

## 5. Meaning of Infectious Disease Surveillance

The meaning of infectious disease surveillance may be summarized as follows:

- (1) Surveillance of circumstances or appearance of patients
  - a. Utilization of information on prevalence for day-by-day diagnosis and treatment
  - b. Detection of, and response to, new infectious diseases
  - c. Prevalence of infectious diseases, early-phase grip of accumulated data and response
  - d. Estimation of the total number of patients
  - e. Assessment of the effects with regard to vaccine-preventable diseases
- (2) Information on the surveillance of pathogens
  - a. Confirmation of pathogens of infectious diseases
  - b. Microbiological surveillance of pathogens
  - c. Prediction of prevalence
- (3) Seroepidemiological surveillance
  - a. Measurement of herd immunity
  - b. Assessment of effects to inoculable diseases
- (4) Active surveillance
  - a. Respond to infectious diseases with aggressive intervention during outbreak of infectious diseases
  - b. Respond to outbreak of infectious diseases with aggressive intervention in conditions for outbreak of infectious diseases

As the phrase “risk management to infectious diseases” is often put to use these days, the existence of exceptional and risky diseases comes to light and responses to them become feasible only by getting acquainted with the trends in common diseases. Here lies the meaning of the fact that the most important thing is to carry out the surveillance of infectious diseases without detachment on a daily basis. Whatever experience he has gained in his clinical work, the clinician should not monopolize it. Instead, his experience should be disseminated step-by-step to the dimensions of neighborhoods, municipalities, prefectures, and the nation. By doing so, his achievements may eventually be put to use in measures to cope with infectious diseases in a global dimension. Thus, accumulated data may be owned in common and be reflected in clinical work and utilized in measures to combat infectious diseases for people in general in the long run. With the baseline acquired by dint of surveillance, there is the need to come out with some kind of response or intervention in cases where some abnormality is detected. The judgment on whether or not this baseline is surpassed may be nurtured by checking the baseline data in routine work. When it comes to surveillance, the important thing is to

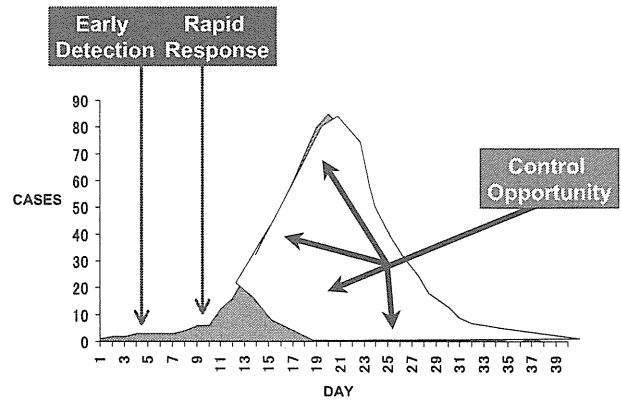


Fig. 1. Surveillance for action (by WHO).

stay restrained and patient – something that is required, say, in the compilation of a dictionary – and to detect any abnormalities and rapidly cope with them. Surveillance primarily aims at minimizing the outbreak of infectious diseases as far as possible, instead of coming out with data (Fig. 1).

Nevertheless, as data are to be commonly shared by many people, there is the need to exercise care to the full extent in protection of patients’ privacy. Talking of information about clinical cases, its exchange is widespread. There will be no problems as long as patients’ (clinical) information is shared among clinicians who are familiar with one another or in the form of an exchange among themselves, but individual information of the kind, which accidentally flows to many unspecified persons via e-mail as in the contemporary age, will instantly spread all over the world out of step with the transmitter’s intention. Exercising full care is indispensable when individuals’ information is involved.

## 6. Legal Infectious Disease Surveillance

In April 1999, the Infectious Disease Control Law was put into force. With some revisions made in the past, the infectious diseases are now classified into Categories 1 to 5 plus the novel influenza virus and others. The law also stipulates for the “new infectious diseases” and “specifically designated infectious diseases” that, if necessary, could remain designated exclusively for a period of 1 year.

