

**Coordinated public health
surveillance between points of
entry and national health
surveillance systems**

Advising principles



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**World Health
Organization**

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ABBREVIATIONS AND ACRONYMS

EBS	Event-based surveillance
EWAR	Early warning and response
IBS	Indicator Based Surveillance
IHR	International Health Regulations (2005)
NFP	National IHR Focal Point
NHSS	National health surveillance system
PHEIC	Public health emergency of international concern
PNL	Passenger name list
PoE	Points of entry
SARS	Severe acute respiratory syndrome
SOP	Standard operating procedure
WHO	World Health Organization

1. DEFINITIONS

The first occurrence in the document of each term defined below will be underlined.

“Affected” means persons, baggage, cargo, containers, conveyances, goods, postal parcels or human remains that are infected or contaminated, or carry sources of infection or contamination, so as to constitute a public health risk (1).

“Aircraft” means an aircraft making an international voyage (1).

“Airport” means any airport where international flights arrive or depart (1).

“Arrival” of a conveyance means in the case of seagoing vessel, arrival or anchoring in the defined area of port; in the case of an aircraft, arrival at an airport; in the case of an inland navigation vessel on an international voyage, arrival at a point of entry; in the case of a train or road vehicle, arrival at a point of entry (1).

“Cargo” means goods carried on a conveyance or in a container (1).

“Contact tracing” is defined as the identification of persons who may have been exposed to an infectious disease by another infected person (2). It aims to identify new cases and respond to them in a timely way, hence preventing the further spread of the disease (3).

“Contamination” means the presence of 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 (1).

“Competent authority” means an authority responsible for the implementation and application of health measures under the International Health Regulations (2005) (1).

“Conveyance” means an aircraft, ship, train, road vehicle or other means of transport on an international voyage (1).

“Conveyance operator” means a natural or legal person in charge of a conveyance or their agent (1).

“Crew” means persons on board a conveyance who are not passengers (1).

“Departure” means for persons, baggage, cargo, conveyances or goods, the act of leaving a territory (1).

“Designated point of entry” means airports, ports and certain ground crossings designated by States Parties to develop the capacities set forth in Annex 1 of the International Health Regulations (2005). These capacities include: an access to appropriate medical services (with diagnostic facilities); services for the transport of ill persons; trained personnel to inspect ships, aircraft and other conveyances; maintenance of a safe environment; a programme and trained personnel for the control of vectors and reservoirs; a public health emergency contingency plan; capacities for responding to events that may constitute a public health emergency of international concern.

“Early warning and response” means the organised mechanism for the earliest possible detection of any public health event requiring rapid investigation and response (3).

“Event” means a manifestation of disease or an occurrence that creates a potential for disease (1).

“Event-based surveillance” means the organized collection, monitoring, assessment and interpretation of mainly unstructured ad hoc information regarding health events or risks, which may represent an acute risk to human health. Event-based surveillance is a functional component of early warning and response (3).

“Ground crossing” means a point of land entry in a State Party, including one utilized by road vehicles and trains (1).

“Indicator-based surveillance” means the systematic (regular) collection, monitoring, analysis and interpretation of structured data, i.e. of indicators produced by a number of well-identified, mostly healthcare-based formal sources (3).

“International Health Regulations (2005)”: international legal instrument that is binding in 196 countries across the globe, including all WHO Member States. The regulations aim to help the international community prevent and respond to acute public health risks that have the potential to cross borders and threaten people worldwide. The IHR, which entered into force on 15 June 2007, require countries to report certain health events to WHO. Building on WHO’s unique experience in global disease surveillance, alert and response, the IHR define the rights and obligations of countries to report events, and establish a number of procedures that WHO must follow in its work to uphold global public health security.

“International voyage” means (1):

- a) in the case of a conveyance, a voyage between points of entry in the territories of more than one State, or a voyage between points of entry in the territory or territories of the same State if the conveyance has contacts with the territory of any other State on its voyage but only as regards those contacts;
- b) in the case of a traveller, a voyage involving entry into the territory of a State other than the territory of the State in which that traveller commences the voyage.

“National IHR Focal Point” means the national centre, designated by each State Party, which shall be accessible at all times for communications with WHO IHR Contact Points under the International Health Regulations (2005) (1).

“Notification” is the mandatory or advised communication of information by a State Party to WHO as stated in article 6 of the International Health Regulations (2005).

“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 (1).

“Public health emergency of international concern” is an extraordinary event which is determined, as provided in the IHR (i) to constitute a public health risk to other States through the international spread of disease, and (ii) to potentially require a coordinated international response (1).

“Public health risk” is a likelihood of an event that may affect adversely the health of human populations, with an emphasis on one which may spread internationally or may present a serious and direct danger (1).

“Reporting” is the process by which health events and health risks are brought to the knowledge of the health authorities (3).

“Reservoir” means an animal, plant or substance in which an infectious agent normally lives and whose presence may constitute a public health risk (1).

“Ship” means a seagoing or inland navigation vessel on an international voyage (1).

“Surveillance” or “public health surveillance” means the systematic on-going collection, collation and analysis of data for public health purposes and the timely dissemination of public health information for assessment and public health response as necessary (1).

“Traveller” means a natural person undertaking an international voyage (1).

“Vector” means an insect or other animal which normally transports an infectious agent that constitutes a public health risk (1).

“WHO IHR Contact Point” means the unit within WHO which shall be accessible at all times for communications with the National IHR Focal Point (1).

2. BACKGROUND

Annex 1 of the International Health Regulations (2005) (hereafter referred to as the IHR) requires State Parties to meet specific minimum core capacity requirements for surveillance and response (1). Surveillance has been defined as the systematic on-going collection, collation and analysis of data for public health purposes and the timely dissemination of public health information for assessment and public health response as necessary (1). A public health surveillance system serves two main objectives (3):

- To measure disease burden, including monitoring mortality/morbidity trends, in order to effectively guide control programmes and the allocation of resources.
- To early detect public health risks and events of all origins, in order to ensure that they are rapidly investigated and controlled. The organized mechanism to reach this objective is referred to as Early warning and response (EWAR) (3).

The efficient collection of pertinent information is critical for EWAR, as is the reporting of information to the competent authorities for taking measures (3).

Pertinent information for EWAR is also generated at points of entry (PoE), including ports, airports and ground crossings, and should be reported timely to the national health surveillance system (NHSS) and beyond, as appropriate. For their part, PoE should promptly receive all pertinent information generated elsewhere that may contribute to their public health surveillance objectives such as to prevent and/or manage the importation and exportation of health hazards.

PoE are considerably different from community settings and require different approaches for implementing public health surveillance:

- Collecting public health surveillance data is not a major concern or viewed as a priority by the numerous actors from a range of sectors who are key stakeholders (e.g. customs and immigration officials, conveyance operators, service providers, veterinary and quarantine authorities).
- The lack of medical personnel in the majority of the conveyances or at PoE is a challenge for efficient public health surveillance and should be compensated by effective mechanisms for intersectoral communication, coordination and information-sharing.
- The IHR require surveillance with an “all-hazard approach” including biological, chemical, and radiological hazards. In PoE and conveyances, this relates to the passage of travellers including passengers and crews, animals, plants, and goods of diverse origin. Events can be recognized or diagnosed before, during or after travel, often when travellers have left the conveyance or the PoE. Therefore, (i) information about these events is not always obtained by the authorities at the PoE, and may reach them, if at all, by other routes. In such situations, investigation takes place retrospectively and public health measures may need to be applied after the travellers have disembarked and left the PoE; and (ii) since the number of travellers fluctuates frequently, the monitoring of indicators may become challenging.
- The approach to surveillance is often focused on detecting and reacting rapidly to individual events, and usually does not include on-going systematic data collection for analysing and calculating epidemiological indicators.

3. RATIONALE, PURPOSE AND AUDIENCE

3.1. Rationale for this guidance

A number of guides (4,5) and meetings of experts have reported a lack of coordination between national health surveillance systems and authorities at PoE receiving or generating information on health events related to travellers and conveyances. These meetings include:

- Asia Pacific Strategies for Emerging Diseases (APSED) country consultation (Colombo, Sri Lanka, 14-16 July 2010) (6);
- EpiSouth Plus project meeting (Rome, Italy, July 2011) (7);
- World Health Organization (WHO) 2nd informal consultation meeting for management of public health events on board ships (Lyon, France, April 2012) (8);
- Intercountry meeting on strengthening surveillance and response capacities under the IHR (Beirut, Lebanon, March 2012) (9).

WHO organized an expert consultation meeting to develop guidance on coordination between PoE and NHSS (Lyon, France, July 2012) (10), during which experts confirmed that existing NHSS need to formalize and strengthen links among PoE authorities and public health surveillance offices at the appropriate levels. They recommended both the purpose and content of this guidance.

