# Surveillance


## Summary

- Infectious disease surveillance is a concept of "a series of cycles that take some action based on data collected from the detection of infectious diseases at an early stage."
- Data used for surveillance mainly includes laboratory-based notifications of causes and syndromic notifications of those judged from symptoms accumulated at medical institutions and pharmacies.
- Since many of the developing countries face challenging issues in outbreak "detection," WHO focuses on the detection of outbreak in areas with poor access to health facilities by promoting "event-based surveillance."
- Infection by pathogens with Antimicrobial Resistance (AMR) has a higher mortality rate than the same type of infection without drug resistance, and it is urgent to strengthen AMR surveillance and to research the spread of pathogens.


## Overview

**[Surveillance]**

In general, surveillance indicates "indicator-based surveillance," but "syndromic surveillance" is also conducted in order to grasp the trend of infection before definitive diagnosis. While indicator-based surveillance is a method based on confirmed diagnosis, such as using notifications of definite patients from medical institutions ("Notifiable Surveillance," of which notifications from specified facilities are referred as "Sentinel Surveillance"), syndromic surveillance uses collected information on a patient's symptoms from various information sources such as sales of medicines and absence from schools / workplaces.

Since many of the developing countries have challenging issues in outbreak "detection," WHO focuses on strengthening the capacity on detection of outbreaks by introducing "event-based surveillance." It is said to have advantages in detection of a disease in areas with poor access to health facilities, by utilizing informal information including media reports and rumors from communities.

Table: Global surveillance target pathogen in AMR[2]

| Bacteria | Resistant antibiotics |
|---|---|
| *Escherichia coli* | Third generation cephalosporin |
| | Fluoroquinolone |
| *Klebsiella pneumoniae* | Third generation cephalosporin |
| | Fluoroquinolone |
| *Staphylococcus aureus* | Methicillin |
| *Streptococcus pneumoniae* | Penicillin |
| *Nontyphidal salmonella* | Fluoroquinolone |
| *Shigella* | Fluoroquinolone |
| *Neisseria gonorrhoeae* | Third generation cephalosporin |

**[Antimicrobial Resistance (AMR)]**

In many cases, drug resistance is caused by inappropriate use of antibiotics. Recently, drug-resistant infections[1] have increased in humans and animals, and become a major agenda at G7, the World Health Assembly, etc. Infections caused by drug-resistant pathogens may limit the types of drugs that can be used for treatment, resulting in a higher mortality rate than the same type of infection without drug resistance.

In many developing countries, detection of AMR is insufficient in terms of types of confirmation tests and facilities to conduct tests. Regarding prevention of in-hospital infections, formulation and practice of countermeasures are not enough. The management system of drugs is also an issue, so there is a need to secure antibiotics containing appropriate amount of active ingredients, because of existing inadequate legal regulations on the medical market.

1: Infection outside the medical institution
2: WHO has set seven bacteria listed in the table as global monitoring targets and it is necessary to strengthen its testing capacity.

# Cooperation Policy

**[Surveillance]**

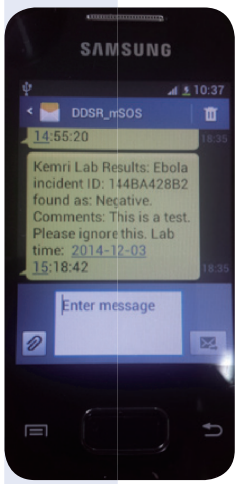
It is important to strengthen the capacity in the surveillance loop (detection, reporting, analysis/interpretation, response and assessment) as a whole, and to provide comprehensive support mainly in Asia and Sub-Saharan Africa, where emerging infectious diseases are likely to occur. Since surveillance capacity is closely related to diagnostic ability in the laboratory, cooperation for laboratory capacity development should be considered. In cases where laboratory networks are not in place, screening of suspected cases at a primary level is key to preventing outbreaks, so interventions that strengthen the clinical diagnosis can be offered. Even when the laboratory network is relatively well maintained, JICA will provide technical support to establish a reporting system, to improve the quality of data and to strengthen the evaluation and analysis capacity. JICA will also focus on support for human resource development, e.g. support to acquire a master's degree in public health related to epidemiology.

**[AMR]**

Antimicrobial Resistance (AMR) (2016 - 2020)" at the Ministerial Conference on Infectious Disease Control in April 2016, and aims at “strengthening Japanese leadership on international policy on drug resistance" and "developing international cooperation in a field of public health and animal health to achieve a global action plan on drug resistance." Based on this, JICA will support strengthening 1) prevention and control of infection, 2) AMR surveillance, 3) diagnosis ability such as drug susceptibility test, 4) proper use of antibiotics on humans and animals, and so on.

Rather than AMR specific support, JICA will incorporate AMR issues into activities as a part of relevant nosocomial infection control, diagnostic capacity development and surveillance system strengthening. Furthermore, since the spread of drug-resistant pathogens is not understood in developing countries, support for research is also prioritized.

# Cases




Message to a mobile phone

Training of outbreak warning system

**[Development of a quick diagnostic kit and an early warning system for yellow fever and rift valley fever (Kenya：2012-2017)]**

In Kenya and African countries, outbreaks of severe mosquito-borne viral infections such as arbovirus infection[3] (yellow fever, rift valley fever, etc.) occur frequently, causing great damage to humans and livestock. This project, with a collaboration between Nagasaki University, Kenya Central Medical Research Institute and Ministry of Health in Kenya, enabled rapid confirmation and diagnosis of diseases by 1) development of a quick diagnostic kit, 2) establishment of early warning system for mass infections, and 3) enhancement of the function of the regional reference laboratory. The inexpensive quick diagnostic kit is currently being prepared for commercialization. In addition, “infectious disease early warning system,” a system that instantaneously gathers information at the central health department using the mobile phone network, is highly evaluated as a system model enabling early containment of the epidemics, and efforts have been made toward nationwide implementation.

# Column

**[One Health]**

In recent years, zoonotic diseases such as highly pathogenic avian influenza, SARS, and Ebola virus disease, are spreading. Approximately 60% of pathogens showing pathogenicity in humans and 72% of emerging infectious diseases that are developed in humans are zoonotic diseases. The concept of “one health,” which recognizes the health of people is connected to that of animals and the environment and builds close cooperative relationships between them to achieve optimal health outcomes, became important.

**[Research project on viral zoonosis in Africa (Zambia: 2013-2018)]**

Hokkaido University and the Faculty of Veterinary Medicine at the University of Zambia collaborated on a viral zoonotic infection that has become a public health problem in Zambia. Ebola virus rapid diagnosis kit was developed utilizing the results of this project that aimed at development/improvement of virus diagnostic method, elucidation of virus survival mode and propagation route, pathogen risk assessment, spread of diagnostic method, and epidemiological information. At the time of the Ebola virus epidemic in May and July 2018 in the Democratic Republic of Congo (DRC), the diagnostic kit was provided free of charge to the National Biomedical Research Institute of DRC.

Work at Laboratory

3: Viral diseases that pass to humans and vertebrates by arthropods such as mosquitoes and ticks.



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