



# WHO Technical consultation on event-based surveillance

Meeting report

March 2013



Global Capacities  
Alert and Response

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*NOTE*

This report has been prepared by the World Health Organization for governments of Member States and for those persons who participated in the “WHO Technical Consultation on Event-based Surveillance”, in Lyon, France, on 19-21 March, 2013. The views expressed in this report are those of the participants and do not necessarily reflect the policies of the World Health Organization.

## Table of Contents

<b>1. Abbreviations and Acronyms</b>	<b>5</b>
<b>2. Introduction</b>	<b>6</b>
<b>3. Objective</b>	<b>6</b>
<b>4. Background</b>	<b>7</b>
<b>5. Summary of the discussion</b>	<b>7</b>
Introduction	7
Surveillance at national level	7
Existing EBS functions	14
Identification of EBS specificities	18
Steps between the provision of information in the field and its treatment by the surveillance system	23
Sources of information contributing to Event-Based Surveillance	24
Developing guidance on Event-Based Surveillance	26
Next steps	28
<b>6. Conclusion</b>	<b>28</b>
<b>Annex 1- Agenda</b>	<b>29</b>
<b>Annex 2 - List of participants</b>	<b>33</b>
<b>Annex 3 - Definitions: Contributions of participants before the consultation</b>	<b>35</b>



## 1. Abbreviations and Acronyms

ARI:	Acute Respiratory Infection
ARO:	Alert and Response Operations
CD:	Communicable Diseases
CDC:	Centers for Disease Control
CO:	WHO Country Office
EBS:	Event-Based Surveillance
ECDC:	European Centers for Disease Control
EI:	Epidemic Intelligence
EMS:	Event Management System
EMT:	Event Management Team
EU:	European Union
EURO:	WHO Regional Office for Europe
EWAR:	Early Warning, Alert, and Response
EWRS:	Early Warning and Response System
GDD:	Global Disease Detection
GOARN:	Global Operations Alert and Response Network
GPHIN:	Global Public Health Intelligence Network
HPA:	Health Protection Agency (UK)
HQ:	Headquarters
IBS:	Indicator-Based Surveillance
IHR(2005):	International Health Regulations(2005)
ILI:	Influenza-Like Illness
IT:	Information Technologies
NFP:	National Focal Point
NuTraVE:	NucleosTrazadore de VigilanciaEpidemiologica
OIE:	World Organization for Animal Health
PHEIC:	Public Health Event of International Concern
PPHSN:	Pacific Public Health Surveillance Network
RO:	WHO Regional Office
SARI:	Severe Acute Respiratory Infection
SHOC:	Strategic Health Operations Centre
SOP:	Standard Operation Procedure
SRRT:	Surveillance and Rapid Response Team
SSS:	Syndromic Surveillance System
WHO:	World Health Organization
WPRO:	WHO Regional Office for the Western Pacific

## 2. Introduction

The world has undergone many rapid changes with demographic explosion and massive urbanization, population movement, increase in international transportation, emergence of new pathogens, use of new techniques which induce new risks, and introduction of the threat of bioterrorism.

To respond to this new environment, the International Health Regulations were revised in 2005. IHR(2005) expands usual infectious disease notification to include surveillance for public health events of various origins (e.g. nuclear and chemical) including those of unknown origin. IHR(2005) also prompts Member States to adopt multi-sectoral/multidisciplinary approaches through national partnerships for effective alert and response systems. Finally, IHR(2005) requests countries to acquire/strengthen capacities for the rapid detection of public-health risks, as well as prompt risk assessment, notification and response to these risks; the Review Committee on the Functioning of the IHR(2005) who met in 2009 has expressed that, to this end, a sensitive and flexible surveillance system with an early warning function is needed.

The importance of strengthening national health surveillance to provide early warning and consequently rapid response has been the primary recommendation of expert groups for the past two decades. National surveillance systems usually rely on information collected in health facilities and target communicable diseases as these diseases have a high epidemic potential and/or can be easily prevented by immunization. However, information provided through this channel is often received incompletely or with delay and does not always allow rapid response even if the system integrates an early warning component.

Countries need to strengthen their health surveillance systems through acquisition of competent trained human resources, development of standard operating procedures (SOPs), and use of electronic tools. Countries also need to develop event-based surveillance (EBS) procedures for collecting and analyzing information from other sources than the health system itself, including rumors and informal sources of information, (i) before a health event occurs (alerts - events that could represent a risk for human health) or is identified (syndromes), (ii) not related to communicable diseases, (iii) coming from places where populations have little or delayed access to the health system.

EBS procedures have been developed at the level of global platforms by World Health Organization (WHO), European Centres for Disease Control (ECDC), Centers for Disease Control (CDC) and others. EBS should also be implemented widely at the country level, including in Member States with weak health surveillance systems that could be efficiently complemented.

Several Member States have developed functions that can contribute to EBS (e.g. absenteeism at school, consumption of drugs, media screening), with the support of WHO Country, Regional and HQ Offices. However, in many countries, EBS remains poorly understood, incompletely structured and only partially implemented by lack of operational guidance. Guidance is also needed for proposing standardization of terms to ensure common understanding of some key concepts.

## 3. Objective

In this context, the objective of the technical consultation held in WHO offices in Lyon, France on March 19-21, 2013 was to initiate the development of a guidance document on EBS, and specifically to:

- Define the terms used for surveillance under IHR(2005)
- Identify the different functions addressed by EBS
- Propose procedures for the acquisition and maintenance of these functions

## 4. Background

The consultation was made up of five parts (agenda, Annex 1):

1. Introduction
2. Surveillance at national level
3. Description of existing EBS functions
4. Definitions used for surveillance under IHR
5. Components addressed by EBS

Different methods were used: PowerPoint presentations, post-it sessions, open space, world cafés and group work.

Participants were experts on epidemiological surveillance, heads of national surveillance systems with an EBS component, and WHO staff (list of participants, Annex 2).

## 5. Summary of the discussion

### Introduction

Mike Catchpole, Kumnuan Ungchusak, and Ray Arthur were elected by an overwhelming round of applause to chair the meeting on Days 1, 2, and 3, respectively.

### Surveillance at national level

A series of presentations aiming at establishing the context of the consultation were made. Overall role of surveillance and specific EWAR functions were presented and discussed. IHR country self-assessments that indicate gaps in surveillance related to EBS as well as current vision of international agencies on EBS were presented.

#### ***Overview of national surveillance systems (Gerardo Priotto)***

The objectives of Public Health Surveillance are to:

- Identify trends and detect outbreaks
- Detect emerging diseases or other health threats for timely public health response
- Estimate disease impact
- Show results of control measures
- Describe the natural history of diseases
- Establish disease distribution, spread modality, risk factors
- Suggest hypothesis generation to stimulate research
- Guide public health planning

All countries have basic disease reporting systems usually limited to the health sector and focusing on known diseases. The flow of information goes from the health facilities at the peripheral level to the district, to the intermediate and central levels. This system can be complemented by specific sentinel systems and health surveys.

Sources of information for national disease reporting systems may include mandatory notification systems for some specific diseases, laboratory-based surveillance, syndromic surveillance, pharmaco-vigilance, nosocomial diseases surveillance, poisoning surveillance, HIV and a series of disease specific surveillance systems including vaccine preventable and non-communicable diseases surveillance.

In addition, as required by IHR(2005), all countries must have an Early Warning Alert and Response (EWAR) function as a component of their surveillance system. EBS is part of EWAR and receives health related information from sources outside the health sector. Some countries have also developed systems for the surveillance of international health events. The objective is to raise



awareness of health threats from abroad and to expedite international assistance when required. Automated internet-based systems are more and more frequently used for this purpose.

As EBS and EWAR are most often built on existing reporting systems, the quality of the basic surveillance system must not be neglected. The development of EBS is an opportunity to develop quality assurance (performance monitoring, evaluation) for pre-existing surveillance systems adapt electronic tools that facilitate data analysis and quality data management, and develop the capacity of human resources through training at all levels.

### ***EWAR functions of surveillance systems (Dominique Legros)***

A public health surveillance system serves two main objectives:

- To monitor disease morbidity and mortality in order to more effectively guide control programs and the corresponding allocation of resources. This is usually referred to as “routine surveillance”.
- To provide timely information of potential public health threats requiring quick investigation and response, and ensure that outbreaks are rapidly detected and controlled. This function is often referred to as EWAR or as “Early Warning and Response System” (EWRS).

EWAR builds on the existing surveillance systems and further develops sensitive and flexible mechanisms of detection within and outside the health sector to trigger immediate investigation and control.

Implementing or strengthening EWAR functions within existing public health surveillance systems does not mean duplicating an existing system, but rather enhancing the capacities of the existing system to quickly detect and effectively respond to outbreaks of all origins. Therefore, EWAR should be very sensitive and designed to : (i) identify, within the health system, any abnormal disease pattern that could indicate or develop into an outbreak and (ii), to also detect, outside the health system, any unusual health events or health-related events which could result in an outbreak in humans.

The first component of the system is usually referred to as “case-based surveillance”. Case-based surveillance requires any contact of the patient(s) (“case”) with the healthcare system and focuses on a list of epidemic-prone priority diseases to be reported by healthcare providers or laboratories. Alerts identified by case-based surveillance rely on the capacity of the healthcare system to detect and report either unusual disease occurrence or unusual disease trends. Thresholds of incidence, taking into account the case demographic information, and the seasonal and historical patterns of incidence, should be defined in advance. For some emerging or re-emerging communicable diseases and diseases targeted for elimination, the report of a single case constitutes a potential public health threat and is sufficient to trigger a public health action. Because EWAR should be designed to achieve the highest level of sensitivity, cases of diseases reported by healthcare providers through EWAR rely most often on syndromic criteria based on clinical appraisal (acute watery diarrhoea, suspected measles, jaundice syndrome, etc.).

The second component of EWAR is referred to as EBS which aims at early detection of any report of unusual health events or health-related events which could represent a threat to human health. Such reports can be rumours and other ad hoc information transmitted through various formal and informal channels, long before they are detected and reported by the healthcare system. Identifying alerts via EBS relies on the capacity of EWAR to broaden its sources of information and to establish mechanisms for sharing information with the various stakeholders in a timely and efficient manner. Events include those related to the occurrence of disease in humans (media report of a cluster of deaths of “unknown disease”, outbreaks occurring in foreign countries) and those related to the potential exposure of humans to infectious, chemical or radio-nuclear agents (food poisoning, water or environmental contamination, animal outbreaks, heat wave, etc.).

Sources of information may include the Ministry of Agriculture and veterinary services (for domestic animals and wildlife), food authorities, the Ministry of Environment, water supply companies, sanitation authorities (e.g., health inspections of public places), Non-Governmental Organizations , Poison centres, Emergency Crisis Centres, Pharmacies (drug consumption), the media and international sources (ECDC, WHO, CDC).

Because of its high degree of sensitivity, EWAR is likely to deal with a significant proportion of false alerts. Establishing mechanisms of event filtering and verification is necessary to help recognize those events requiring further monitoring or immediate intervention.

***Surveillance functions as required by IHR – Identified gaps (Stella Chungong)***

Based on Annex 1 of IHR(2005), a list of core capacities was compiled for the purpose of monitoring progress in IHR implementation. Under core capacity #3 (surveillance), Member States are required to develop the following core surveillance functions:

- Event detection and confirmation
- Risk Assessment
- Reporting/Notification
- Data Management and analysis
- Feedback and supervision

In 2012, 128 countries (i.e. 66% of all Member States) submitted their self-administered IHR monitoring questionnaire to WHO. Of them, 81% declared their surveillance core capacity achieved. Within the surveillance core capacity, 87% of the countries declared their capacity of indicator based surveillance (IBS) achieved, versus 74% for EBS. Achievement of IBS capacity ranged from 81% in the AFRO region to 93% in EURO. Achievement of EBS capacity ranged from 59% in AFRO to 79% in EURO.