3.2. Purpose of the guidance

The purpose of this document is to support competent authorities in charge of IHR implementation to improve national capacities for the prevention, detection and control of events, by strengthening communications and coordination between PoE and the NHSS.

This document provides steps for implementing/strengthening communications mechanisms and defines criteria for deciding what and how events should be reported between PoE and the NHSS.

3.3. Target audience

The target audience for this document includes:

- the authorities at PoE responsible for receiving reports of events from designated crew members of conveyances or their operators, and from the national/international health surveillance systems;
- the authorities at PoE responsible for centralizing public health information and/or conducting public health surveillance activities;
- the authorities at national and sub-national levels responsible for implementing health measures and for reporting pertinent public health surveillance information to PoE authorities. These national and sub-national authorities include National Surveillance Centres and IHR National Focal Points (NFP);
- all agencies, organizations, and other bodies that contribute to the reporting of information related to potential events involving PoE.

The guidance is directed primarily at IHR designated PoE, but State Parties are encouraged to apply it to all their countries' PoE, to the extent of their capabilities.

4. IHR PRINCIPLES REGARDING SURVEILLANCE AND PoE

The purpose of the IHR is to prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade (1).

4.1. The scope of IHR surveillance

The scope of the IHR has been expanded from specific diseases (cholera, plague and yellow fever) to any "illness or medical condition, irrespective of origin or source, that presents or could present significant harm to humans" (1). This includes events caused by infectious diseases, zoonosis, chemical and radiological agents, vectors and others sources of diseases.

The IHR no longer provide a list of diseases to be put under surveillance, but define the concept of "public health emergency of international concern" (PHEIC) with a "decision instrument" (IHR Annex 2) to determine if an event may constitute a PHEIC, which requires notification to WHO.

4.2. The National IHR Focal Point

Under the IHR, each State Party designates a National IHR Focal Point (NFP), which is accessible at all times for communications with WHO IHR Contact Points. The NFP functions include (IHR article 4):

- sending to WHO IHR Contact Points urgent communications concerning the implementation of the IHR in the country;
- disseminating information to, and consolidating input from, relevant sectors including those responsible for surveillance and reporting, PoE, public health services, clinics and hospitals, and other government departments.

Mandatory notifications by State Parties to WHO through the NFP concern:

- a) all events which may constitute a PHEIC occurring within their territory in accordance with the decision instrument (IHR article 6.1), including unexpected or unusual events (IHR article 7), within 24 hours of assessment of public health information;
- b) as far as practicable, a public health risk identified outside their territory that may cause international disease spread, as manifested by exported or imported human cases, vectors which carry infection or contamination, or contaminated goods, within 24 hours of receipt of evidence (IHR article 9.2);
- c) as far as applicable, and upon request, relevant data concerning sources of infection or contamination, including vectors and reservoirs, at their PoE, which could result in international disease spread (IHR article 19);
- d) the health measures (e.g. entry/exit screening, isolation) implemented in response to events which may constitute a PHEIC (IHR article 6.1);
- e) additional health measures that significantly interfere with international traffic (e.g. isolation of conveyances) and their health rationale within 48 hours of implementation, unless the WHO Director General has recommended them (IHR article 43).

For events for which there is insufficient information available to complete the decision instrument, a State Party may nevertheless keep WHO advised through the NFP and consult with WHO on appropriate health measures (IHR article 8).

4.3. IHR and surveillance at PoE

According to Annex 1 of the IHR, States Parties shall utilize existing national structures and resources to meet their core capacity requirements including:

- at local level: the capacities to detect events involving disease or death above expected levels for the particular time and place in all areas within the State Party's territory (including at PoE); and to report all available essential information immediately to the appropriate level of health-care response;
- at national level: to provide, by the most efficient means of communication available, links with airports, ports and ground crossings for the dissemination of information and recommendations received from WHO regarding events in the State Party's own territory and in the territories of other States Parties.

State Parties shall identify the competent authority at each designated PoE (IHR article 19). Competent authorities may operate at local, intermediate or national level depending on the country. As indicated in IHR article 22, the competent authorities at the PoE are responsible for:

- monitoring that baggage, cargo, containers, conveyances, goods, postal parcels and human remains carried through the PoE are free of sources of infection or contamination;
- applying public health measures (e.g. inspections of conveyances, vector control, medical examination of travellers, disinfection, decontamination, insect control, and ratting).

Competent authorities may require:

- from travellers:
 - their itinerary, destination, health documents required under the IHR, a non-invasive medical examination, and if there is evidence of a public health risk, on a case-by-case basis, the least intrusive and invasive medical examination that would prevent the international spread of disease (IHR article 23),
 - the completion of contact information forms and questionnaires on travellers' health (IHR article 35);
- the inspection of baggage, cargo, containers, conveyances, goods, postal parcels and human remains (IHR article 23);
- the ship's Maritime Declaration of Health (see section 8.1.1.2), and from the master of a ship or the ship's surgeon any information related to health conditions on board during an international voyage (IHR article 37, IHR annex 8);
- the Health Part of the Aircraft General Declaration (see section 8.1.1.3), and from the pilot in command of an aircraft or the pilot's agent, any information relating to health conditions on board during an international voyage (IHR article 38, IHR annex 9).

Officers in command of ships or pilots in command of aircraft, or their agents, shall make known to the port or airport control as early as possible any cases of illness indicative of a disease of an infectious nature or evidence of a public health risk on board. This information must be immediately relayed to the competent authority for the port or airport. In urgent circumstances, such information should be communicated directly by the officers or pilots to the relevant port or airport authority (IHR article 28). Conveyance operators shall facilitate the provision of relevant public health information requested by the State Party (IHR annex 4).

If evidence of a public health risk is found on board a conveyance and the competent authority is not able to carry out the control measures required, the affected conveyance may nevertheless be allowed to depart, on condition that, at the time of departure, the competent authority informs its counterpart at the next known PoE of the evidence found and of the control measures required. In the case of a ship, this information shall be noted in the Ship Sanitation Control Certificate (IHR article 27). The next PoE must also

be informed if any travellers have been placed under public health observation but allowed to continue their international voyage (IHR article 30).

States Parties are obliged to collect and handle health information containing personal identifiers in a confidential manner. However, States Parties may disclose and process personal data when it is essential for the purposes of assessing and managing a public health risk, subject to particular conditions (IHR article 45).

5. EXISTING DOCUMENTS RELATED TO SURVEILLANCE AT POE

5.1. Other international regulations

Besides the IHR, two other international regulations relate to public health surveillance at PoE:

- The Convention on International Civil Aviation issued by the International Civil Aviation Organization (11), including its Annex 9 (12) and the Air Traffic Management document (13). These documents:
 - comply with IHR provisions regarding aircraft and airports;
 - detail the documents that can be required by a Contracting State for the entry and departure of an aircraft, the passengers information that can be provided, and the modalities for communicating such information;
 - detail how a suspected communicable disease aboard an aircraft should be reported by the pilot-in-command and the air traffic control;
 - include models of the aircraft General Declaration, the Passenger Manifest, and the Public Health Passenger Locator Form (see section 8.1.1.3).
- The Terrestrial Animal Health Code issued by the World Organisation for Animal Health (14), which defines the requirements of its Member countries regarding the surveillance and control of animal diseases.

5.2. International guidance

A list of international guides related to surveillance at PoE is presented in Annex 1.

6. OBJECTIVES OF PUBLIC HEALTH SURVEILLANCE AT PoE

The epidemiological situation as well as the volume of movement of conveyances, cargoes and travellers varies according to State Party and PoE. It is therefore important for State Parties to assess their needs, priorities and current local and national situations, including available resources, and use that information to set their objectives and implement the most appropriate public health surveillance activities at each PoE.

Different objectives may be considered, such as:

- to enable the early detection of events for their timely verification and the application of control measures;
- to provide data to competent authorities for risk assessment of events;
- to inform competent authorities at PoE, and at all relevant levels in the health system and other sectors (e.g. customs, animal health, conveyance operators), and to assist them in adopting preventive measures, investigation, management and follow up of events;
- to alert other PoE likely to face the same event, either directly or through the NFP or other structures according to national and regional practices;
- to detect changes in trends of events at PoE;
- to prevent and/or manage the importation and exportation of health hazards (including diseases and their agents) in a country;
- to prevent the international dissemination of vectors and reservoirs and the spread of vector-borne diseases.

7. EVENTS UNDER SURVEILLANCE AT PoE

The various multisectoral entities operating at PoE collect information relating to their respective duties and objectives. Some of this information is of interest for human public health, while some is of lesser or nil interest, as it relates to hazards that are not known to adversely affect human health.

It is therefore crucial to have clear criteria for defining the types of events that must be communicated to the public health surveillance system in order to avoid overwhelming it with unnecessary volumes of information.