The Infectious Disease Control Law stipulates for the collection and release of information about infectious diseases based on reports from physicians, the grasp of the outbreak of infectious diseases and their trends, and the reinforcement of surveillance systems, including surveys on the causative factors. The infectious diseases in the categories 1-5 are unexceptionably taken up for surveillance (Table 4). The infectious diseases in categories 1-4 are called “notifiable diseases,” and all physicians who have diagnosed these patients are required to report. The category 5 infectious diseases are classified into “notifiable diseases,” and “sentinel-reporting diseases,” about which

**Table 4.** Target diseases of the Infectious Diseases Control Law revised on Feb. 1, 2011. (Reportable infectious diseases under the National Epidemiological Surveillance of Infectious Diseases)

**1. Target diseases to be notified all cases by all physicians**

**Category I (to be notified promptly after diagnosis)**

Crimean-Congo hemorrhagic fever\*, Ebola hemorrhagic fever\*, Lassa fever\*, Marburg disease\*, Plague\*, Smallpox\*, South American hemorrhagic fever

**Category II (to be notified promptly after diagnosis)**

Acute poliomyelitis\*, Avian influenza virus infection (H5N1)\*, Diphtheria\*, Severe acute respiratory syndrome (due to SARS coronavirus)\*, Tuberculosis\*

**Category III (to be notified promptly after diagnosis)**

Cholera\*, Enterohemorrhagic *Escherichia coli* infection\*, Paratyphoid fever\*, Shigellosis\*, Typhoid fever\*

**Category IV (to be notified promptly after diagnosis)**

Anthrax\*, Avian influenza virus infection (excluding H5N1)\*, Botulism\*, Brucellosis\*, Chikungunya fever\*, Coccidioidomycosis\*, Dengue fever\*, Eastern equine encephalitis\*, Echinococcosis\*, Epidemic typhus\*, Glanders\*, Hantaviruspulmonary syndrome\*, Hemorrhagic fever with renal syndrome\*, Hendra virus infection\*, Hepatitis A, Hepatitis E\*, Herpes B virus infection\*, Japanese encephalitis\*, Japanese spotted fever\*, Kyasanur Forest disease\*, Legionellosis\*, Leptospirosis\*, Lyme disease\*, Lyssavirus infection (excluding rabies)\*, Malaria, Melioidosis\*, Monkeypox\*, Nipah virus infection\*, Omsk hemorrhagic fever\*, Psittacosis\*, Q fever\*, Rabies\*, Relapsing fever\*, Rift Valley fever\*, Rocky Mountain spotted fever\*, Scrub typhus (Tsutsugamushi disease)\*, Tick-borne encephalitis\*, Tularemia\*, Venezuelan equine encephalitis\*, West Nile fever (including West Nile encephalitis)\*, Western equine encephalitis\*, Yellow fever\*

**Category V (to be notified within 7 days after diagnosis)**

Acquired immunodeficiency syndrome\*, Amebiasis\*, Acute encephalitis (excluding Eastern equine encephalitis, Japanese encephalitis, Rift Valley fever, Tick-borne encephalitis, Venezuelan equine encephalitis, West Nile encephalitis and Western equine encephalitis)\*, Congenital rubella syndrome\*, Creutzfeldt-Jakob disease\*, Cryptosporidiosis, Giardiasis, Measles\*, Meningococcal meningitis\*, Rubella\*, Severe invasive streptococcal infections (Streptococcal toxic shock-like syndrome)\*, Syphilis, Tetanus\*, Vancomycin-resistant Enterococcusinfection\*, Vancomycin-resistant *Staphylococcus aureus* infection\*, Viral hepatitis (excluding Hepatitis A and E)

**Pandemic influenza and relevant infections (to be notified promptly after diagnosis)**

Pandemic influenza\*, Re-emerging pandemic influenza\*

**2. Target diseases to be reported by the sentinel clinics and hospitals**

**Category V**

**<Influenza sentinel> (weekly report)**

Influenza (excluding avian influenza virus infection, pandemic influenza and relevant infections)\*

**<Pediatric disease sentinel> (weekly report)**

Chickenpox, Erythema infectiosum, Exanthem subitum, Group A streptococcal pharyngitis\*, Hand, foot and mouth disease\*, Herpangina\*, Infectious gastroenteritis\*, Mumps\*, Pertussis\*, Pharyngoconjunctival fever\*, Respiratory syncytial virus infection\*