Within the EBS capacity, the following proportion of countries reported achievement of the following capacities:

Capacities	% of countries achieving capacity
Use of Annex 2 to notify WHO	98%
Identification of EBS information sources	91%
System/mechanism in place for capturing and registering public health events	88%
SOPs / guidelines for EBS available	80%
All events within the last 12 months assessed within 48 hours	80%
NFP responded to all verification requests from WHO within 24 hours in the last 12 months	79%
All events meeting criteria notified to WHO within 24 hours of risk assessment	78%
SOPs / guidelines for EBS implemented	66%
Engagement of communities	65%
Evaluation of community / primary level reporting	62%
Review of decision instrument and update of procedures	56%

Stakeholder's meetings were held in five WHO regions to map countries' gaps and needs in IHR implementation. All meetings expressed need for strengthening EBS and for support from WHO and partners. Some countries specifically asked for better guidance and for support in establishing functional EBS.

#### ***Need for development of guidance on EBS (Pierre Nabeth)***

Although prompted by IHR and already organized at the global level (WHO-Event Management System - EMS, ProMed, GPHIN, etc.), the early detection and rapid response to public health events is rarely based on sources of information outside of the usual health reporting systems at the national level. As regularly expressed by countries and supported by WHO, the development of operational guidance and the provision of in-country support would help countries integrate formalized access to these sources of information into their national systems

An important pre-requisite for guidelines development is to have the same understanding of a basic set of terms used for surveillance and in particular define what EBS is and is not. The guide developed by WPRO in 2008 on "Establishing Event-based Surveillance" defines EBS as "the routine reporting of cases of disease" and EBS as "the rapid detection, reporting, confirmation, assessment of public health events". Events are defined as the occurrence of disease in humans, such as clustered cases of a disease or syndromes, unusual disease patterns or unexpected deaths as recognized by health workers and other key informants in the country; or as the potential exposure for humans, such as events related to diseases and deaths in animals, contaminated food products or water, and environmental hazards including chemical and radio-nuclear events.

Our current vision, as stated in the WHO Guidelines on the Implementation of EWAR under the IHR (2005)(currently under revision), is that EBS consists of the capture and analysis of any report from outside the health system related to acute health events or health-related events and which could represent an immediate threat to human health. According to this vision of EBS, once an alert is

communicated to the EWAR system, it receives the same treatment, wherever it comes from. However, while sources and procedures are well established in the “usual health reporting system”, EBS relies on different sources, different providers, and different procedures of transmission of information.

In conclusion, there is a need to complement “case-based” reporting with other sources of information, as requested by most countries, independently from the level of performance of their “case-based” system. These sources should be identified, and data transmission and analysis organized. EBS should not be implemented as a parallel surveillance system but rather integrated at all levels (peripheral, intermediate, and central) of the national surveillance system. Operational guidance for implementing EBS is needed and will facilitate the integration of non-health sectors such as points of entry, chemicals, and radio-nuclear sources of information to national surveillance systems, as required by IHR.

#### ***Event-Based Surveillance in the WHO-European Region (Dennis Faix)***

Alert and Response Operations (ARO) in the IHR Framework require that national IHR focal points (NFP) be accessible at all times for communication with WHO, and for dissemination of information and consolidation of input nationally. The WHO ARO IHR contact point at the regional office level must also be accessible at all times, as they are the primary channel for WHO-NFP event-related communications. The WHO ARO IHR contact point disseminates information within WHO and activates the WHO risk assessment and response system. The Director General of WHO declares Public Health Emergency of International Concern (PHEIC), and makes temporary and standing recommendations.

The EURO-ARO IHR contact point e-mail/outlook inbox is shared by all members of the EURO-ARO team and serves as the source of noise/signals, which are filtered by a duty officer operating on a 24/7 basis. Each item is filtered, verified, assessed and categorized according to the results of the initial risk assessment. Events requiring follow up are included in the daily list for discussion at a daily event review meeting. Information is recorded and regularly updated in the WHO Event Management System (EMS). Information is also shared with NFPs via the Event Information Site (EIS).

A series of Standard Operating Procedures (SOPs) have been developed for EBS and include procedures for signal monitoring and filtering, alert evaluation and disposition, daily alert/event review meeting. The development of a new IT platform shall provide access to a larger number of sources of information, better sharing of the initial filtering/processing, synchronisation of data between servers/users highly customizable for permissions, capacity to put data/events in context quickly with other data sources, timelines, histograms, links between data/events as well as geospatial/temporal display.

#### ***Epidemic Intelligence at EU level: role of ECDC (Pasi Penttinen)***

ECDC mandate is to identify, assess and communicate current and emerging health threats to human health from communicable diseases (Source: ECDC Founding Regulation - 851/2004). Within this framework, ECDC's role comprises technical and scientific advice, EU level surveillance, early warning and risk assessment, strengthening preparedness capacity and communication. All actions aim to provide health security at EU level in close cooperation with EU Member States, European institutions, WHO, Research groups, Public health authorities outside of EU, Non-Governmental Organizations and industry, etc. ECDC's role in EU health security is restricted to risk detection/monitoring and risk assessment, while risk management is under the responsibility of the European Commission and of Member States.

Epidemic intelligence (EI) is defined as the systematic collection and collation of information from a variety of sources, which is then validated and analysed with the purpose to speed up the detection

of potential health threats and allows, if necessary, timely response through an adequate risk assessment. EI has indicator-based and event-based components. The main focus in EI at ECDC is on EBS related components and follows a process that starts with information screening and event filtering (risk detection). Filtered events are then validated and analysed for their potential threat to human health (risk assessment).

EI at ECDC, on a 24/7 basis:

- Detect/monitor public health threats
- Assess risks/investigate public health threats
- Collect information
- Daily analysis/validation of potential threats (roundtable)
- Store relevant info (Threat Tracking Tool : TTT)
- Organize operational communication
- Support outbreak response

Events of particular interest include:

- Outbreaks of communicable diseases (CD) extending to more than one EU Member State
- Spatial or temporal clustering of cases, if there is risk of propagation between EU Member States
- Spatial or temporal clustering of cases, if there is a risk of propagation to the EU
- Appearance/resurgence of a CD requiring timely coordinated EU action to contain it
- Disease/occurrence that creates a potential PHEIC (IHR, 2005)
- Events requiring continuous close monitoring e.g. measles
- Unexpected events e.g. anthrax in injecting drug users
- Increased media attention e.g. travel-related issues
- Possible intentional release e.g. water contamination in a hotel
- Emerging diseases or spread in new areas e.g. dengue
- Mass Gathering events e.g. 2010 FIFA World Cup

An EI information system (EPIS) has been developed and serves to complement the EU Early Warning and Response System with unofficial communications between experts. In the future, ECDC will pursue the development and assessment of new technologies for threat detection and monitoring, and ensure a better integration/ interconnectivity between ECDC and EC tools.

### ***Event-based surveillance – view from CDC (Ray Arthur)***

Homeland Security Presidential Directive 21 (HSPD-21) defines the term biosurveillance as the process of active data gathering, with appropriate analysis and interpretation of biosphere data that might relate to disease activity and threats to human or animal health—whether infectious, toxic, metabolic, or otherwise, and regardless of intentional or natural origin—in order to achieve early warning of health threats, early detection of health events, and overall situational awareness of disease activity. The National Strategy for Biosurveillance specifies biosurveillance goals and core functions as follows:

- Scan and discern the environment
- Identify and integrate essential information
- Alert and inform decision makers
- Forecast and advise impacts

US domestic sources of information for biosurveillance include environmental sensors (BioWatch-Dept. of Homeland Security), prescription/absenteeism monitoring, internet-based press reports and blogs and social media scanning, and syndromic surveillance (BioSense- CDC). CDC uses Epi-X as a communication tool for EBS. Epi-X provides secure, moderated communications for public health officials to report and discuss disease outbreaks and other acute health events including terrorism. Events such as outbreaks of infectious disease, suspected threats or acts of terrorism, disease or

injury associated with a new, unusual, or unknown agent or setting, contamination of products, such as drugs or foods are reported on Epi-X.

The Global Disease Detection (GDD) Operations Center is used for CDC worldwide Event-Based Surveillance & Response. GDD Operations Center was initiated in 2006, on the model of WHO's Alert and Response Operations in Geneva. GDD screens sources of EI and collects disease/event information, systematically conducts risk assessments and assigns a "threat" level, reports to decision makers and responds to health events, and also provides operational support and funding for rapid deployment of CDC assets and field teams directly or through Global Outbreak Alert and Response Network (GOARN).

### ***Event Management at WHO (Johannes Schnitzler)***

Event management at WHO covers all hazards. It ensures that events are detected early, that information is shared across all levels of WHO and that response is appropriate and defensible. In this way, high quality interventions based on international best practice are guaranteed, as is timely and accurate notification of public health events to the international community.

SOPs for event management were developed in 2008 (currently being reviewed) and cover:

- Event verification with affected country
- Assessment of the risk to the international community
- Dissemination of information to those who need to know
- Assistance to affected country

A system of events grading has been developed to help classify events following risk assessment, using the following definitions:

- Ungraded: Event assessed / monitored by WHO, no WHO response required;
- Grade 1: Limited consequences; remote WHO Regional Office (RO) / HQ assistance to Country Office (CO); minimal staff required; support coordinated by a focal point in the RO;
- Grade 2: Moderate consequences; moderate WHO RO/HQ + external support to CO; time-limited missions; remote input to strategic plans, technical advice; support coordinated by an Emergency Support Team at RO;
- Grade 3: Substantial consequences; substantial RO/HQ + external support to CO; on-going in country technical assistance, issuance of hazard specific and country specific guidance; support coordinated by an Emergency Support Team at RO.

The WHO HQ Strategic Health Operations Centre (SHOC) provides a hub and a technical platform for the WHO HQ Event Management Team (EMT) to support and conduct event management and operational coordination during significant IHR events and humanitarian emergencies. SHOC also maintains operational readiness through planning, drills and response exercises.

GOARN is a network of technical institutions, coordinated by WHO, that provide international assistance to Member States for outbreak response. GOARN rapidly deploys multi-disciplinary experts for outbreak response and coordinates with international technical institutions.

Event-related information is entered, updated and stored in the Event Management System (EMS) which in turn serves as a source of information for several WHO information products, including the Event Information Site (for NFPs), the Disease Outbreak News (public site), GOARN and the Web updates.

### ***Contribution of animal health surveillance to human health surveillance (Stéphane de La Rocque)***

There are many examples of animal health events providing early warning of human health events. The majority of emerging diseases are of zoonotic nature, most of them originating from wildlife and many amplifying in livestock. During the recent Rift Valley Fever wave of outbreaks in eastern, southern and western Africa, the early detection of the virus in cattle and small ruminants

has been key in the identification of areas and populations at risk, facilitating the implementation of appropriate preventive measures (e.g. animal vaccination or targeted educational campaign for the slaughterhouse workers). Furthermore, the joint analysis of data on events both in animal and humans allowed a better description of the epidemiology of the disease, highlighting contrasted transmission processes in arid, irrigated or peri-domestic foci and quantifying the respective contribution of the different actors of the cycle (vectors, animal, human). For that purpose, WHO, FAO and OIE developed a common database of all human and animal outbreak events, the latter used for identification and modeling the most susceptible areas at the continental level. Monitoring of the emergence of the various clades of H5N1 in poultry and wild birds in South-East Asia was of great interest for depicting the routes of spread, and the identification of areas or compartments for increased surveillance both in animal and humans (e.g. live-birds markets, networks of poultry production and distribution). These studies combine specific surveillance protocols in animals (passive surveillance and early detection, active investigation, monitoring of sentinel herds), deep exploration of livestock value-chains and intensive use of spatial analysis (GIS) and modeling tools.