The key guiding concept is the public health risk. Under the IHR, surveillance activities must cover any type of event with the potential to become a PHEIC (see section 4.1). Beyond IHR requirements, countries may have to identify other public health risks of interest to them at national level as well as to individual PoE. Thus, selection criteria for identifying events to be covered by surveillance should also consider the local context, including epidemiological patterns, vulnerability, available control measures and official priorities.

7.1. Events that may be placed under surveillance at all types of PoE

The following list provides the main categories of events that may be considered for placing under surveillance at all types of PoE (the proposed case definitions to be used are provided in annex 2):

- **Events for which surveillance is required by the IHR (1):**
 - **Diseases with mandatory notification:** smallpox, poliomyelitis due to wild type poliovirus, human influenza caused by a new subtype, severe acute respiratory syndrome (SARS).
 - **Diseases with potential international public health concern that shall always lead to the use of IHR Annex 2:** cholera, pneumonic plague, yellow fever, viral haemorrhagic fevers (Ebola, Lassa, Marburg, Crimean-Congo haemorrhagic Fever), West Nile fever.
 - **Other diseases of special national or regional concern that should lead to the use of IHR Annex 2:** for example dengue fever, Rift Valley fever or meningococcal diseases.
 - **Any other events of potential international public health impact that could lead to the use of IHR annex 2:**
 - **other diseases**, for example, multiresistant pulmonary tuberculosis;
 - **zoonotic events**,¹ such as brucellosis, sheep and goat pox, foot and mouth disease, rabies, infections with echinococcus, salmonellosis and other zoonotic events mentioned in the OIE list of notifiable diseases (14);
 - **food safety events**, for instance a contaminated water system used for bunkering potable water to conveyances, contaminated food or drink, or unsanitary conditions in food premises.
 - **chemical events**, for example the leakage of toxic materials or a chemical accident.
 - **radiological and nuclear events** such as the leakage of radiological materials;
 - **the release or dissemination (accidental or intentional) of human or animal pathogens**, for instance intentional anthrax release, leakage from biological samples transported without adequate protective packaging;
 - **events of unknown origin.**
- **Other diseases required by the NHSS:** for example measles, rabies, diphtheria, or tuberculosis.
- **The presence of vectors, reservoirs or contaminations with potential public health impact:** for example invasive vector species related to emerging pathogens, contaminated goods, sources of legionnaires' disease.
- **Other events of interest:**
 - **Syndromes of interest:** for example gastrointestinal illness, influenza-like illness, acute haemorrhagic fever syndrome, signs and symptoms of potential infectious diseases that require further evaluation.
 - **Deaths** (other than as a result of an accident).

7.2. Types of surveillance adapted to PoE

EWAR is the surveillance component that responds to the objectives of surveillance at PoE. To ensure efficiency, the EWAR processes need to be systematized and formalized. EWAR relies on two main channels of information: indicator-based surveillance (IBS) and event-based surveillance (EBS) (3).

¹ The importation and exportation of live animals includes not only livestock, but also exotic animals for different purposes, and pets accompanying human travellers.

IBS is defined as the systematic collection, monitoring, analysis, and interpretation of structured data, i.e. indicators, produced by a number of well-identified, predominantly health-based, formal sources.

The collection of IBS data is a routine, regular process, which is primarily passive. Data are collected according to established case definitions that are either disease-specific or syndromic. Data are analysed in comparison with baseline values and thresholds to determine unusual disease patterns.

However, given the nature of events occurring at PoE, their identification by interdisciplinary teams including non-medical staff, and the rapid population turnover, EBS may be also appropriate for capturing events and risks.

EBS is defined as the organized collection, monitoring, assessment and interpretation of mainly unstructured ad hoc information regarding events or public health risks, which may represent an acute risk to human health.

The information collected by EBS is very diverse in nature and originates from multiple sources both official and unofficial. The data collection process is usually active. The criteria used for event detection and reporting in EBS are more sensitive and less specific than the case definitions generally used by conventional IBS. This approach makes it possible to detect a broader scope of events in a timely manner.

7.3. Specificities of surveillance at the different PoE

The focus and methods of surveillance depend on the type of PoE (i.e. ports, airports or ground crossings). Travellers usually spend more time on board ships, with more opportunities for interaction than on aircraft or ground transportation. An aircraft can transfer potential hazards from country to country much faster than other type of conveyance. Ground conveyances remain for a shorter time at ground crossings than aircraft and ships at airports and ports respectively. Moreover, each type of conveyance relates to different types of risks depending on the population and the cargo, the itinerary, and each conveyance's specific construction and environment.

7.3.1. SPECIFICITIES AT PORTS

Ships provide accommodation to travellers including passengers and crew members, who may stay on board for a period ranging from few hours to several months. Passenger ships are also able to carry large numbers of people, ranging from hundreds to thousands. If surveillance activities and control measures are not in place, outbreaks can rapidly spread through various modes of transmission and affect numerous people. Even outbreaks on cargo ships with small crews can jeopardize the safety of sailing if the majority of crew members develop serious illness. Therefore, surveillance aboard ships is essential for timely capturing changes in trends in the number and characteristics of cases, and for facilitating the timely implementation of health measures, including contact tracing (15-18). Foodborne and waterborne diseases including Legionnaires' disease, as well as gastrointestinal illness and influenza-like illness should be specifically under surveillance aboard ships (15,19). The role played by ships in the transnational spread of communicable diseases is documented historically (16,20).

Ships also contribute to the dissemination of vectors and reservoirs, their invasion and establishment in new places, and the consequent spread of vector-borne diseases. Cargo ships can carry live animals and diverse goods associated with specific risks, for instance biological hazards, dangerous chemical agents, or vectors.

Ships can also affect the water in ports by accidentally discharging garbage, sewage and other waste, or with bilge water and ballast water. These may transfer exotic and invasive species to the port water and coastal areas, as well as pollution with a potential impact on sea life and the human populations (e.g. vibrio cholera).

7.3.2. SPECIFICITIES AT AIRPORTS

Air travel can play a major role in the rapid spread of infectious diseases since it allows millions of travellers to move from country to country within hours. The airplane cabin's closed environment provides opportunities for the spread of diseases that are transmitted primarily through the air or by droplets. The air quality on board modern commercial aircraft is high, and the risk of air transmission of diseases is likely to be similar to, or less than, other circumstances in which people are together in confined spaces (21). Airplanes have also played a role in the dissemination of vectors and vector-borne diseases worldwide; both through passengers and cargo.

7.3.3. SPECIFICITIES AT GROUND CROSSINGS

Ground conveyances such as cars, trucks, buses and trains transport travellers, goods, plants and animals. The confined environment of ground transportation, where passengers or animals often remain confined for long hours, can facilitate disease transmission as well as the dissemination of infected vectors and reservoirs.

Zoonosis surveillance and food safety surveillance (including local food vending stores) are important at ground crossings and should include the veterinary services. Specific challenges in applying control measures at ground crossings include the difficulties of screening large numbers of goods and persons, especially for countries with many hard-to-control ground crossings; the fact that passengers may remain in the conveyance during the border crossing (unless directed to secondary inspection); the remoteness from medical services; and the lack of facilities or services such as the disposal of special waste and hazardous materials.

8. STRENGTHENING COORDINATION BETWEEN POE AND THE NATIONAL HEALTH SURVEILLANCE SYSTEM

Table 1 presents steps to be followed for strengthening coordination between PoE and the NHSS.

Table 1. Steps for strengthening coordination between PoE and the NHSS

Step 1	Review and assess the national context and the various PoE
Step 2	Set the objectives and decide on events under surveillance.
Step 3	Establish the criteria for reporting events to the NHSS.
Step 4	Establish procedures for the detection of events occurring after departure from the PoE, and for contact tracing.
Step 5	Establish information flow circuits and ensure feedback.
Step 6	Reinforce data management.

8.1. Step 1: review and assess the national context and the various PoE

As a first step, a situation analysis should be carried out, to include:

- at national level: a review of the epidemiological context, the existing public health surveillance sources, the actors and activities relevant to PoE;
- at the PoE: a review of the epidemiological context, the entry/exit movements and any origins and destinations that may have an impact on the dissemination of events, the types of conveyances and the nature of the arriving travellers and cargo, as well as all the current sources of information, the actors, reporting capacities, guidelines and practices for public health surveillance.

This should preferably be based on site visits and a review of all key components and existing procedures at the PoE. A WHO assessment tool and checklist may be of assistance for this purpose (22). Examples of situation analyses conducted within the Episouth Plus Project can be consulted on the Episouth Plus website (23).

It is recommended that the assessment be carried out by at least two public health specialists with knowledge of core capacity requirements in the IHR and relevant expertise in PoE and surveillance (22). Gaps and needs will be identified through this process, in the light of the NHSS and IHR requirements. Finally, the surveillance objectives at PoE will be established and a decision made about the events to be placed under surveillance.

