van O, I, Roest HJ. Cluster of botulism among Dutch tourists in Turkey, June 2008. *Euro Surveill* 2010;15(14).
- (A50) Said B, Ijaz S, Kafatos G, Booth L, Thomas HL, Walsh A, et al. Hepatitis E outbreak on cruise ship. *Emerg Infect Dis* 2009 Nov;15(11):1738-44.