In other cases, the pathogen is difficult to detect in the animal population or there is little interest from the animal sector. Congo-Crimean Haemorrhagic Fever is one of these examples, where the animal reservoir is rarely investigated. This situation stimulated the current effort to improve collaboration between the 2 sectors, and the better integration and understanding of animal health and human health surveillance systems (e.g. One Health approach). The international organizations charged with surveillance and reporting of animal and human outbreak events, FAO, OIE and WHO, developed a privileged framework for sharing early detected events and associated risk assessment, the Global Early Warning System (GLEWS). This functioning system is part of a wider global effort determining a joint strategic direction and proposing long term international collaboration aimed at coordinating global activities to address health risks and respond to emergencies at the animal-human interface. The main principles are described in a tripartite concept note entitled "Sharing responsibilities and coordinating global activities to address health risks at the animal-human-ecosystems interfaces" - FAO/OIE/WHO, April 2010, available at [www.who.int/influenza/resources/documents/tripartite\\_concept\\_note\\_hanoi/en/](http://www.who.int/influenza/resources/documents/tripartite_concept_note_hanoi/en/)

### **Existing EBS functions**

To obtain an overall view of the current status of EBS implementation and as a basis to discussions on guidance, countries provided details on their experience in this field. Invited experts described existing EBS in their countries in terms of components, functions, methods and sources. In this way, in addition to estimating actual EBS status, successful models could be recorded and errors to avoid could be pinpointed. Furthermore, areas for improvement could be identified.

#### ***Lebanon (Nada Ghosn)***

A school-based surveillance system was established in 2009 in collaboration with the Ministry of Education and High Education of Lebanon during the Influenza A(H1N1) pandemic, in order to complement the existing diseases surveillance system. The objectives are to monitor weekly absenteeism in schools (> 3 days), to monitor the weekly incidence of 5 target syndromes (acute diarrhea, acute respiratory infection, rash, acute jaundice, conjunctivitis), and to detect outbreaks. All schools from public and private sectors are included.

The system helps build partnerships between the health and education sectors at all levels and enhances the decentralization process. However, the reporting rate remains low in the private sector and the system lacks specificity for outbreak detection. In the future, it is expected that the use of historical data will improve the capacity of analysis and that regular sessions of information conducted in schools will help improve reporting.

### ***Iran (Payman Hemmati)***

Iranian CDC (Ministry of Health and Medical Education) has developed a Syndromic Surveillance System (SSS) program which currently collects clinical data, and will, in the near future, include other components (non-routine clinical data and non-clinical data).

Syndromes are defined by a few key clinical presentations. The programme includes 14 clinical syndromes : fever and acute rashes, fever with bleeding/hemorrhagic manifestations, influenza-like illness (ILI), severe acute respiratory illness (SARI), neurological symptoms and/or fever, undifferentiated prolonged fever, jaundice, food poisoning, acute watery (non-bloody) diarrhea, bloody diarrhea, acute flaccid paralysis, sudden and unexpected death, shock syndrome with/without fever, and chronic cough. Non-clinical data includes sales statistics of some foodstuff, mass deaths of birds, mass abortions among cattle, meteorological information, etc.

Some examples of non-routine clinical data include drug sales statistics, absenteeism, community-based syndromes, Google flu trend, etc.

Sources of information include health posts (urban), health houses (rural), rural / urban health centres, private offices / clinics, hospitals- especially emergency departments, border health surveillance units, mass gatherings or closed communities.

Campaigns of sensitization have been planned in order to raise awareness of the public, health volunteers and public health workers regarding reportable syndromes.

The SSS program is being constructed on an IT-based platform which includes web-based, mobile-based and asynchronized software. SSS can complement the routine disease-based surveillance i.e. confers an early warning function, increases surveillance coverage, speeds up notification and reporting processes from the peripheral to provincial and central levels. Sending feedback from central to more peripheral levels is another advantage.

### ***Albania (Silvia Bino)***

Albania has established since 1999 a nationwide electronic reporting tool (ALERT) to support the early warning system for outbreak detection and improve its sensitivity. ALERT complements other surveillance systems such as disease-based surveillance, laboratory reporting system, rumor identification system, school absenteeism, drug consumption, veterinary reporting system of zoonosis and entomological surveillance.

Primary healthcare units and hospital emergency departments report respectively 9 and 12 syndromes, by age group, on a daily basis, using different technological approaches. Aggregated data are analysed on a weekly basis, using the moving epidemic method (MEM) to generate alert thresholds. The following syndromes are being monitored: upper respiratory infection, lower respiratory infection, severe acute respiratory disease, diarrhea without blood, diarrhea with blood, rash with fever, unexplained fever, jaundice, suspected meningitis, and haemorrhagic fever.

Overall, the system generated 1067 alerts across all syndromes monitored and helped detect three large hepatitis A outbreaks in 1999, 2003 and 2006 (increase in "jaundice" cases). ALERT proved flexible, simple, acceptable and sensitive, providing representative and timely alerts.

### ***Pacific Islands (Yvan Souares)***

EBS has been developed in the Pacific Islands Region within the framework of the Pacific Public Health Surveillance Network (PPHSN) and includes the following activities:

- Routine syndromic surveillance, based on national/territorial public health services
- Media screening, including internet activity
- Verification of rumours from varying sources
- Web-based syndromic surveillance for mass-gathering events



The SSS was initiated in 2010 and is a simple sentinel early warning system that complements other surveillance systems by monitoring 4 syndromes on a weekly basis: ILI, acute fever and rash, prolonged fever and diarrhea. Its primary purpose is to serve as an early warning system for outbreaks through timely detection of increased trends of syndromes. Alert thresholds are set at 90% of number of weekly cases previously reported in a given country. The SSS is still in development and needs further strengthening.

PacNet is an early warning email-based system, established in 1997 as a method for dissemination of public health surveillance information. The primary purpose is to serve as an outbreak alert by sharing timely information on outbreaks of disease so that others in the Pacific might take appropriate action when a threat has been identified. PacNet is also the main PPHSN media for wider communication and coordination.

### ***Turkey (John Watson)***

EWRS in Turkey is active and functional with a central mechanism for coordination, and close links with Provincial Health Directorates for information flow, as well as support for case detection, investigation, and response.

EWRS objectives in Turkey are to:

- Enhance the capacities of the existing system to quickly detect and effectively respond to outbreaks of all origins, using an all hazard approach;
- Strengthen risk management (the identification, assessment, control or elimination of outbreak risks);
- Strengthen inter-sectoral collaboration to ensure rapid detection and control of public health events and outbreaks;
- Enhance communication of outbreak-related information to the public, between partners from other sectors, to health care providers, and with the media.

The process of EWRS reporting, verification, data collection and management, and response activities have been strengthened in recent years, including continued laboratory strengthening, and collaboration with laboratory partners at all levels. The systematic screening of formal and informal sources of information (media, community and other informal sources) has been established, streamlining the collection of data. The management of collected data and the monitoring and tracking of events has been improved. A EWRS computerized information management system is currently being developed with the support of WHO HQ.

In the coming years, collaboration and partnership with all related sectors (food safety, veterinary health, environment, education, interior, and municipalities) shall be further strengthened. The Turkish experience shall be highlighted as a model for other countries, and collaboration with regional and international partners such as ECDC and WHO further reinforced.

### ***Mexico (Hugo Lopez-Gatell)***

The current National Surveillance System of Mexico, established in 1995, monitors 116 diseases reported by 20000 health units. Since 2008, a series of mechanisms have been put in place within the system for the early detection of outbreaks:

- Immediate notification reporting system by telephone, fax, telegram, email or an ad-hoc online platform with structured fields;
- Emergency Coordination Units at national and state level which act as a single hub for emergency management and for news monitoring, hotline services. These units were designated as State Focal Points for IHR;
- Weekly situation assessment (Epidemic Pulse) convenes the national network of surveillance and laboratories, and informs and advises high ranking health officials in real time;

- Syndromic surveillance during mass gathering events using defined assessment protocols and an open online platform which invites reporting by clinicians and the public;
- Cluster Surveillance of Severe Acute Disease (NuTraVE) which coordinates ambulatory care units, hospitals, and public health and clinical laboratories for early detection of emerging threats, and risk assessment at local and state levels;
- The expanded surveillance NuTraVE(work in progress) which includes school and job absenteeism, prescription patterns, animal surveillance, food and drug safety, and surveillance in touristic areas.

#### ***UK : EBS during the 2012 Olympics (Mike Catchpole)***

EBS was one of the components of the surveillance developed for the Olympics 2012. At the national level, EBS was based on incident reporting by local health protection teams, the purpose of which was to accelerate the reporting and the risk assessment of health protection events, on a daily basis. Criteria for reporting were defined in advance for each disease / syndrome under surveillance (could be a single case of a disease anywhere in the UK, or an outbreak in the Olympic area, etc.).

A series of criteria for the risk assessment, specific to the Olympics, were added to the usual ones and included: involvement of Olympic athletes, staff, or visitors, geographical location within an Olympic area, proximity to an Olympic venue, proximity to a training site, proximity to a major Olympic transport hub, nosocomial infection in an Olympic hospital / clinic, time of the occurrence in relation to the Olympic event.

At the international level, compilation of intelligence for EBS was performed by ECDC, using open access web information (media and official sources) such as GPHIN(Public Health Agency of Canada), HealthMap (Harvard-MIT Division of Health Sciences and Technology, Boston, US), MedISys(European Commission's Joint Research Centre, and PULS (University of Helsinki). Risk assessment of any significant events was undertaken by the Health Protection Agency (HPA), in partnership with ECDC and WHO.

#### ***France - International Epidemic Intelligence (Philippe Barboza)***

France implemented International EI in 2002 to complement its traditional indicator surveillance to monitor international risks/threats linked to infectious diseases and major environmental issues that may affect the French territory (including the multiple overseas territories). The system collects information from informal sources such as social networks, media and internet, as well as from the early warning systems of Ministries of Health. The information collected is triaged, validated, analysed and communicated by the Institut de Veille Sanitaire. The triage of information of unequal quality coming from a high number of sources represents an important challenge faced by the system.

France also collaborates in a number of international networks in the domain of early warning such as Episouth and the Global Health Security Initiative. International collaboration will help optimize international EI related activities by better coordination of contributions and development of partner synergy based on national expertise. In the event of a major threat, increased EI capacities will avoid (or limit) duplication and improve the dissemination of information, ultimately contributing to the strengthening of health security.

#### ***Morocco (Majdouline Obtel)***

Morocco's surveillance system relies on an IBS that includes a system of mandatory notification of the diseases, a laboratory-based surveillance system, a hospital-based surveillance system and population-based epidemiological surveillance. In addition, Morocco has now engaged strongly in the development of EBS in order to further build a structured system of vigilance and alert i.e. EI.

The sources of information for EI will include: animal surveillance, laboratories, environmental sources, health insurance, hospital and ambulatory care data, and international sources. A

structured surveillance unit, with staff and budget, is in charge of indicator-based and event-based surveillance. Legislation, guidelines and SOPs are being developed. Weekly epidemiological bulletins are produced. However, a number of challenges still need to be addressed for the system to become fully functional.

### ***Moldova (Stela Georghita)***

Moldova's surveillance system routinely collects data on disease occurrence, complemented by an event monitoring component where information on potential threats is routinely searched for and assessed. Within the health sector, the routine surveillance monitors 72 notifiable communicable diseases and is completed by sentinel surveillance of ILI, ARI and SARI using specific indicators like drug sales, hospital admissions and outpatient visits to the family doctor. Outside the health sector, schools (absenteeism), laboratory surveillance including environmental factors, Ministry of Agriculture routine data, information from the police/fire brigade, mass media, and general population are also used as sources of information for early warning.