8.1.1. IDENTIFYING THE SOURCES OF INFORMATION

Events at PoE cannot be detected solely at the PoE location. Data collection is often a complex process involving different actors both inside and outside the country. Sources of data about events may differ depending on the type of PoE.

8.1.1.1. Sources of data at all types of PoE

When identifying the sources of information, State Parties can consider the following main sources of data, common to most PoE:

- Sources of information at PoE level:
 - the officers in command of ships or pilots in command of aircraft, or their agents, who shall make known any public health risk on board as early as possible (see section 4.3);
 - the PoE stakeholders, such as veterinary services, agricultural services, customs, immigration authorities (including the immigration cards when available (21)), transport authorities, conveyance operators, facility operators (at ports/airports/ground crossings);
 - the PoE health care services, which take care of travellers and workers, mainly for acute health events.
- Formal sources of information at national level including:
 - the NFP;
 - the NHSS providing information from the public and private healthcare system (e.g. laboratories for biological and environmental exams, primary health care units, hospitals, travel clinics, general practitioners) and from other sectors (e.g. school attendance, media) using both indicator-based surveillance and event-based surveillance (3);
 - ministries dealing with activities at PoE (including ministries of health, environment, agriculture, trade, foreign affairs, interior and homeland security).
- Formal sources of information at international level, including:
 - bilateral States communications, regional networks and WHO regional offices, intergovernmental organizations and international bodies (IHR article 44);
 - the competent authority at the previous PoE (see section 8.4.2).
- Informal sources of information, such as:
 - media reports;
 - rumours;
 - complaints from travellers directly affected or witnessing events;
 - non-governmental organizations;
 - electronic health event surveillance systems (e.g. Global Public Health Intelligence Network, ProMED-mail, HealthMap) (3).
- The general public and travellers in transit are also deemed to have roles in self-reporting any health event.

8.1.1.2. Specific sources of data at ports

In addition to the sources of data at all PoE, specific sources of information are available at ports:

- **Maritime Declaration of Health:** for ships on international voyages, the master of the ship, before arrival at its first port of call in territory of a State Party, shall ascertain the state of health on board, and, except when that State Party does not require it, the master shall, on arrival, or in advance, complete and deliver to the competent authority a maritime declaration of health (IHR article 37, IHR annex 8).
- **Ship Sanitation Certificates:** ships should be inspected regularly to certify that they are free of infection and contamination, including vectors and reservoirs (IHR article 39). If the competent authority identifies a public health risk during a ship's inspection, the inspection findings and the control measures taken are recorded in the Ship Sanitation Certificates (IHR article 27 and Annex 3).
- **Ship's illness medical log (15):** for each voyage, a standardised illness medical log recording all illnesses should be maintained daily by a designated crew member. It should include all cases of communicable diseases, syndromes, or other events that occurred during the voyage.
- **Other sources of data** e.g. stevedores, port workers unions, port and flag state control systems, maritime authorities and port authorities.

8.1.1.3. Specific sources of data at airports

In addition to the sources of data available at all PoE, other sources of information are available at airports:

- **Health part of the Aircraft General Declaration:** the pilot in command of an aircraft or the pilot's agent, in flight or upon landing at the first airport in the territory of the State Party, shall, except when that State Party does not require it, complete and deliver to the competent authority the Health Part of the Aircraft General Declaration (IHR article 38, IHR annex 9).
- **Passenger Name List – PNL (“Passenger Manifest”):** in case of an event aboard an aircraft, State Parties can require the aircraft conveyer to present the PNL, which should provide the names of all the passengers aboard the aircraft (12).
- **Public health passenger locator form:** when a public health risk has been identified and States Parties request information for contact tracing, passengers and crew may be asked to complete a public health passenger locator form (12).
- **Health declarations from passengers:** when a specific event occurs, States Parties can require such a declaration from visitors arriving and departing by air.
- **Other sources of data:** the air traffic control (responsible for passing on information from inflight communications with aircraft), the airline companies' representatives/ground services.

8.1.1.4. Specific sources of data at ground crossings

The IHR do not stipulate health documents for conveyances at ground crossings, but systematic health checks of travellers at ground crossings are sometimes conducted as part of health checks on immigrants. Other sources of public health surveillance data include the drivers of the conveyances, the conveyance operators, or migrant detention centres and border guards. Operational procedures and railway association guidelines could also be considered.

While ships and airplanes usually have medical staff or trained non-medical staff able to detect events on board and inform the ports or airports, ground conveyances generally lack this type of staff training and involvement.

8.1.2. IDENTIFYING THE ACTORS, THEIR ROLES AND RESPONSIBILITIES

Actors in surveillance at PoE are not limited to the public health sector but also belong to other sectors and disciplines (10). Strong intersectoral operational links and active information sharing should therefore be established. The involvement of chemical, food safety, radiological, and animal health experts may be required, depending on the event (4).

It is important to identify if there is a specific authority (such as a health coordinator) responsible for collecting health data for the PoE, and if standard operating procedures (SOPs) exist for reporting, with the means to do so. If this is not the case, then a specific authority should be assigned this responsibility as described in paragraph 8.5.1.

Actors involved in event detection and response must be identified with their contact details, and their roles and responsibilities clearly stated. Depending on the event, different actors from both the private and public sector would be involved at local, intermediate, national and international levels. Answers to the following questions can help State Parties to identify those actors:

- What conveyances operators run at the PoE?
- Who receives reports or can identify events at the local level (e.g. public health surveillance officer working at the port authority, public health and veterinary authorities at local, intermediate or national levels)?
- Who is involved in the response at the local, intermediate, and national levels (which authorities and for what type of event)?
- Who needs to be informed about events detected, the response measures implemented, and their results (chain of command)?

- Who is responsible at the national level for receiving the information from the local or intermediate level health authorities?

The various actors can be involved in routine surveillance as well as during an emergency (including emergency responses). Many of the same actors perform in both routine surveillance and in emergencies with some changes in roles.

Examples of actors and possible roles for PoE surveillance are presented in table 2.

In addition, travellers in transit have a role in reporting events affecting themselves or that they have witnessed occurring to other travellers.

Table 2. Examples of actors and possible roles at PoE

Level	Actors	Roles and responsibilities
Local	The pilots, crew, and operators of conveyances; private operators at ports, airports and ground crossings; port state control; PoE administration; air traffic control; railway control agencies; travellers; health care staff at ports, airports and ground crossings; competent authorities, customs, veterinary services, agricultural services, border guards, immigration services, stevedores, and other services providers at PoE; public health surveillance units; primary health care bodies; police; hospitals; fire departments; first aid stations; municipalities.	Primary data provider Event detection Self-Reporting Public health surveillance (collection, analysis, dissemination of data) Training provider IHR implementation Response measures Risk Assessment
Intermediate	Public health surveillance units; laboratories; hospitals; training providers; public health intermediate level coordination for PoE.	Continuous assessment Ensuring quality of data, monitoring and evaluation Dissemination of official information
National	NFP; national health surveillance units; food safety authorities; veterinary authorities; ministries of health, the environment, transport, agriculture, interior, defence, trade, and foreign affairs; public health institutes; non-governmental organizations; experts from all relevant sectors (e.g. animal health, chemical, poison, food safety, radio-nuclear).	Guidelines development Coordination
International	WHO, and other international organizations (e.g. ICAO, OIE, FAO). International, regional and subregional public health surveillance networks. Specific diseases surveillance networks.	

8.2. Step 2: Set the objectives and decide on events under surveillance

Following the situation analysis, public health surveillance objectives should be set for each PoE. The list of potential objectives presented in section 6 may be used as a guideline.

Based on the situation analysis and using the list of events presented in section 7, the following criteria can help to decide which events should be put under surveillance at each PoE:

- **Events required by the IHR and the NHSS.**
- **Events affecting more than one country and requiring at least one of the following measures:** rapid response; investigation; contact tracing; follow-up by the competent authority to ensure the implementation of health measures and their effectiveness.
- **Events for which the response measures applied will significantly interfere with international travel or trade** (e.g. the detention of a conveyance, cargo, goods, the isolation of travellers for more than 24 hours, as per IHR article 43).
- **List of vectors to be placed under surveillance:** vectors on conveyances that visited a PoE situated in an area where vector control is recommended; invasive vector species related to emerging pathogens (e.g. dengue fever) for specific time periods according to national plans.
- **Other events may be put under surveillance at each PoE:** State Parties can decide on these by asking the following questions from the national and international viewpoints:
 - Is the potential public health impact of the event serious (known morbidity, disability, mortality related with this type of event)?
 - Is this a disease with significant epidemic potential to cause a serious public health impact due to its ability to spread rapidly internationally (e.g. cholera, yellow fever, plague, viral haemorrhagic fever) (24)?
 - Is the disease a specific target of a national or international control programme (e.g. WHO disease control programme)?
 - Will the information collected lead to public health action (e.g. contact tracing, other specific control measures, international reporting)?

The amount of data to be collected needs to be balanced against the cost and labour the data collection entails. To make the system sustainable, only data that fulfils the PoE health surveillance objectives and data used for public health purposes should be collected (25). Finally, events to be placed under surveillance need to be carefully considered and selected on the basis of the feasibility of implementing public health control measures. Standard, clear definitions for events should be used for public health surveillance purposes (see proposed case definitions to be used in Annex 2).

8.3. Step 3: Establish the criteria for reporting events to the NHSS

The decision to report and the recipient of the report depend on factors such as the public health impact, the need and feasibility of control measures, and the potential for international concern of the detected events.

It is therefore important to establish criteria to define which events should be reported, to which level, and how rapidly.

1. Events to be reported immediately to the NFP

The following events should be reported through the channels of communication as per national rules (which may include reporting to the local, intermediate, and national levels):

- **Cases of diseases with mandatory notification to WHO under Annex 2 of the IHR** (see section 7.1, IHR article 6.1).
- **Other events that should or could lead to the use of IHR Annex 2** (see section 7.1) and may require notification to WHO (IHR article 6).
- **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) contaminated goods. This information must be notified to WHO as far as practicable (IHR article 9).
- **Events on conveyances that present a public health risk** and must be communicated to the next PoE for follow-up measures (see section 4.3).
- **Events in response to which additional health measures were applied that significantly interfere with international traffic**. These additional health measures must be notified to WHO (IHR article 43).

2. Events to be reported immediately to the local and/or intermediate public health authorities for the purpose of taking action

They are events not described in case 1 but requiring at least one of the following measures:

- rapid response and health measures;
- investigation;
- contact tracing;
- follow-up to ensure the effectiveness of health measures.

3. Other events not listed in cases 1 and 2 above that require reporting by the NHSS using its recommended channels, reporting frequency and rules of communication

4. Data to be recorded for the purpose of routine analysis and trend monitoring

This covers the collection of structured data for trend monitoring, including denominators (e.g. numbers of travellers per time period, per ship, and per itinerary) as pre-defined for that country's PoE.

An example of indicators to be used is the percentage of gastrointestinal illness cases among passengers and/or crew aboard a ship (see case definition in Annex 2). Further indicators are presented in section 8.6.2.

If the monitoring of these indicators identifies an increase in the number of cases beyond predefined thresholds (3) (e.g. 2% of gastrointestinal illness among a ship's passengers (15,17,19)), this should be reported as stipulated in case 2 above.

5. Discarding situations as "events" when none of the above cases applies.

8.4. Step 4: Establish procedures for the detection of events occurring after departure from the PoE, and for contact tracing

8.4.1. EVENTS THAT NEED TO BE LINKED TO TRAVEL RETROSPECTIVELY

Some events among travellers such as early stage communicable diseases, may be diagnosed after disembarkation. They can be detected through the NHSS and related to travelling afterwards. These events may require follow-up measures with the conveyance operators and the port, airport and ground crossing administration/service providers. They must therefore to be communicated to PoE health authorities.

In order to identify such events, NHSS staff should be advised to include travel information in their reports since this will allow:

- the surveillance authority receiving the report to link the case with travel and consequently inform the competent authority at the PoE, who may then implement the necessary health measures (e.g. in the event of a legionella case linked to travel in a ship);
- the national surveillance system to identify all the travel-related cases and analyse the public health surveillance data based on that parameter.

The following diseases may be considered for systematic recording of travel information: anthrax, diphtheria, viral haemorrhagic fevers (e.g. Ebola, Lassa, Marburg), pulmonary tuberculosis, meningococcal disease, measles, SARS, human influenza caused by a new subtype, pneumonic plague and Legionnaires' disease.

8.4.2. CRITERIA FOR IMPLEMENTING CONTACT TRACING

Contact tracing is defined as the identification of persons who may have been exposed to an infectious disease by another infected person (2). It aims to identify and respond in a timely manner to new cases, thereby preventing the further spread of the disease (3). It is one of the recommendations that may be made by WHO in case of a PHEIC (IHR article 18).

The decision to implement contact tracing should be based on a careful, case-by-case, risk assessment taking into account factors such as feasibility, the severity of the disease and its potential for epidemic spread, the infectivity of index patients, and the duration of the trip (2,26,27).

Tools are available to support the risk assessment and decision-making process by public health officials for initiating contact tracing after exposure aboard aircraft for tuberculosis, SARS, meningococcal disease, measles, rubella, diphtheria, Ebola, Marburg, Lassa, smallpox, anthrax (21,26), and aboard public ground transport for tuberculosis, meningococcal disease, and measles (2).

To perform contact tracing, a State Party may require:

- For air travel: the completion of a public health passenger locator form (see section 8.1.1.3) by passengers and crew members who have been in contact with a case (12, 28); and the PNL² (see section 8.1.1.3),

² The International Air Transport Association has issued a form to formalize the request for passenger contact information (Request form for passenger contact tracing. International Air Transport Association; 2008. <http://www.iata.org/whatwedo/safety/health/Documents/request-form-passenger-contact-tracing.pdf>)

- For sea transport: the Maritime Declaration of Health (see section 8.1.1.2), with the list of crew members, passengers or other persons who have joined the ship since the international voyage began or within past thirty days, whichever is shorter, including all ports/countries visited during this period (IHR Annex 8).

8.5. Step 5: Establish information flow circuits and ensure feedback

The routes and the rules of communication should be agreed upon and formalised. Figure 1 presents an example of a communications circuit.

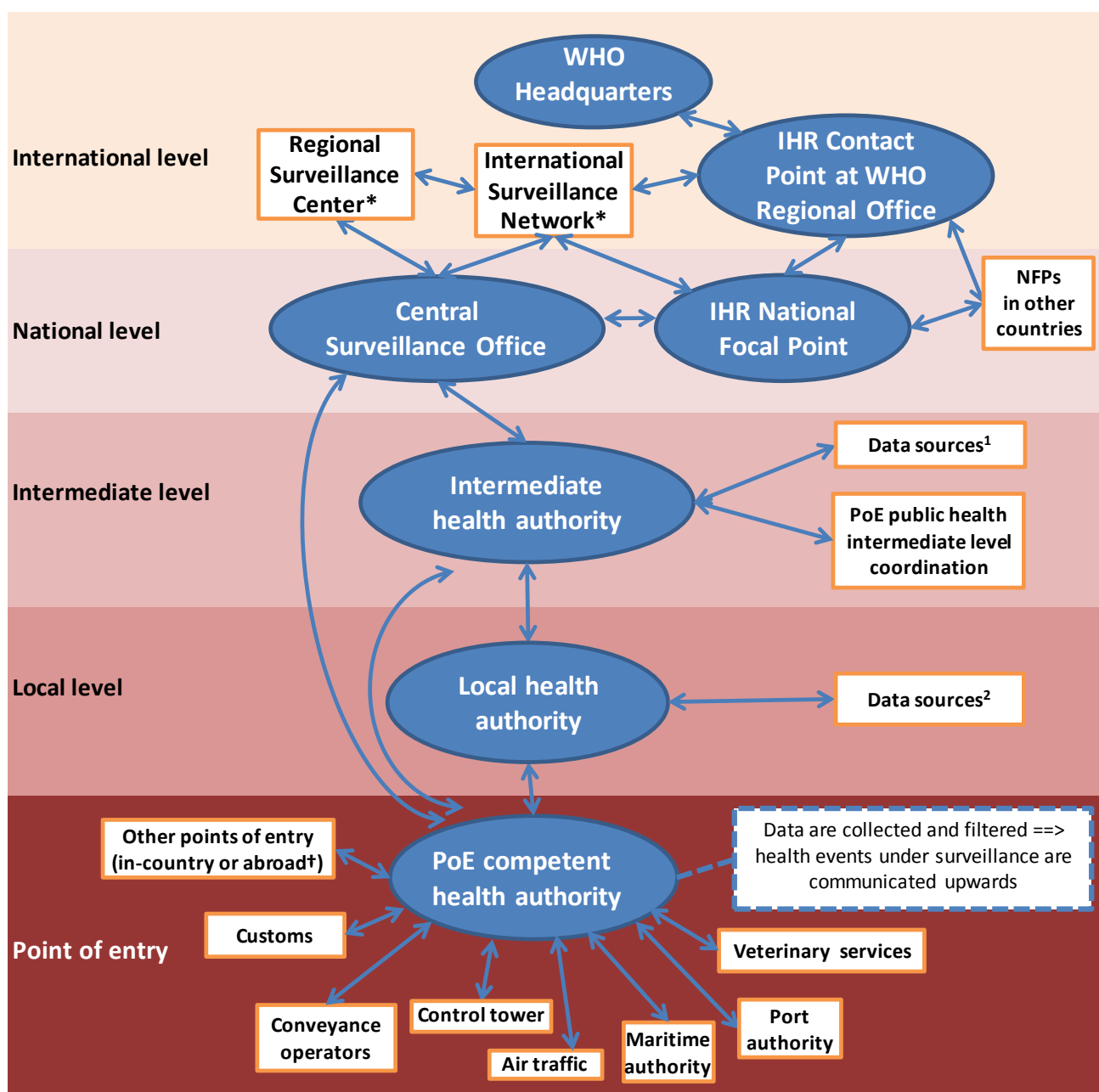


Figure 1. Example of surveillance data flow between PoE and the NHSS

* Regional/international centers and networks for surveillance exist only in some regions; † According to national rules and arrangements; **Data sources¹**: health care centers, hospitals, laboratories, point of entry in another country; **Data sources²**: health care centers, hospitals, laboratories, conveyance operators, customs, veterinary services, point of entry in another country.