The national surveillance electronic system for communicable diseases and public health events is a network of data collection on communicable diseases and public health events which integrates demographic, clinical, epidemiological and laboratory data and enables real-time monitoring, analysis and evaluation of the epidemiological situation. The system covers notification, assessment and response to biological, chemical and radio-nuclear events, automatically generating alerts based on the occurrence of events in population groups, at specific times, in specific places.

### ***Thailand (KumnuanUngchusak)***

The Surveillance and Rapid Response Team (SRRT) in Thailand receives information from case-based surveillance (59 notifiable diseases for more than 2 million records per year) and from EBS. Overall, more than 450 outbreaks are notified every year. Eight events should be reported (mostly by sub-district officers and villagers) under EBS: cluster of illness, unknown diseases, death with unknown cause, known disease with increasing number, known disease with abnormal severity, abnormal animal death, unsanitary condition, chemical leakages. A handbook for EBS has been developed for use by sub-district SRRTs.

However, too many reports are received by SRRT because of the unclear definition of some events. Definitions for abnormal events shall be revised to include: clustering of cases of same syndrome in same setting; abnormal absenteeism from school, workers, etc; abnormal animal deaths.

There is also a need for feedback from provincial or national level concerning events reported by the frontline SRRT.

**Country presentations** confirmed that most countries have traditional healthcare based reporting systems augmented by sentinel surveillance and surveys. Use of non-healthcare sources and international sources remains relatively limited. Although the importance of high quality traditional surveillance systems is critical for monitoring and health system management purposes, EBS can offer greater flexibility and speed of outbreak detection of all origins. The implementation of EBS will require high level coordination and support and a collaborative approach, particularly to intelligence sharing.

## **Identification of EBS specificities**

### ***Concepts relevant to Event-Based Surveillance and their relationships.***

Guidance on EBS, and more generally on surveillance, cannot be developed if terms are not understood in the same way. Through an exercise conducted before the consultation, we highlighted that the same usual and basic term had different meanings for different participants. Pre meeting

email discussions were completed during the meeting itself and help reach consensus on a series of critical surveillance related concepts. (Discussion on terminology, annex 3).

### ***Indicator-based surveillance***

Indicator-based surveillance (IBS) is the systematic (regular) collection, monitoring and interpretation of structured data, i.e. of indicators produced by a limited number of well identified formal sources, which contribute to early warning. Sources of information are mainly healthcare-based (e.g. healthcare structures, medical professional, laboratories, etc. grouped under “case-based surveillance”) but can also include non-(human) health sources such as animal health data, meteorological data, etc. Data collection by the EWAR system is usually passive.

Data collected within IBS may represent individual or aggregated cases, either disease-specific or syndromic, and may come from exhaustive or sentinel systems. Most data collected for IBS purposes are primarily collected for other purposes than early warning (health-care based data are collected for the monitoring of disease morbidity and mortality within routine surveillance, animal health data are collected for the surveillance of zoonosis, etc.).

Examples include the report by district authorities of an increase in diarrhoeal disease cases beyond incidence threshold (aggregated data, syndromic surveillance) or of an increase of ILI beyond threshold (aggregated data, syndromic, usually sentinel), the report by a general practitioner of a case of measles (individual case, disease-specific), the organized notification to the EWAR coordination unit by its partners of the veterinary services of Rift Valley fever cases in cattle, or the report of a sudden increase in school absenteeism through the absenteeism monitoring system by partners in the Ministry of Education.

### ***Event-based surveillance***

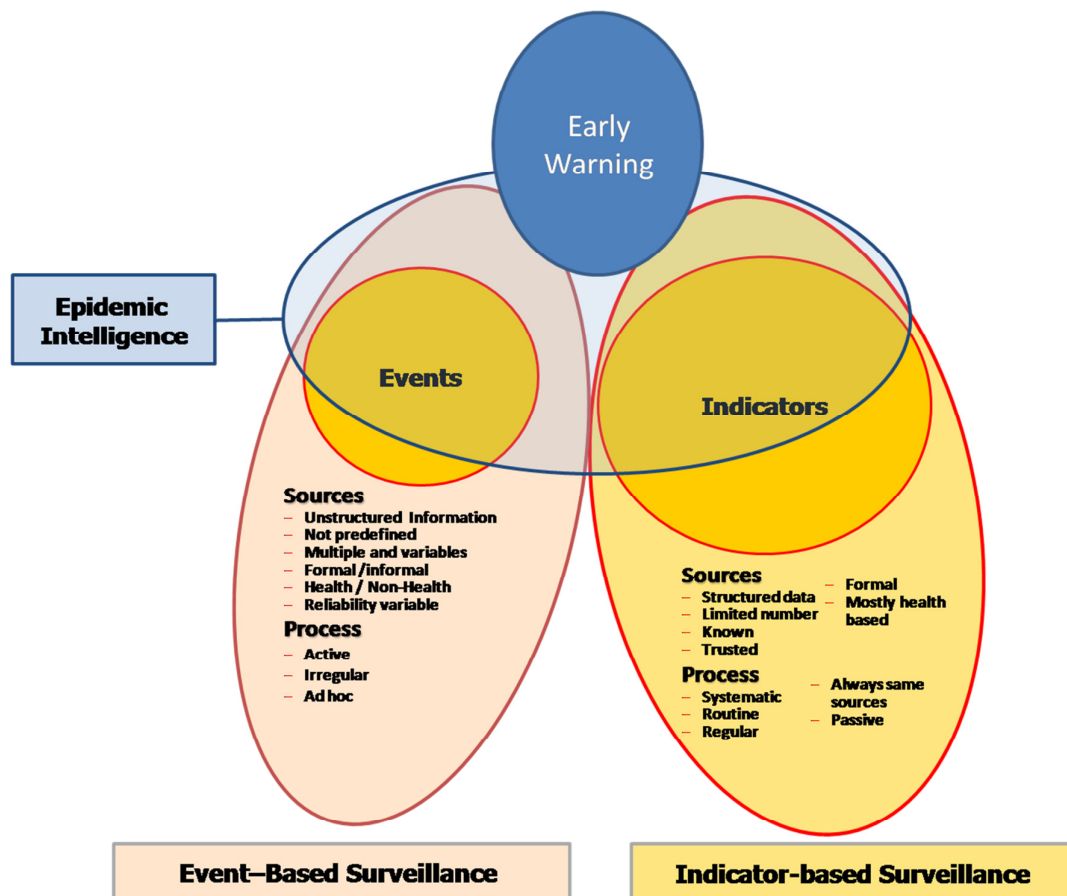
EBS can be defined as the collection, monitoring and interpretation of unstructured ad hoc information, i.e. of health events or health-related events, which may represent a potential acute risk to human health. The information collected is very diverse in nature and originates from multiple, not-predetermined sources both official and unofficial, including rumours reported by the media, ad hoc reports from informal networks, etc. The data collection process is usually active and specifically set up for EBS purposes.

Examples include the detection by the EWAR coordination unit of an outbreak in an article published in a local newspaper or in a review of international internet sources, the telephone call to the EWAR coordination unit by a social worker of an unusual number of cases of bloody diarrhea in a deprived neighborhood, the report by the central pharmacy of an abnormal increase in use of pentamidine, a drug seldom prescribed in the country, farmers complain of mass die off of poultry, teacher’s ad hoc report of high proportion of absenteeism in his/her class, etc.

### ***Indicator-based versus event-based surveillance***

EBS acts in complement to IBS. The characteristics of the information collected (structured, organized, regular, and referring to thresholds for IBS, ad hoc, informal for EBS) and the methods used for data collection (usually passive for IBS, more active for EBS) differentiate indicator-based from event-based surveillance, rather than the sources of information which are shared by both systems. As the EWAR system matures, data collection become more structured, systematic and organized, coordination with non-health partners expand, indicators are developed and “event-based information” progressively becomes “indicator-based information”. However, informal sources of information such as the media are likely to remain part of EBS.

Figure 1: indicator-based and event-based surveillance and their contribution to EWAR



### ***Epidemic Intelligence***

EI can be defined as the operation of early detection systems, the collection and organization of often informal information, in relation to health events or health-related events that represent a potential acute risk to human health and/or that can spread or affect public health even away from the initially affected country or region. Epidemic intelligence relies primarily on EBS but also integrates results originating from IBS.

EI uses human illness data that can be classified in a 3-dimensional perspective, depending on the type of surveillance (disease-specific vs syndromic), the presentation of data (individual cases for emerging diseases or diseases targeted for elimination vs aggregated data for endemic diseases with epidemic potential) and the methods and characteristics of data collection (event-based vs indicator-based surveillance). Each situation will be specific depending on the resources of the country and on the capacity of its EWAR system, and on the epidemiology of the diseases. This will evolve continuously.

Figure 2: Three-dimensional perspective of human health data collected for EWAR

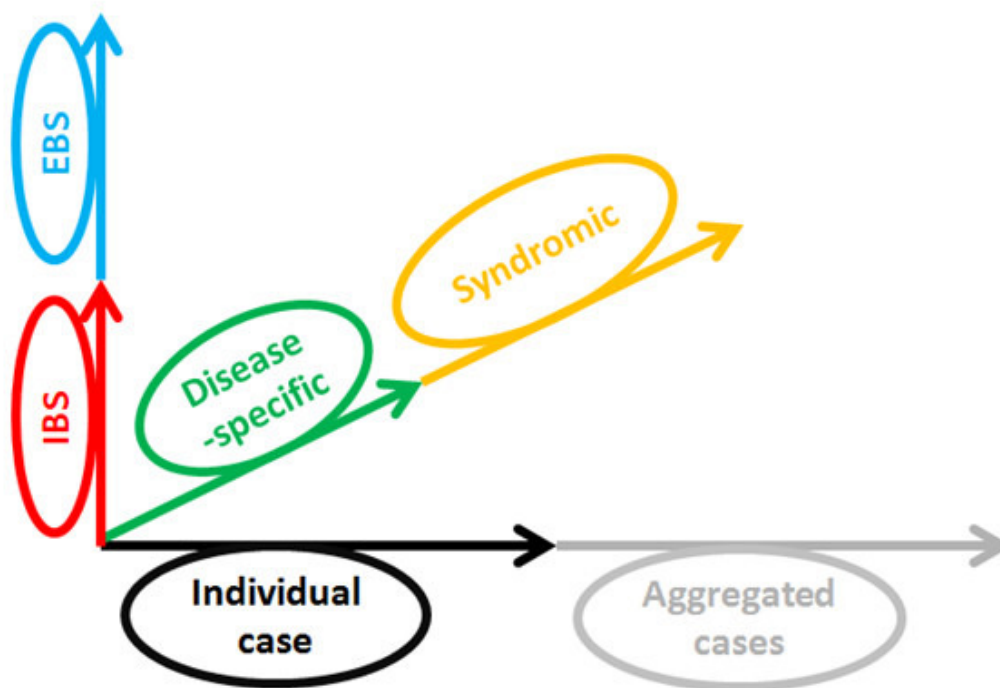


Figure 3:

The report by a community leader of one death due to acute watery diarrhea in an adult (i.e. revealing a potential outbreak of cholera) is classified as “event-based”, “syndromic”, and “individual case”.

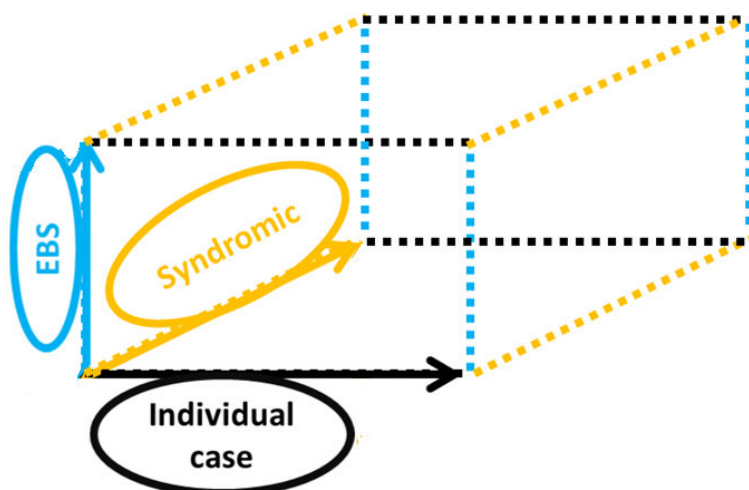


Figure 4:

The report by a health worker of an increase in the number of ILI cases seen at the consultation is classified as “indicator-based”, “syndromic”, and “aggregated”.