8.5.1. COORDINATION

8.5.1.1. Health data coordinator at the PoE

A focal person or team should be designated with the role of coordinating public health surveillance at each PoE, centralizing all the relevant health information and ensuring a unique channel of data exchanges with the NHSS and other actors. In principle, this role may be assigned to the PoE competent authority. Depending on the actors and resources available, the coordinator can be from the ministry of health or another agency.

Given that pertinent data can emanate from various non-health sources, this coordinator should also have a role of triaging the data collected in order to communicate only data of public health importance to the NHSS (see section 8.2 and the WHO guidance on EWAR (3)).

8.5.1.2. National level coordinator of border public health data

At national level, a focal point for collecting surveillance data from all PoE should be designated (whether or not within the ministry of health) to liaise with the NFP.

This coordinator/coordinating authority should be responsible for developing SOPs, identifying needs in terms of material and human resources, and establishing training and contingency plans.

Depending on the characteristics of the borders and the resources available, a country may allocate this function to an officer cumulating other public health surveillance roles. Alternatively, a country may establish a dedicated Central Coordination Unit, which must then ensure close ties with other public health surveillance units. In countries with numerous PoE and extensive borders and/or coastlines, an additional intermediate level coordination may be justified.

8.5.2. FEEDBACK TO THE POE AND ITS DATA SOURCES

Feedback to the information provider is essential to building the relationship between the various levels and to mobilising partners. Actors involved in the detection, assessment and response must be informed routinely about the follow-up and evolution of events they have communicated, for instance by receiving acknowledgments for the information they have sent, receiving information updates (e.g. laboratory results, actions undertaken, any developments in the spread of the event), and being informed about the closure of the event. This could be done through weekly newsletters and/or quarterly bulletins (3).

In addition, the IHR require the State Party to provide, by the most efficient means of communication available, links with airports, ports, ground crossings for the dissemination of information and recommendations received from WHO regarding events in the State Party's own territory and in the territories of other States Parties (IHR annex 1).

This can be challenging when it involves PoE of different countries. It is another situation in which direct PoE-to-PoE communications would be an advantage (always copying the national public health authority).

8.5.3. COMMUNICATIONS BETWEEN POE

In the event of a public health risk being identified on board a conveyance, the competent authority at the previous PoE of departure should send the information to the competent authority at the PoE of arrival, either directly or through the NFP.

The rules for direct PoE to PoE communication, inside a country and between countries, must be clarified. Direct communication between PoE for operational purposes (in particular in federal countries or between countries) may be facilitated by establishing general administrative arrangements in advance. These may save time and effort by avoiding excessive case-by-case formal authorization procedures. Such arrangements

must include all ministries and agencies that play a role in public health-related international communications.

8.6. Step 6: Reinforce data management

8.6.1. DATA COLLECTION AND STANDARDIZATION

Data about events collected from the different sources should be consolidated at both PoE and national level. Case definitions must be standardized country-wide (see proposed case-definitions in annex 2). The data collection process should also be standardized.

The following are suggested data items to be included when reporting an event to the next level:

- **Source, date and time of the report** (by who and when was the event first reported?).
- **Contact details of the information source** (name, office number, mobile number).
- **Who was informed first?** (e.g. the competent authority, the local health departments).
- **Description of the event** (what happened, what type of event is it? See section 7.1).
- **Location of the event** (aboard a conveyance, at a PoE, municipality/city, province, region?).
- **Relation to travel** (e.g. the event has affected the population on board; it has been imported and threatens the travellers/population at and around the PoE; it may be exported to another country).
- **Start date** (date of onset of symptoms in the first case).
- **Number of cases** (how many people were affected?). If feasible, provide the attack rate: the number of cases/population at risk.
- **Description of cases** (clinical description/symptoms, who has been affected, when, where, and how many cases are confirmed). Provide background information on the cases if appropriate (e.g. vaccination history, origin and final destination of the travel).
- **Number of deaths** (how many deaths occurred among the cases?).
- **Means of transmission or dissemination of the event** (including conditions that may affect the spread of the event, e.g. results of the conveyance inspection, mass gatherings, etc.).
- **Confirmation date** (when was the event confirmed, when and how was the etiological agent identified?). Provide the laboratory results if available.
- **Health measures taken or intended** (what measures, who has implemented or is intended to implement them, and when?).
- **Status of the event** (on-going or controlled?).
- **Is assistance needed?** (If yes, please specify).
- **Any other relevant information concerning the event.**

Procedures for monitoring the volume of movements of conveyances and travellers per conveyance through the PoE should be established. This information will be used to define the denominators for analysing surveillance data (e.g. the number of travellers per time period, the number of incoming and outgoing conveyances per time period, and the number of passengers per conveyance).

PoE should have an efficient and reasonable record-keeping system for general administrative purposes; for the traceability of events collected, assessed, reported, and dealt with; for the inspection of conveyances and the application of public health measures; and for monitoring the volume of movement of conveyances and travellers.

8.6.2. DATA ANALYSIS

Data collected must be analysed and interpreted. This may be carried out at local, intermediate, or national level depending on the country. The passenger-days of travel can be calculated and used for calculating indicators. The following are examples of indicators that could be calculated and monitored:

- Number of events identified in the entire country's PoE per incoming and/or outgoing travellers during a specific time period.
- Number of events at PoE per incoming and/or outgoing travellers per type of PoE (i.e. port, airport, ground crossings) during a specific time period.
- Number of events per number of conveyances with the same itinerary during a specific time period.
- Number of events per passenger-day on board a conveyance.
- Number of events per total number of incoming and/or outgoing conveyances at a PoE during a specific time period.
- Number of events per type of incoming and/or outgoing conveyances (e.g. cargo ships, passenger ships, aircrafts, trains, road vehicles) during a specific time period.

Seasonality and secular trends can be also analysed. For common diseases like gastrointestinal and influenza-like illnesses, the expected rate per time period or per itinerary could also be calculated (number of cases/number of passengers during a specific period or per itinerary). This could be of help for the early detection of outbreaks (see section 8.2 and the WHO guidance on EWAR (3)).

8.6.3. MEANS OF COMMUNICATION

A variety of means is available for communicating information, including written reports, telephone, fax, radio, and electronic data transmission (e.g. mail, internet platform). That information can be registered in a number of ways. For events needing immediate notification, the quickest and most reliable option should be selected, but whatever the means used, the contact details and the information to be communicated must be predefined and agreed upon by all parties. Information-sharing records should be always kept. In some countries web-based electronic information communications tools are used for that purpose.

Public health surveillance contact points should be identified at each PoE, at the national health system level, at the IHR national focal point, and with the other actors involved (including the conveyance operators and other service providers). A contact list (on paper and/or in electronic format) should be maintained and made available with updated contact details (names, phone and fax numbers, and the email address of the contact points) (3,22,29). All the public health surveillance actors should be provided with the contact details that relate to their specific responsibilities, accordingly with the agreed routes and rules of communication (see section 8.4.1). Contact information sorted by type of risk could also be useful.

9. DOCUMENTS TO BE DEVELOPED

A national plan for coordinated public health surveillance between PoE and the NHSS, which includes SOPs, should be drawn up in each country.

SOPs should specify the tasks and modalities for detection, triage, verification, risk assessment, and communication, for the coordinator as well as the other actors involved in public health surveillance at PoE. These SOPs should include:

- a list of events to be reported and their case definitions;
- a mapping of data sources and information flow, including a diagram depicting the information flow and a national contact list with updated contact information for each actor (see section 8.6.3);
- each actor's specific responsibilities;
- the procedures, legal framework, and templates for receiving, collecting, and assessing reports from arriving conveyances;
- the procedures, legal framework, and templates for requesting additional public health information from the conveyance operators;
- the procedures, legal framework, and templates for both routine and emergency reporting of information;
- the procedures and templates for the feedback of information;
- the procedures, legal framework, and templates for contact tracing.

These SOPs should be defined specifically for each PoE to ensure that all potential sources of surveillance data effectively transmit their information to the coordinator, and in the opposite direction, that all pertinent data generated elsewhere is transmitted in a timely manner to the relevant persons at the PoE level.