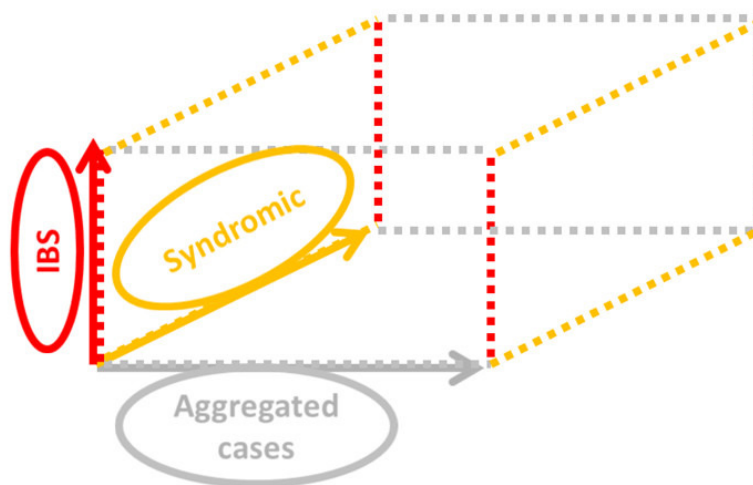
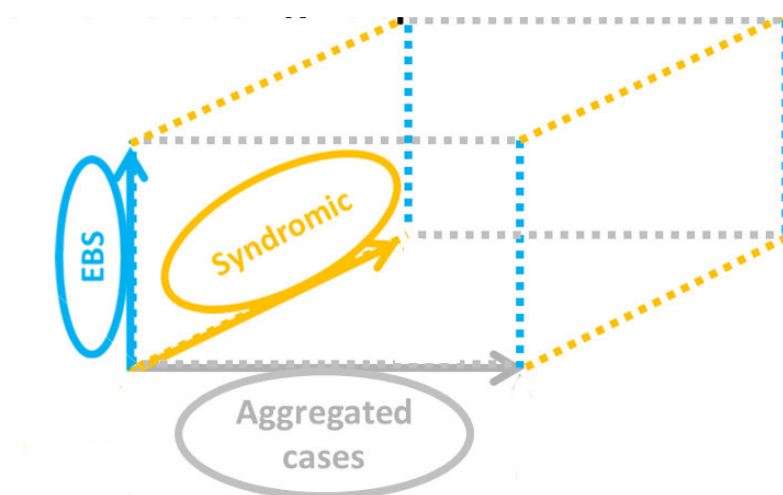


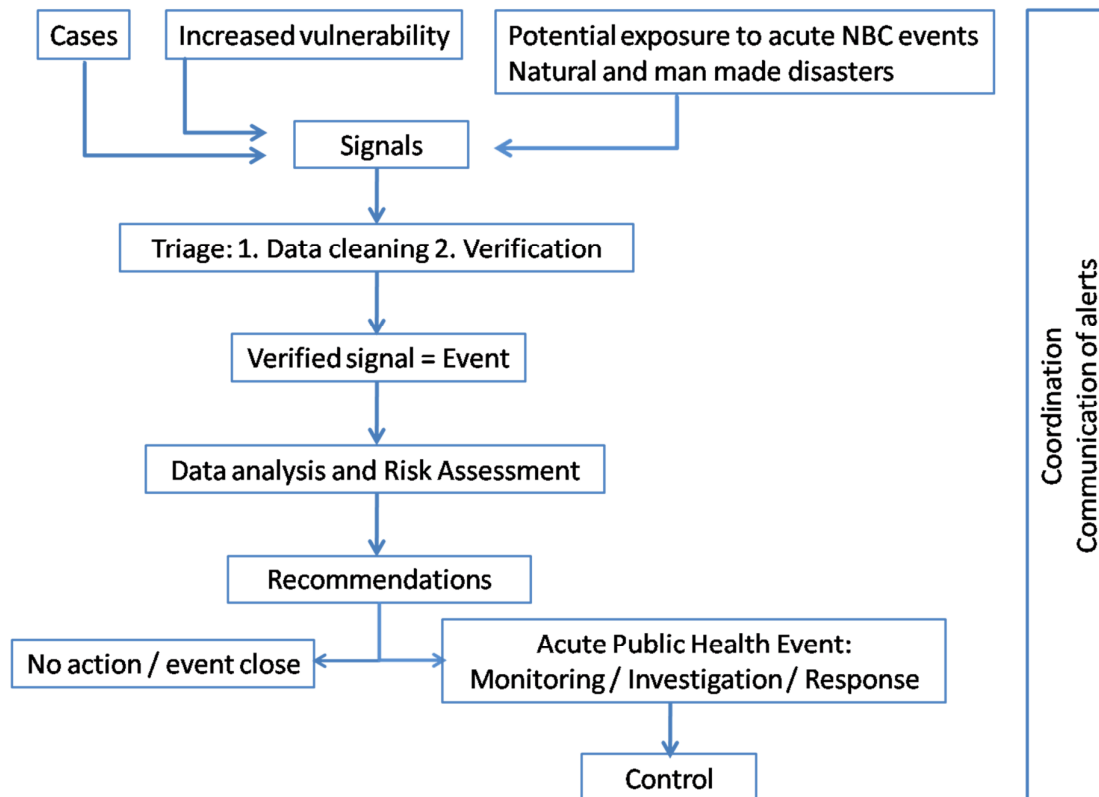
Figure 5:

A media article about a suspected cluster of cases of haemorrhagic fever is classified as “event-based”, “syndromic”, and haemorrhagic“aggregated”.



## **Steps between the provision of information in the field and its treatment by the surveillance system**

Figure 6: Steps for data collection, verification, analysis and assessment



Information collected by indicator-based or event-based surveillance may consist in the report of cases or deaths (individual or aggregated), potential exposure of human beings to biological, chemical or radio-nuclear hazards (i.e. health related events), occurrence of natural or man-made disasters (which may represent as well a potential acute risk to human health). Increased vulnerability of the population like shortages of vaccine may also potentially be a threat to human health. Once collected by the EWAR system, this information is called “signal”.

The next step consists in triaging the information to eliminate hoaxes and false rumors. The process of triage starts with data cleaning (eliminating duplicates, correcting obvious mistakes) and is followed by the verification of the information. The verification consists in actively cross checking the validity of the information, by contacting the original source and additional sources, and eventually asking for additional / complementary information. Once the signal has been verified, it is called an “event”.

In the next step, event related data are analysed and the event risk assessment is performed. The risk assessment helps estimate the potential public health impact of the event on human health and its probability of extension (for health events, i.e. spread of an outbreak) or development into humans (for health related events, i.e. zoonotic event transmitted to humans).

Based on the results of the risk assessment, recommendations are made either to close the event (i.e. there is no estimated immediate risk to human health, no action needed) or to consider the



event as an “acute public health event” that requires daily monitoring, further investigation and/or immediate public health response with an objective of control.

Active coordination and communication with data providers and partners are ongoing throughout the different steps. Depending on the nature of the event and the methods of control, messages of “alert” may need to be developed and communicated, including to the public.

### **Sources of information contributing to Event-Based Surveillance**

EBS requires a multi-sectoral approach and should rely on sources of information beyond traditional health data.

These sources can be directly linked to human health (e.g. poison centers, drug sales) but data can also be provided by the non-human health sector such as environment (contamination of the environment, air pollution, temperatures, etc.), animal health (epizooties), or industry (contamination of products).

Main issues are the access to these sources – including collection and transmission of data - and the implementation of a process for verifying data provided.

To feed the surveillance system with information collected from these sources,

- there is a need to build trust and credibility with sectors in charge of them;
- collaboration must be formalized at the political level;
- mechanisms for information sharing should be established
- exchange of technical staff should be organized.

Additional sources that can contribute to EBS are local communities, schools, and media:

#### ***Use of local communities for EBS***

Community is defined as members of the public or non-health workers, such as community leaders, volunteers, teachers, or police. Distinction must be made between urban and rural communities.

Small amounts of money (10 US\$/month in Thailand) can be allocated to compensate for time. In Albania, feedback is provided to review performance.

Information collected is related to direct human health issues but it can also be animal deaths, air pollution, flooding, etc.

In Thailand, a cluster is two or more cases of epidemiologically linked diseases; 8 events are under surveillance. Case definitions are not very precise and refer to “abnormal” or “increasing” numbers of cases.

Reporting flow depends on the country context. In Thailand, community members report through local health facilities. In Morocco, there is a hotline (free) for reporting floods.

#### ***Use of school absenteeism for EBS***

This requires the building of bridges between the Health and Education sectors. Involvement of educators is also used for health education purposes.

Information may be collected either actively or passively using systematic mechanisms or on an ad hoc basis.

In Lebanon, the population concerned is that of 6-15 year-old children. When the percentage of absentees is higher than 8%, an alert is produced and an investigation is conducted.

The denominator needs to be clearly identified. Is it the class, the grade or the school ?

In Lebanon, this method was implemented 4 years ago. However, it did not allow detection of an outbreak before the health system.

### ***Use of media and global tools for EBS***

Media are an important source of information for EBS. Newspapers can be scanned manually or through automated internet-based systems such as GPHIN. Radio, TV and hotlines can also be used as sources of information.

The critical issue is the selection i.e. the triage of relevant information. Even though, in theory, access to information available on internet is “relatively easy”, practical implementation is, indeed, very challenging. The main hurdles are:

- The huge volume of information to be treated;
- The amount human resources and expertise needed to carry out this task;
- The significant level of duplication prevailing (main events are systematically monitored by several organizations);
- The lack of international collaboration.

These findings are taking place against a background where the already limited resources devoted to public health, in general, and EBS, in particular, are shrinking. Conversely, needs are constantly increasing, in terms of early detection, but also in terms of travel advice (that requires the same type of information).

In this context, it is essential that strategy should focus on optimizing overall and regional cooperation. In particular, this enhanced collaboration must address the following points:

- To develop solutions to allow countries and stakeholders to access information already triaged by other stakeholders;
- To facilitate countries/stakeholders’ access to major EI tools;
- To support countries to meet their uncovered EI-EBS needs,

The lack of triage information sharing is seen as the main cause of unnecessary international duplication.

EI processed information is not optimally used. The same information might not have the same significance or level of importance if considered at the global, regional, national or even regional levels. Hence, information that has already been treated should be widely shared to allow countries/stakeholders to assess it while taking into consideration their own needs and objectives.

The very “shy” position of WHO in this process is clearly underlined:

- WHO should take a leading role in coordinating the collection, the organization, and the dissemination of EI raw information;
- WHO should also be more involved in EI and EBS capacity building;
- The involvement of WHO in events verification is perceived as essential, but WHO’s limited information sharing is deplored: information posted on IHR-EMS or GAR website represents only a very small subset of the events verified by WHO; the need for WHO to safeguard confidentiality is clearly recognized but genuine confidentiality issues would explain only a part of the discrepancy between number of verified events and effectively shared information. Before the implementation of IHR, similar confidentiality issues prevailed. Yet, much more information was shared by WHO through the outbreak verification list (OVL). It was therefore recommended considering the resuscitation of the OVL or of an OVL-like support.

### ***Use of electronic resources for Event-Based Surveillance***

The role of IT tools is to facilitate the management of events: detection, validation, analysis and response. Functions expected from electronic tools are data entry, data management and data localization (GIS).

Standards of data management must be developed through partnerships, taking into consideration best practices and interoperability of systems.

Reporting of events should be developed through a classification system that could be similar to the International Classification of Diseases (ICD).

Relevant events and type of expected outputs must be clearly identified; indicators for these events should be relevant, useful, informative, and feasible.

IT tools could facilitate provision of information for surveillance by communities.

### **Developing guidance on Event-Based Surveillance**

#### **Proposed title for the guide:**

Implementing Event-Based Surveillance for early detection and assessment of public health events: a practical guide

#### **General remarks:**

The guideline will be practical, simple and develop applicable and useful recommendations to help countries implement their EBS system.

Existing guidance on surveillance will be taken into consideration, links will be established where appropriate and care will be taken to ensure that no conflicts arise with other WHO departments or international agencies.

Revision of the unpublished WHO EWAR guidelines should be abandoned but its content will be used in the guidance on EBS that should be developed in the perspective of improving early detection of public health events for providing rapid response.

It will be brief (maximum 50 pages + annexes).

It will be a collaborative exercise, engaging partners beyond the public health community such as clinicians, veterinarians, journalists as well as communities and NGOs.

### **Proposed content of the guideline**

- Glossary
- Introduction / Background
  - Rationale
  - Scope / Target audience
  - Objectives
- Surveillance context
  - Surveillance for programmatic management vs for outbreak early detection and response
  - Epidemic intelligence
  - Syndromic vs disease specific surveillance (with examples)
  - Individual case vs aggregated cases (with examples)
  - Indicator based vs Event-Based Surveillance (with examples) – EBS as a complement of IBS – EBS as a tool to improve early detection / strengthen early warning capacity
- Country self-assessment of capacities for early detection of public health events (with examples)
  - Defining needs
  - Setting objectives
  - Drawing an action plan
- Implementing / Practicing Event-Based Surveillance
  - Detection
  - Triage / Filtering
  - Verification / event characterization
  - Risk Assessment
  - Communication to partners and the public
  - Response
- Resources needed for the implementation of EBS (with examples)
  - Communication and IT (with examples)
  - Human resources
  - SOPs
  - EBS platform / “unit”
  - Partnership
- Challenges and opportunities
  - Preventing failures when implementing EBS
  - Monitoring and evaluation – Drill exercises

### **Implementation of the guidance**

The guidance will be developed by WHO and provided to countries for field implementation. The specificity of this guidance is that its implementation requires contributions beyond the public health community. Clinicians, veterinarians, community leaders, etc. need to be involved.

Different types of contribution are expected:

- Technical: regional and subregional networks, WHO collaborating centres, NGOs
- Financial: funding agencies
- Political: WHA resolutions, diplomatic and peer pressure

Before implementing EBS, countries will assess their actual capacities for early detection and assessment of public health events with the support of WHO and in the context of IHR core capacity assessment. This exercise will include a nationwide mapping exercise of all public health hazards and an inventory of resources, tools and methods available at country level. Guidance will be adapted and implemented according to country needs.

If needed, translations will be done. Tutorial/educational and training materials/academic programmes will be developed (drill exercises).

### **Next steps**

The guideline on the implementation of EBS will be developed by WHO.

A working group made up of participants in the technical consultation and representatives from WHO regional offices will be established. Terms of reference for this working group will be to complement literature, to review all sections of the first draft, and to propose examples.

Working group members but also additional individuals with specific expertise will be allocated specific sections of this first draft to review.

The second draft will be sent to selected countries for peer review. Thailand, Brazil, Nigeria, Cameroon, or Morocco are potential candidates.

A meeting including the six WHO Regional Offices representatives, experts, partners, NGOs, and potential donors will be organized in order to: share the guide draft and the peer review results; ensure that the guidance is simple, useful, and applicable; decide how the guidance will be pilot tested and implemented; identify “champion” countries and supporting agencies. Initial plans were to organize this meeting in July 2013, but it will be most likely organized after September 2013.

The final draft will be released by December 2013.

## **6. Conclusion**

This first technical consultation on event-based surveillance brought together participants with expertise in surveillance and experience in the use of non-traditional sources of information that can contribute to public health surveillance.

A literature review has shown that articles or documents describing elements that could be used for event-based surveillance exist, but that simple guidance describing EBS and providing support for its implementation is needed.

The consultation enabled terminology to be clarified: it was noticed that the same terms can designate different concepts or that, on the contrary, a same concept is designated by different terms. Guidance on EBS will require a chapter on definitions for surveillance.

EBS contributes to early warning; its description and the process for its implementation must be treated integrally with other components of surveillance, specifically EWAR.

Following this consultation, we will develop draft guidance on EBS to be endorsed by all WHO Regional Offices during a meeting that will be organized in September 2013.

## **Annex 1- Agenda**



### **Technical Consultation on Event-Based Surveillance**

**Lyon, France**

**19-21 March 2013**

#### **Objectives**

To initiate the development of a guidance document which will aim at:

- Defining the terms used for surveillance under IHR
- Identifying the different functions related to event-based surveillance (e.g. media screening, community based information)
- Proposing procedures for the acquisition and maintenance of these functions

#### **Expected outcomes**

- Identification of the content of the guidance document
- Timetable for the development of the guidance document
- Creation of a working group

<b>Day 1 - Tues19 March</b>	<b>Agenda Item</b>	
<b>INTRODUCTION</b>		
<b>9:00 – 10 :15</b>	Opening remarks and welcome message Background and expected results Self-introduction of participants Election of chair of the meeting Administrative announcements	Stella Chungong  Pierre Nabeth
<b>SURVEILLANCE AT NATIONAL LEVEL</b>		
<b>10:15 – 10:25</b>	Overview of national surveillance systems	Gerardo Priotto
<b>10:25 – 10:35</b>	EWAR functions of surveillance systems	Dominique Legros
<b>10:35 – 10:45</b>	Discussion on EWAR and Surveillance	All
<b>10:45 – 11:00</b>	<i>Coffee break</i>	
<b>11:00 – 11:15</b>	Surveillance functions as required by IHR – Identified gaps	Stella Chungong
<b>11:15 – 11:30</b>	Need for development of guidance on event-based surveillance – Review of existing documents	Pierre Nabeth
<b>11:30 – 11:45</b>	Surveillance strategy in the WHO-EU Region	Dennis Faix
<b>11:45 – 12:15</b>	Discussion on Surveillance under IHR	All
<b>12:15 – 12:30</b>	Event-based surveillance – ECDC vision	Pasi Penttinen
<b>12:30 – 12:45</b>	Event-based surveillance – CDC vision	Ray Arthur
<b>12:45 – 13:45</b>	<i>Lunch</i>	
<b>13:45 – 14:00</b>	Event Management - WHO	Johannes Schnitzler
<b>14:00 – 14:15</b>	Contribution of animal health surveillance to human health surveillance	Stéphane de La Rocque
<b>14:15 – 14:30</b>	Discussion on activities and support provided by WHO and partners	All

DESCRIPTION OF EXISTING EVENT-BASED SURVEILLANCE (EBS) FUNCTIONS		
14:30– 15:30	Country presentations <ul style="list-style-type: none"> <li>- Lebanon</li> <li>- Iran</li> <li>- Pacific</li> <li>- Albania</li> <li>- Turkey</li> <li>- Mexico</li> </ul>	Nada Ghosn Payman Hemmati Yvan Souares
15:30– 15:45	<i>Coffee break</i>	
15:45 –16:45	Discussion – components/functions/methods/source of event-based surveillance	All
16:45– 17:15	Taking the pulse – some suggestions, what can be improved etc.	All
<b>Day 2 - Wed 20 March</b>	<b>Agenda Item</b>	
09:00 – 09:10	Wrap up Day 1	
09:10–10:00	Country presentations <ul style="list-style-type: none"> <li>- UK</li> <li>- France</li> <li>- Thailand</li> <li>- Morocco</li> <li>- Moldova</li> </ul>	Mike Catchpole Philippe Barboza KumnuanUngchusak Majdouline Obtel StelaGeorghita
10:00 – 10:15	<i>Coffee break</i>	
10:15– 11:15	Discussion – components/functions/methods/source of event-based surveillance	All
11:15 – 13:00	Museum Visit (Lunch)	All



<b>DEFINITION OF TERMS USED FOR SURVEILLANCE UNDER IHR</b>		
<b>13:00–15:00</b>	Definition of terms	Group work
<b>15:00 – 15:15</b>	<i>Coffee break</i>	
<b>15:15–16:00</b>	Revision and finalization of the definition	Group work
<b>16:00 – 16 :30</b>	Presentation of definition and consensus building	All
<b>16:30 – 16:45</b>	Taking the pulse – some suggestions, what they think, what can be improved etc.	All

<b>Day 3 – Thu 21 March</b>	<b>Agenda Item</b>	
<b>09:00 – 09:15</b>	Wrap up Day 2	
<b>COMPONENTS ADDRESSED BY EVENT-BASED SURVEILLANCE</b>		
<b>9:15 – 10:00</b>	Identification of functions to take into consideration	Group work
<b>10:00–10:45</b>	Identification of EBS Functions - Plenary	All
<b>10:45 – 11:00</b>	<i>Coffee break</i>	
<b>11:00 – 11:45</b>	Procedures for the acquisition and maintenance of EBS functions	Group work
<b>11:45–12:30</b>	Acquisition and maintenance of EBS Functions - Plenary	All
<b>12:30 – 13:30</b>	<i>Lunch</i>	
<b>13:30 –15:00</b>	Critical elements to consider for developing guidance on EBS	All
<b>15:00 – 15:15</b>	Coffee break	
<b>15:15–15:45</b>	Next steps	All
<b>15:45– 16:00</b>	Conclusions and Closure of the meeting	All

## **Annex 2 - List of participants**

### **Dr Ray R. Arthur**

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## **Annex 3 - Definitions: Contributions of participants before the consultation**

### **a. Signal / Alert**

#### **Different concepts**

##### **Signal:**

- Information that needs to be analysed in order to determine if it is the indication of an abnormal event
- Something suggesting a possible problem
- Information that arises from one or multiple sources, which suggests a new potentially causal, or a new aspect of a known event, either adverse or beneficial. This signal can be direct information or information analysed to determine a potential event.
- Useful information.
- The signal may be normal or abnormal. If abnormal, it is an alert.
- Semantically, these two words look synonyms, however conceptually they are different: A signal is information produced as a result of raw data analysis while the alert is issued when the defined threshold level is reached.

##### **Alert:**

- **The first notification that a public health event with adverse consequences may occur or may be occurring. (WHO)**
- Event that after verification is considered as abnormal
- An alert is issued after verification, when a public health event is confirmed
- Result of a decision
- Alert in surveillance must be a public health confirmed or should be the critical number of cases (indicator, epidemic ratio, etc.) that is used to sound an early warning to respond to an epidemic.
- Event: an alert which has been verified.