Memorandums of understanding should be signed between all the different sectors involved in public health surveillance at PoE.

10. HUMAN RESOURCES DEVELOPMENT

Human resources development should follow the overall principle of sustainability. It should ensure training for all actors, across all categories of personnel involved in public health surveillance. Initial training could be complemented with regular shorter training courses (3).

In addition to the public health surveillance procedures required at PoE, training should be provided for conveyance operators, customs, and other personnel who have initial contact with travellers, to enable them to recognize key symptoms and signs of events among travellers.

Regular meetings among the various authorities involved will also contribute to harmonising practices and improving the system.

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12. ANNEXES

ANNEX 1. INTERNATIONAL GUIDES RELATED TO PUBLIC HEALTH SURVEILLANCE AT PoE

Reference	Surveillance-related content	Type of PoE
International health regulations (2005). Assessment tool for core capacity requirements at designated airports, ports and ground crossings. World Health Organization; 2009. http://whqlibdoc.who.int/hq/2009/WHO_HSE_IHR_LYO_2009.9_eng.pdf	Assessment tool for IHR core capacity requirements at PoE, including the coordination and communication of event information.	All
WHO Guidance for the Use of Annex 2 of the International Health Regulations (2005). World Health Organization; 2008. http://www.who.int/ihr/revised_annex2_guidance.pdf	Guidance for using the IHR decision instrument for assessing and notifying events that may constitute a PHEIC.	All
Asia Pacific Strategy for Emerging Diseases (2010). Technical Papers. World Health Organization; 2011. http://www.wpro.who.int/emerging_diseases/documents/docs/APSEDTechnicalPapers03Sep10Final.pdf	Strategic approach and suggested action for strengthening IHR core capacity requirements at PoE.	All
Technical Guidelines for Integrated Disease Surveillance and Response in the African Region. Harare, Zimbabwe and Atlanta, Georgia, USA: World Health Organization Regional Office for Africa and the Centers for Disease Control and Prevention; 2010. http://www.cdc.gov/globalhealth/dphswd/idsr/pdf/Technical%20Guidelines/IDSR%20Technical%20Guidelines%202nd%20Edition_2010_English.pdf	Guidelines for surveillance in the African region.	All
Early detection, assessment and response to acute public health events: implementation of Early Warning and Response with a focus on Event-Based Surveillance. Interim version. World Health Organization; 2014. http://www.who.int/ihr/publications/WHO_HSE_GCR_LYO_2014.4/en/	Guidance for implementing early warning and response, including event-based surveillance.	All
International health regulations (2005). A guide for public health emergency contingency planning at designated points of entry. World Health Organization; 2012. http://www.wpro.who.int/emerging_diseases/documents/PHECP_Guide_web.pdf	Guidance for supporting the development of public health emergency contingency plans at PoE.	All
World Health Organization. IHR Core Capacities at Points of Entry: Report of a Regional Meeting. Geneva: World Health Organization; 2011. http://apps.searo.who.int/PDS_DOCS/B4661.pdf	Country examples and experts' views on strengthening IHR core capacities at PoE.	All
Self-assessment tool for nations to increase preparedness for cross-border implications of crises. Organization for Security and Co-operation in Europe; 2013. http://www.osce.org/borders/104490	Self-assessment tool for increasing preparedness at PoE.	All
World Health Organization. Tuberculosis and air travel : guidelines for prevention and control (3rd ed.). Geneva : World Health Organization; 2008. http://www.who.int/tb/publications/2008/9789241547505/en/	Guidelines for the prevention and management of tuberculosis cases on aircrafts, including contact tracing.	Airports
Guidelines for states concerning the management of communicable disease posing a serious public health risk. International Civil Aviation Organization; 2009. http://www.icao.int/safety/aviation-medicine/guidelines/AvInfluenza_guidelines.pdf	Guidance for the surveillance and reporting of events on board an aircraft or at an airport.	Airports
Guidelines on completing the public health passenger locator form. International Civil Aviation Organization. http://www.icao.int/safety/aviation-medicine/guidelines/Guidelines%20on%20Completing%20the%20PLF.EN.pdf	End-user guidance for the public health passenger locator form.	Airports
European Centre for Disease Prevention and Control (ECDC). Risk assessment guidelines for diseases transmitted on aircraft. 2nd ed. Stockholm; 2010. http://ecdc.europa.eu/en/publications/Publications/0911_GUI_Risk_Assessment_Guidelines_for_Diseases_Transmitted_on_Aircraft.pdf	Risk assessment guidance for selected diseases on board planes to decide whether or not contact tracing is of interest	Airports
World Health Organization. WHO guide to ship sanitation (3rd ed.). Geneva : World Health Organization; 2011. http://www.who.int/water_sanitation_health/publications/2011/ship_sanitation_guide/en/	Health requirements for ship construction and operation.	Ports
EU Ship Sanitation Training Network. European Manual for Hygiene Standards and Communicable Diseases Surveillance on Passenger Ships. Larissa, Greece; 2011. http://www.shipsan.eu/Portals/0/docs/Manual_October_2011.pdf	Guidance on communicable diseases surveillance on board ships and reporting requirements.	Ports

Health Protection Agency. Guidance for the Management of Norovirus Infection in Cruise Ships - Norovirus Working Group. London; 2007. http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1206520183347	Guidance for the surveillance and reporting of Norovirus outbreaks on board cruise ships.	Ports
Vessel Sanitation Program. 2011 Operations Manual. U.S. Department of Health and Human Services; 2011. http://www.cdc.gov/nceh/vsp/operationsmanual/opsmanual2011.pdf	Guidance for minimizing the risks of acute gastroenteritis on board cruise ships, including surveillance and reporting.	Ports
Contact tracing risk assessment profile (CT-RAP) for public ground transport. Robert Koch Institute; 2011. http://www.rki.de/EN/Content/Prevention/React/Work/wp7/WP_7_tool1.pdf?blob=publicationFile	Risk assessment guidance for selected diseases on board ground conveyances to decide whether or not contact tracing is of interest	Ground crossings

ANNEX 2. PROPOSED CASE DEFINITIONS FOR DISEASES AND SYNDROMES THAT MAY BE PLACED UNDER SURVEILLANCE AT PoE

Disease/syndrome	Case definition
Acute haemorrhagic fever syndrome*	<p><u>Suspected case:</u> acute onset of fever of less than 3 weeks duration in a severely ill patient. AND any of 2 of the following: haemorrhagic or purpuric rash; epistaxis (nose bleed); hematemesis (blood in vomit); haemoptysis (blood in sputum); blood in stool: other haemorrhagic symptoms, AND no known predisposing factors for haemorrhagic manifestations. <u>Confirmed case:</u> a suspected case with laboratory confirmation or epidemiologic link to confirmed cases or outbreak.</p>
Cholera*	<p><u>Suspected case:</u> In a patient aged 5 years or more: severe dehydration or death from acute watery diarrhoea. In the event of a cholera epidemic: any person aged 5 years or more with acute watery diarrhoea, with or without vomiting. <u>Confirmed case:</u> a suspected case in which <i>Vibrio Cholerae</i> O1 or O139 has been isolated in the stool.</p>
Dengue fever*	<p><u>Suspected case:</u> any person with acute febrile illness of 2-7 days duration, AND 2 or more of the following: headache, retro-orbital pain, myalgia, arthralgia, rash, haemorrhagic manifestations, leucopenia. <u>Confirmed case:</u> a suspected case with laboratory confirmation.</p>
Gastrointestinal illness†	<p>Acute diarrhoea (three or more episodes of loose stools in a 24 hours period), OR vomiting, AND at least one of the following symptoms: one or more episodes of loose stools in a 24 hour period, abdominal cramps, headache, muscle aches, fever $\geq 38^{\circ}\text{C}$.</p>
Human influenza caused by new subtypes‡	<p>Laboratory-confirmed case of a recent human infection caused by an influenza A virus which has: a) demonstrated the capacity to infect a human, b) is not a variant or mutated form of those (i.e. A/H1 or A/H3) circulating widely in the human population.</p>
Influenza-like illness*	<p>A person with sudden onset of fever of $\geq 38^{\circ}\text{C}$ and cough or sore throat in the absence of other diagnoses.</p>
Legionnaires' disease†	<p>Pneumonia (Legionnaires' disease) or self-limiting influenza-like illness (Pontiac fever). AND laboratory confirmation or probable diagnosis of legionellosis or environmental exposure to a shared source of legionella contamination.</p>
Measles §	<p><u>Possible case:</u> any person with fever and maculo-papular rash, AND at least one of the following three symptoms: cough, conjunctivitis, coryza. <u>Probable case:</u> any possible case with an epidemiological link to human-to-human transmission. <u>Confirmed case:</u> any possible or probable case not recently vaccinated and meeting the laboratory criteria for measles.</p>
Meningococcal disease §	<p><u>Possible case:</u> any person with at least one of the following five clinical criteria: fever, meningeal signs, petechial signs, septic rash, septic arthritis. <u>Probable case:</u> any possible case with an epidemiological link to human-to-human transmission. <u>Confirmed case:</u> laboratory-confirmed invasive meningococcal disease.</p>
Pneumonic plague*	<p><u>Suspected case:</u> any person with a sudden onset of fever, chills, headache, severe malaise, prostration and very painful swelling of lymph nodes, or cough with blood-stained sputum, chest pain, and difficulty in breathing. <u>Confirmed case:</u> suspected case confirmed by isolation of <i>Yersinia pestis</i>, or epidemiologic link to confirmed cases or outbreak.</p>
Poliomyelitis due to wild type poliovirus ‡	<p><u>Suspected case:</u> a child under 15 years of age presenting with acute flaccid paralysis, or any person at any age with paralytic illness if poliomyelitis is suspected. <u>Confirmed case:</u> suspected case with isolation of wild poliovirus in stool specimens collected from the suspected case or from a close contact of the suspected case.</p>

Disease/syndrome	Case definition
Rabies*	<p><u>Suspected case:</u> a person with one or more of the following: headache, neck pain, nausea, fever, fear of water, anxiety, agitation, abnormal tingling sensations or pain at wound site, when contact with a rabid animal is suspected.</p> <p><u>Confirmed case:</u> a suspected case with laboratory confirmation.</p>
Rift Valley fever*	<p><u>Suspected case:</u></p> <p><i>Early disease:</i> acute febrile illness (axillary temperature >37.5 °C or oral temperature >38.0°C) of more than 48 hours duration that does not respond to antibiotic or antimalarial therapy, AND direct contact with sick or dead animal or its products, AND/OR recent travel (in the previous week) to, or living in an area where the virus activity is suspected/confirmed AND/OR abrupt onset of any one or more of the following: exhaustion, backache, muscle pains, headache (often severe), discomfort when exposed to light, and nausea/vomiting, AND/OR nausea/vomiting, diarrhoea or abdominal pain with one or more of the following: severe pallor (or Hb < 8 gm/dL), low platelets (thrombocytopenia) as evidenced by the presence of petechiae (or platelet count < 100x10⁹ / dL), evidence of kidney failure (oedema, reduced urine output) (or creatinine > 150 mol/L), AND/OR evidence of bleeding, AND/OR clinical jaundice (3-fold increase above normal of transaminases).</p> <p><i>Late stages of diseases or complications (2-3 weeks after onset):</i> patients who have experienced a flu-like illness in the preceding month, with clinical criteria and who additionally develop the following: central nervous system manifestations which resemble meningo-encephalitis AND/OR unexplained visual loss.</p> <p><u>Confirmed case:</u> a laboratory-confirmed suspected case</p>
Severe acute respiratory syndrome (SARS)‡	<p><u>Clinical case definition:</u> a history of fever AND one or more symptoms of lower respiratory tract illness (cough, difficulty breathing, shortness of breath), AND radiographic evidence of lung infiltrates consistent with pneumonia or acute respiratory distress syndrome, or autopsy findings consistent with pneumonia or acute respiratory distress syndrome without an identifiable cause.</p> <p><u>Confirmed case:</u> individual with laboratory confirmation of infection with SARS coronavirus, who either fulfils the clinical case definition of SARS or who has worked with live SARS coronavirus or clinical specimens infected with SARS coronavirus.</p>
Signs and symptoms of potential infectious diseases that require further evaluation**	Fever (temperature 38°C or more) associated with certain signs or symptoms as appearing obviously unwell, with persistent coughing, impaired breathing, persistent diarrhoea, persistent vomiting, skin rash, bruising or bleeding without previous injury, confusion of recent onset. With or without fever: any acute skin rash or eruption, severe vomiting (other than motion sickness), severe diarrhoea, recurrent convulsions.
Smallpox ‡	Acute onset of fever (>= 38.3 °C), malaise, and severe prostration with headache and backache occurring 2 to 4 days before rash onset, AND development of a maculopapular rash starting on the face and forearms, then spreading to the trunk and legs, and evolving within 48 hours to deep-stated, firm/hard and round well-circumscribed vesicles and later pustules, which may become umbilicated or confluent, AND lesions that appear in the same stage of development on any given part of the body, AND no alternative diagnosis explaining the illness, AND laboratory confirmation.

Disease/syndrome	Case definition
Tuberculosis*	<p><u>Suspected case:</u> any person with a cough lasting 3 weeks or more.</p> <p><u>Confirmed case:</u></p> <p><i>Smear-positive pulmonary tuberculosis:</i> a suspected patient with at least 2 sputum specimens positive for acid-fast bacilli, OR one sputum specimen positive for acid-fast bacilli by microscopy and radiographic abnormalities consistent with active pulmonary tuberculosis as determined by the treating medical officer, OR one positive sputum smear by microscopy and one sputum specimen positive on culture for acid-fast bacilli.</p> <p><i>Smear negative pulmonary tuberculosis:</i> a patient who fulfils all the following criteria: two sets taken at least 2 weeks apart of at least two sputum specimens negative for acid-fast bacilli on microscopy, radiographic abnormalities consistent with pulmonary tuberculosis and a lack of clinical response despite one week of a broad spectrum antibiotic, a decision by a physician to treat with a full course of anti-tuberculosis chemotherapy, OR a patient who fulfils all the following criteria: severely ill, at least two sputum specimens negative for acid-fast bacilli by microscopy, radiographic abnormalities consistent with extensive pulmonary tuberculosis (interstitial and miliary), a decision by a physician to treat with a full course of anti-tuberculosis chemotherapy, OR a patient whose initial sputum smears were negative, who had sputum sent for culture initially, and whose subsequent sputum culture result is positive.</p>
Viral Haemorrhagic fever: Ebola §	<p><u>Probable case:</u> symptoms compatible with Ebola fever (sudden onset of fever, intense weakness, muscle pain, headache, sore throat, vomiting, diarrhoea, rash, impaired kidney and liver functions, internal and external bleeding), AND within 21 days of symptom onset: risk exposure in sub-Saharan Africa (medical treatment, contact with body fluids of ill persons, contact with primates or bats in areas with suspected or known Ebola activity) or contact with a case of Ebola fever.</p> <p><u>Confirmed case:</u> a suspected case that is laboratory confirmed.</p>
Viral Haemorrhagic fever: Lassa §	<p><u>Probable case:</u> clinical symptoms compatible with Lassa (malaise, fever, headache, sore throat, cough, nausea, vomiting, diarrhoea, myalgia, chest pain, hearing loss), AND within 21 days of symptom onset: risk exposure to rats or their droppings in rural areas of West Africa or contact with a case of Lassa fever.</p> <p><u>Confirmed case:</u> a suspected case that is laboratory confirmed.</p>
Viral Haemorrhagic fever: Marburg §	<p><u>Probable case:</u> symptoms compatible with Marburg (abrupt onset, severe headache, severe malaise, muscle aches and pains, high fever, severe watery diarrhoea, abdominal pain and cramping, nausea, vomiting), AND within 21 days of symptom onset: risk exposures in sub-Saharan Africa (medical treatment, contact with body fluids of ill persons, contacts with primates or bats; all of the above in areas with suspected or known Marburg activity) or contact with a case of Marburg haemorrhagic fever.</p> <p><u>Confirmed case:</u> a suspected case that is laboratory confirmed.</p>
West Nile fever*	<p><u>Suspected case:</u> a hospitalized case of encephalitis due to unknown cause.</p> <p><u>Confirmed case:</u> laboratory confirmation of a suspected case.</p>
Yellow fever*	<p><u>Suspected case:</u> any person with acute onset of fever, with jaundice appearing within 14 days of onset of the first symptoms.</p> <p><u>Probable case:</u> a suspected case with an epidemiological link to a confirmed case or outbreak or a positive post-mortem liver histopathology.</p> <p><u>Confirmed case:</u> a laboratory confirmed suspected case.</p>

* Technical Guidelines for Integrated Disease Surveillance and Response in the African Region. Harare, Zimbabwe and Atlanta, Georgia, USA: World Health Organization Regional Office for Africa and the Centers for Disease Control and Prevention; 2010; † EU Ship Sanitation Training Network. European Manual for Hygiene Standards and Communicable Diseases Surveillance on Passenger Ships. Larissa, Greece; 2011; ‡ WHO Guidance for the Use of Annex 2 of the International Health Regulations (2005). World Health Organization; 2008; § European Centre for Disease Prevention and Control (ECDC). Risk assessment guidelines for diseases transmitted on aircraft. 2nd ed. Stockholm; 2010; ** Annex 9 to the Convention on International Civil Aviation. Facilitation. Thirteenth edition. International Civil Aviation Organization; 2011 and IHR Annex 8 Model of Maritime declaration of Health.