#### **Close concepts, with different application or no difference:**

- Signal: information which tells people of something is happening. It can be both good news and bad news. Alert: something which inform people that abnormal phenomenon happens. For Surveillance, alert should be used.
- No difference, alert simply sounds better
- Alert, signal, and threat are all the same word in Turkish: any initial indication (unverified) of an acute public health event.
- Report to EWAR of any suspected acute public health event (also called “signals” in some documents). Alerts must first be verified and assessed for their risk to human health. A verified alert becomes an “acute public health event” if it presents a potential immediate risk for human health

#### **Other close concept (ECDC):**

**Noise:** Random, unuseful, information.

## **b. Threat / Risk / Hazard**

### **Different concepts**

- Risk is the likelihood of the occurrence and the likely magnitude of the consequences of an adverse event during a specified period. (WHO, 2012)
- Risk is not the same concept as threat and hazard: it is the probability of occurrence and the likely magnitude of impact of an adverse event during a specified period.
- Risk is probability of something to happen. It can be good or bad.
- Risk is a combination of the consequences of an event (hazard) and the associated likelihood/probability of its occurrence.
- Risk is the probability that an event will occur, e.g., that an individual will become ill or die within a stated period of time or by a certain age. Also, a non-technical term encompassing a variety of measures of the probability of a (generally) unfavorable outcome.
- Public health risk is the probability of a verified alert resulting in negative consequences for public health and affects the health of human populations. The public health risk is estimated by the risk assessment.
- The term "Risk" is a factor which is positively associated with a disease or condition (outcome) but is not sufficient to cause that e.g. smoking is a risk factor for cancer but is not sufficient to cause cancer and other factors like genetic ones are also necessary.
- Hazard is a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.
- A hazard is an agent that has potential to cause adverse health effects in exposed populations. A hazard is a potential source of danger
- Hazard has mainly been used for chemical or physical risks at the environmental level which are more distal in the hierarchy of causation and are indirectly associated with outcome.
- Threat is a public health event. A public health event is an outbreak, or cluster of disease or an unusual health-related event, which might have public health consequences.
- Threat is a person or thing likely to cause damage or danger. A real or perceived danger.
- Threat is applied when the risk is very high to cause an outcome. When the risk factor is very imminent to outcome (proximal in the hierarchy of causation), it can be considered as a direct cause or "Threat".

### **Same or close concepts**

- Minor differences that might make sense only for English native speakers. No need to take into consideration these differences.
- For surveillance purposes, threat and hazard should be treated as synonyms and use only one of them. I prefer Threat, because it translates better in the languages I know.
- Threat and Hazard is similar. Something that can cause problem, danger to health.
- They are different but more from the perspective of disciplinary orientation: Risk is a traditional epidemiological concept.
- Hazard has connotation of poisoning with chemical, toxins, or exposure to radiation.
- Threat is a word with no particular home; I think the word is also often used very loosely to mean danger of any kind, health or otherwise e.g. public health threats
- Something that can cause danger to health. There are some differences between risk and the 2 other terms: Risk is often used epidemiological concept probability of something to happen. Threat and Hazard is similar. Hazard is often used of poisoning with chemical, exposition to radiation, etc
- Hazard is the inherent capability of an agent or a situation to have an adverse effect. A factor or exposure that may adversely affect health. Loosely, in lay speech a synonym for Risk; in epidemiology, a similar concept to Risk Factor.

**Other close concept (ECDC):**

Event: A signal which indicates a potential public health event.

**c. Indicator-based surveillance / Case-based surveillance**

**Different concepts**

- Both imply a regular and systematic organized collection of indicators /data, but
  - . Case base surveillance is more restrictive and covers only strictly medical indicators related to a number of patients and exclude other non-medical indicator based surveillance
  - . Indicator based surveillance has a larger definition it included case-based surveillance, non-medical surveillance i.e. the regular and purposively organized collection of non-medical indicators (e.g. temperature, drug consumption, absenteeism)
- In a formula: Indicator-based surveillance = Case-based surveillance + non-case-based surveillance (indicators reflecting other parameters such as meteorological, absenteeism, internet activity, etc.)
- IBS is the routine reporting of diseases or syndromes; CBS is the monitoring of suspect/confirmed cases responding to the case definition.
- CBS is part of IBS. The only difference is that CBS focuses on a case and seeks more variables and information on that one particular case identified.
- Different concepts linked to collection of indicators/data: IBS is the reporting indicators medical or non-medical. Case base surveillance is restrictive to medical indicators related to a number of cases (example: suspect/confirmed cases responding to a case-definition).
- Indicator based surveillance deals with numbers and can from historical data built expected figures that can be compared with the observed figures. Indicator-based can include case-based reporting (reporting every case with needed data) or aggregated-based reporting (reporting number of cases)
- Some text has divided indicator-based surveillance to two parts: syndromic and case-based surveillance; Case-based surveillance is a synonym of routine disease surveillance, where maximum data set (epidemiological and clinical information) is gathered from a suspect case. In the meantime he/she is sampled to get laboratory information.

**Same or close concepts**

- Indicator-based surveillance and case-based surveillance is used interchangeable. I prefer the term case-based surveillance which mean the collection of disease information of individual case, analysis, interpret and consider to take action.
- Case-based surveillance (case-based, indicator-based and routine surveillance are all the same in Turkish) provides alerts from within the health system.
- The on-going routine collection, collation and analysis of data to reduce the incidence and prevalence of communicable diseases. Includes clinical and laboratory notifications of disease, mortality surveillance and syndromic surveillance, as well as other similar systems. (no use of CBS)
- Case-based surveillance consists of the collection and analysis of morbidity and mortality data on epidemic-prone priority diseases based on the reporting of unusual disease patterns by health care providers and laboratories. Case-based surveillance requires any contact of the patient(s) ("case") with the health care system and focuses on a list of epidemic-prone priority diseases / syndromes to be reported by health care providers or laboratories. For diseases of this list, all health care providers and all laboratories must report immediately any unusual disease occurrence or any unusual disease pattern. The reporting system may also be automated and real time.

IBS is the routine collection of pre-defined information about diseases<sup>10</sup> using case definitions (e.g. weekly surveillance of cases of acute flaccid paralysis). There are often predetermined outbreak thresholds for alert and response. (WHO)

#### **d. Event-based surveillance / Syndromic surveillance / Non-specific surveillance**

##### **Different concepts**

##### Event-based surveillance

- Is the organized and rapid capture of information about events that are a potential risk to public health, reported through formal or informal channels. This information can be rumours and other ad-hoc reports transmitted through formal channels (i.e. established routine reporting systems) and informal channels (i.e. media, health workers and nongovernmental organizations reports), including (1) Events related to the occurrence of disease in humans (e.g. clustered cases of a disease or syndromes, unusual disease patterns or unexpected deaths as recognized by health workers and other key informants in the country); and (2) Events related to potential exposure for humans (e.g. diseases and deaths in animals, contaminated food products or water, environmental hazards) including chemical and radio-nuclear events (WHO-WPRO).
- The organized and rapid capture of information about events that are a potential risk to public health (WHO).
- Is the ad hoc detection and interpretation of unstructured information originating from multiple not predetermined sources already available in networks and the Internet.
- Is capturing abnormal health event for the purpose of early detection and response. Event-based Surveillance doesn't need detail of individual case at the beginning but rather some idea of what has happened and is it abnormal.
- Detection/monitoring of unusual disease or proxy
- 'Event' includes include public health issues beyond the clinical realm e.g, chemical spillage
- Event-based surveillance provides alerts from outside of the health system, including from media monitoring, rumors, other sectors, etc. (in practice there is sometimes overlap between CBS and EBS)
- Detection and analyzing of unusual and unstructured data from multiple not determined sources.
- The ongoing routine monitoring, collation and analysis of clusters or outbreaks of disease or unusual disease patterns or events through professional or lay communication, operational communication tools, rumors or news.
- The opposite of the indicator based. It includes all sources of information that are integrated within a systematic indicator-based surveillance.
- Event-based surveillance is aimed at early detection of any unusual acute health event or health-related event. It consists in the detection and interpretation of unstructured information originating from multiple, not predetermined and non-health care related sources. , including rumors and other ad hoc information. Events include those related to the occurrence of disease in humans and animal zoonosis cases (?) and those related to the potential exposure to infectious, chemical or radio-nuclear agents among humans.

##### Syndromic Surveillance

- Is a component of indicator-based surveillance (and case based surveillance). It consists in the regular collection of indicators. Cases are classified according to their syndromic presentation as opposed to final diagnosis
- Is a component of case based surveillance, where cases are defined by a syndromic presentation without a specific disease label.
- Can be case-based surveillance but instead of giving specific diagnosis, health personnel can just give diagnosis by syndrome. This is particular useful during disaster
- Detection/monitoring of a (combination of) clinical sign and syndrome.
- Syndrome is more on the clinical context when one reports based on clinical features only.
- Collecting and monitoring cases using predefined syndromic signs.
- Type of indicator based surveillance, where cases are defined based on clinical syndromes without any laboratory testing.

- A method of surveillance that uses routinely available data (sometimes in real time) and case definitions that are based entirely on clinical features, before their clinical or laboratory confirmation, in order to detect outbreaks earlier than would otherwise be possible with traditional methods
- Syndromic surveillance for early outbreak detection is an investigational approach where health department staff, assisted by automated data acquisition and generation of statistical signals, monitor disease indicators continually (real-time) or at least daily (near real-time) to detect outbreaks of diseases earlier and more completely than might otherwise be possible with traditional public health methods (e.g., by reportable disease surveillance and telephone consultation). The distinguishing characteristic of syndromic surveillance is the use of indicator data types.
- Syndromic surveillance is generally meant to refer to the monitoring of the frequency (e.g., the number or rate of episodes) of illnesses with a specified set of clinical features (e.g., fever and respiratory complaints, vesicular skin rashes, diarrhea, etc.) in a given population (e.g., members of a health maintenance organization, residents of a given geographic region, etc.), without regard to the specific diagnoses, if any, that are assigned to them by clinicians.
- In syndromic surveillance, there are 3 types of data: clinical data, non-routine health data, and non-health (or non-clinical) data. The second and third components of syndromic surveillance are actually Event-Based Surveillance (EBS).

#### Non-specific surveillance

- Component of indicator-based that includes syndromic surveillance plus other non-medical surveillance e.g. structured drug consumption surveillance
- Linked to an increased risk (e.g. abundant pop of vectors)
- Perhaps does not exist.
- Component of indicator-based on unusual and unstructured data.
- Surveillance of events which are not necessary related to human health!

#### **Close concepts**

- Syndromic surveillance and non-specific surveillance are the same and are used instead of each other in epidemiological texts.

#### **Close concepts ?**

- As a form of public health surveillance, syndromic surveillance is the ongoing, systematic collection, analysis, interpretation, and application of real-time (or near-real-time) indicators for diseases and outbreaks that allow for their detection before public health authorities would otherwise note them. Syndromic surveillance is distinguished from other methods of surveillance by the data types that are monitored as potential indicators of a disease or outbreak... syndromic surveillance for a bioterrorist-related outbreak is a new concept that emphasizes timeliness and applies automated analysis and visualization tools to screen nonspecific indicator data in electronic form so as to detect unexpected patterns that warrant investigation. The advantage of syndromic surveillance is the lead-time it provides public health authorities to take more effective public health actions. What syndromic surveillance allows is not necessarily earlier diagnosis per se but the ability to mobilize public health investigation and response capabilities before disease and outbreak confirmation

#### **e. Risk assessment / Analysis / Evaluation**

##### **Different concepts**

##### Risk Assessment:

- **A systematic process for gathering, assessing and documenting information to assign a level of risk to human health to a verified alert. Risk assessment includes three components: hazard assessment, exposure assessment and context assessment. (WHO)**
- Evaluation of the risk based on the available information and action-oriented
- Aims to identify potential changes in characteristics of diseases and their risk factors in a given area. :
- Does this event have probability to cause severe health damage?



Analysis:

- More academic, based on data of various nature
- As a standalone word simply means that, 'to analyse whatever data you have'. Otherwise if you add words to it e.g. situation analysis, then the meaning is closer to Risk assessment.
- Related to data, for descriptive purpose (disease, time, place, person) or analytic purpose (association between disease and exposure)
- The process of a rapid initial assessment of a public health event. Should ideally contain all rapidly available information on the epidemiology (time, place, personal characteristics), factors related to transmission and a description of the context.

Evaluation:

- Risk evaluation is the French translation for risk assessment
- Evaluation should mean assessment of performance processes put in place for an intervention, and of outcomes and impact of an intervention. Any other use of the word 'evaluation' outside of these three specified is perhaps not so honest
- Related to systems, like evaluation of surveillance systems, of control programs...

The process of risk management has two parts:

- Risk Assessment. The process of estimation of the magnitude of a particular risk or the scientific quantification of risk through analysis of existing data.
- Risk Evaluation. The judgment about how important to us the risk is. The social and political judgment about the importance of a risk faced by the individuals and communities. This involves trading off the results of risk assessment against potential benefits and also includes balancing scientific judgments against other factors and beliefs.

**Same or close concepts**

- In other context they would have very different meanings but in the context of surveillance (both indicator and event-based) they all 3 refer to the same process i.e. determining if the detected signal is usual/normal vs unusual/abnormal.
- Differences are minors:
  - o Analysis refers more to the first stage: is the detected even usual
  - o Evaluation could refer to both stage
  - o Risk analysis: refers more to the last stage of the process implemented ie once an event has been assessed as "unusual"
  - o Assessment and analysis and evaluation are totally different for individual word. However it is quite similar when we use it in combination with the term risk. People often use the term risk-assessment, risk analysis and risk evaluation. I think the term Risk assessment is better.
  - o Risk assessment (assessment, analysis, evaluation are the same in Turkish): the systematic appraisal of collected information to determine the risk to public health - this is a dynamic process.

**2. Which of the following terms would best describe the elements that should be integrated into EBS?**

**Function / Component / Method /Source**

- Component x 2
- When thinking of "elements integrating a whole", the word Component seems appropriate; when thinking of "alternative ways to detect events", which "may or may not be adopted in a country" the word Method seems more appropriate.
- Not quite understand the question. Do you mean when we described the term Event-based surveillance, what are the key information to make people understand it. If so the term should include: What is the purpose of EBS? What can be the source of EBS? Timely verification mechanism. Action and feed back to the source.

- Function: If meaning : the clear chain of actions; Component If meaning: the network to be in place to ensure rapid detection and reporting method If meaning: SOP and thresholds for the alert and report
- All these surveillance related terms apply to EBS, EBS being a type of surveillance
- if the question refers to which aspects would need to be included in guidance for EBS, I would think all are necessary parts.
- Function, to complement the Indicator-based surveillance system, to be able to collect alerts from the community; Method, for regular screening; Source, to refer to official and not official, media and professional

### **3. How would you define these words?**

#### **k. Biosurveillance**

- Increasingly used, biosurveillance is the overall concept integrating both event-based and indicator-based surveillance. It encompasses the processes data collection (formal, informal) analysis risk assessment, the tools (e.g. biosurveillance systems utilizing complex algorithms, traditional epidemiological surveillance, notification reporting etc). Provides a good alternative to “surveillance”. The word surveillance is now ambiguous although it should theoretically cover the whole scope; it is too connoted “classical indicator-based epidemiological surveillance”. Well adapted to complex experts systems : more adequate than Epidemic intelligence or medical intelligence systems.
- A process of systematic and continuous gathering, analyzing, interpreting, and communicating information that might relate to health threats to humans, animals, or plants.
- Collection of laboratory testing on human specimens or micro-organism for surveillance purpose.
- A type of environmental surveillance with emphasis on biohazards
- Emerging terminology (used mainly in the US), which in my opinion could be used interchangeably with “Epidemic Intelligence”. Consists of both “indicator-based surveillance” and “event-based surveillance”. Might be a useful term to use in multi-sectoral or multi-disciplinary settings, to distinguish from other, non-health related forms of “surveillance”.
- In my opinion Biosurveillance means, a process of monitoring related health Risk including environmental risk.
- Surveillance related to microbiological agents
- Process of gathering, integrating, interpreting, and communicating essential information that might relate to disease activity and threats to human, animal, or plant health. For the public health professional, biosurveillance activities range from standard epidemiological practices to advanced technological systems, utilizing complex algorithms.
- Process of gathering, integrating, interpreting, and communicating essential information related to all-hazards threats or disease activity affecting human, animal, or plant health to achieve early detection and warning, contribute to overall situational awareness of the health aspects of an incident, and to enable better decision making at all levels.
- Biosurveillance is the overall concept integrating collecting analyzing and interpreting any available information in relation to any health related threats for humans, animals or plants. It integrates standard epidemiological data collected by health-care structures and unstructured non-medical information (including rumors) collected through event-based surveillance. Biosurveillance integrates the data collection processes, analysis and risk assessment.
- Biosurveillance is a process of gathering, integrating, analyzing, interpreting, and communicating essential information that might relate to disease activity and threats to human, animal, or plant health.

#### **l. Community based surveillance**

- Component of indicator based surveillance mostly based on syndromic surveillance: Regular and structured collection of well identified syndromes from the community (non-medical source)
- Systematic and continuous collection of data on defined syndromes by community actors without medical training.

- Surveillance process by the community in addition to surveillance from health service units.
- Surveillance conducted by the primary health care workers or even below at the community level
- Use of community members as sources of surveillance data (though one wonders whether expansion of surveillance to include community members should in itself constitute a separate surveillance system)
- Indicator or event-based surveillance with a special focus on community involvement.
- Might involve specific training or advocacy in communities, volunteer participation in the reporting system or evolving “crowd-sourcing” methodologies.
- Type of surveillance using community actors must be volunteer participation in the reporting system with a continuous collection of defined syndromes data.
- Source of information comes from the community: via the municipalities, schools, public
- Means the detection and reporting of diseases from the community usually by local people, health volunteers or leaders who have received basic instruction on how to recognize certain conditions e.g. 14 clinical syndromes. Simply put, if community-based surveillance is supposed to assist public health, it must be based on clearly identified needs and well-defined reportable syndromes.

#### **m. Epidemic intelligence**

- Epidemic intelligence consists of the ad hoc detection and interpretation of unstructured information originating from multiple not predetermined sources already available in networks and the Internet: it may be unverified rumors from the media, reliable information from official sources and classical surveillance systems. Epidemic intelligence is a process that includes a formalized protocol for event selection, verification of the genuineness of reported events, searches of complementary reliable information, analysis and communication
- Organized and systematic capture of unstructured information from multiple sources for the early identification of potential health threats.
- Critical information related to outbreak which is essential for a successful control.
- Never heard this
- Same as early warning system
- The process to detect, validate, analyse, document, monitor and communicate on events that may represent a threat to public health. It consists of analyzing and assessing both “indicator-based surveillance” and “event-based surveillance”.
- Detection, verification and analysis of unstructured information from one or multiple sources for the early identification of potential health problem. Need a structured networks system.
- Surveillance system gathering information from outside the frontiers.
- The process of detecting, verifying, investigating, analyzing, assessing the alerts that may represent a threat to public health. Activities aimed at prevention, protection against, and control of biological, chemical and radiological risks, or the public health impact of terrorist attacks, natural disasters, and wars (complex emergencies). A government body should be engaged in collecting secret or sensitive information related to epidemic outbreaks. I think this term is set for differentiating between public health surveillance and other types of surveillance used by other sectors like military surveillance, police surveillance, etc.

#### **n. Medical intelligence**

- Medical intelligence and Epidemic intelligence are in fact the same concepts. Although inappropriately, sometimes epidemic intelligence is more used to refer to infectious events only. For that reason some prefer to use medical intelligence that more clearly encompass also non infectious events (drugs, product contamination, environmental ...
- To me it seems restrictive and out of focus in the context of public health surveillance.
- Information that is essential for successfully treating a patient?
- Same as early warning system
- Terminology used mainly in military sector. Overlapping with epidemic intelligence, but includes also understanding of healthcare capacities, and threats and vulnerabilities of target areas/ populations. US DoD and Wikipedia defines as: “That category of intelligence resulting from collection, evaluation,

analysis, and interpretation of foreign medical, bio-scientific, and environmental information that is of interest to strategic planning and to military medical planning and operations for the conservation of the fighting strength of friendly forces and the formation of assessments of foreign medical capabilities in both military and civilian sectors. Also called MEDINT.”

- Medical intelligence is the same concepts of Epidemic intelligence. Medical intelligence is used to refer to other medical events (No-epidemic events).

#### **o. Digital disease detection**

- Process of detecting potential health threats using all potential digital (internet based) sources. Could be a good alternative to Epidemic and Medical intelligence
- Process of detecting disease activity potentially threatening public health by using digital (internet based) sources
- Detection of abnormal in disease occurring and distribution using modern digital technology.?
- Use of technology in disease detection (e.g. alert thresholds programmed in software..)
- Using available electronic and web-based resources for “epidemic intelligence”.
- Detecting disease using modern digital technology
- The use of digital resources (Information Technology) for disease detection. The internet has become a critical medium for clinicians, public health practitioners and lay people seeking health information. Data about diseases and outbreaks are disseminated not only through online announcements by government agencies but also through informal channels, ranging from press reports to blogs to chat rooms to analyses of web searches (Digital Resources for Disease Detection). IT can be used to strengthen both formal routine case-based surveillance and syndromic surveillance including its EBS component.

#### **p. Early warning system**

- **An integral part of an existing public health surveillance and response system, it should allow the early detection of any abnormal/unusual occurrence or event so that the event may be verified and confirmed if applicable and measures for its control implemented in a timely manner. In some cases, this process may initiate an international notification and/or a request for international assistance under the IHR. (WHO-SEARO)**
- System implemented to detect and to notify/report potential threat to the authority in charge of response with the objective to implement appropriate control measures. Early warning systems refers more to the process including communication and regardless to the type of surveillance (all indicator event-based can/should be integrated within EWS)
- A specific procedure capable of detecting and communicating as early as possible any departure from normally observed phenomena which may constitute a potential threat.
- A system which is capable to detect outbreak and give timely alert to responsible authority to initiate control action.
- Organized network, functions, procedures ensuring rapid reporting and subsequent analysis of an unusual event
- A surveillance function with emphasis on immediate notification/early detection of prioritized public health events of interest
- A formalized mechanism of alerting authorities at all relevant administrative levels and sectors in a timely fashion of acute health threats in the biological, chemical, radionuclear or environmental fields. At EU level is organized through an Early Warning and Response System (EWRS), consisting of a network of relevant authorities and a secure information exchange platform.
- We use EWRS to denote the system for Event-based and Case-based surveillance, risk assessment, response, etc., for public health events.
- Structured Process to detect potential event and outbreak and report to in time the authority in charge of response to implement proper control measures. Need a also structured networks system.
- Early warning is the process of systematically identifying public health events in a timely fashion in order to facilitate an appropriate response.
- Detection of alerts that have to be verified if they constitute the early phase of an outbreak

- In disease surveillance, a specific procedure to detect as early as possible any departure from usual or normally observed frequency of phenomena.
- When a public health surveillance system can create an alert in advance of a real outbreak or very early at the beginning of an outbreak through early detection of incidents of a disease or before the occurrence of an outbreak through non-routine health or non-health information, it has the early warning component.

**g. Threat detection**

- Very generic and not specific everything will fall under threat detection
- A term that takes different meanings according to the context.
- Detecting something that is harmful for people health.
- Detection of an identified event seen as a threat
- Given the loose meaning of the word 'threat', in the context of health this expression could have a very general meaning ranging from chemical threats, nuclear threats, etc.
- A key activity of epidemic intelligence which has the objective of identifying rapidly emerging health threats in a fashion timely enough to enable a rapid response. Activities could include monitoring of indicator-based surveillance, early warning systems, media monitoring, proactive contacts with professional networks etc.
- Detecting quickly an emerging health threats
- The result of a functioning Early Warning System is threat detection

**WHO References:**

(WHO- SEARO): *Early Warning and Response to Outbreaks and other Public Health Events: A Guide, 2008.*

(WHO- WPRO): *A guide to establishing event-based surveillance, 2008..*

(WHO): *Rapid Risk Assessment of Acute Public Health Events. 2012.*