**<Eye disease sentinel> (weekly report)**

Acute hemorrhagic conjunctivitis\*, Epidemic keratoconjunctivitis\*

**<Sexually transmitted disease (STD) sentinel> (monthly report)**

Condyloma acuminatum, Genital chlamydial infection, Genital herpes, Gonorrhea

**<Target diseases at sentinel hospital>**

(weekly report) Aseptic meningitis\*, Bacterial meningitis\*, Chlamydial pneumonia (excluding psittacosis), Mycoplasma pneumoniae

(monthly report) Methicillin-resistant *Staphylococcus aureus* infection, Multi-drug-resistant *Pseudomonas aeruginosa* infection, Penicillin-resistant *Streptococcus pneumoniae* infection, Multi-drug-resistant *Acinetobacter* infection

**Target disease of syndromic surveillance designated by the government ordinance**

**<Syndromic surveillance sentinel> (to be reported promptly after diagnosis)**

Unknown fever ( $\geq 38^{\circ}\text{C}$ ) and respiratory symptom, Unknown fever and rash/vesicle

**3. Target disease of active epidemiological surveillance to be reported through on-line system**

**Category II infectious disease**

Avian influenza virus infection (H5N1)

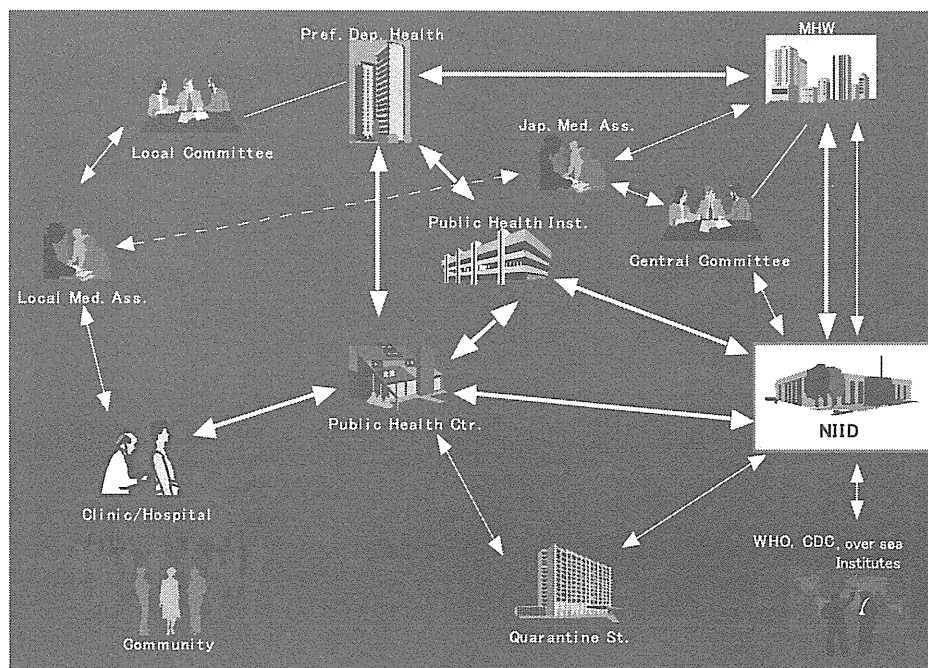


Fig. 2. Infectious diseases surveillance network.

the designated reporting clinics/hospitals are required to furnish reports. When it comes to “notifiable diseases,” all physicians involved are legally obligated to send in their reports.

Regarding “sentinel-reporting diseases,” there are about 3,000 designated sentinels for pediatrics, 600 for ophthalmology, 900 for sexually transmitted disease (STD) clinics, 5,000 for influenza (including 3,000 for pediatrics and 2,000 for internal medicine), and 5,000 core medical institutions (core hospitals serving as designated points).

Reports from physicians are filed with local public health centers. The local public health laboratory is so organized as to perform microbiological examinations on the diseases designated under the Infectious Disease Control Law (the disease pathogens subject to surveillance are given in Table 4). The specimens these local public health laboratories are unable to deal with are referred to related divisions of the National Institute of Infectious Diseases. When it comes to diseases diagnosed at the designated sentinels, about 10% of them refer specimens to the local public health laboratory, which serves as a microbiological laboratory center in the local, where the specimens are analyzed. The information thus secured is also analyzed and reverted at the local level. The public health centers, prefectural governments and other institutions, the Ministry of Health, Labor and Welfare, and the National Institute of Infectious Diseases are linked to one another online; the local public health laboratories are also linked with the National Institute of Infectious Diseases for the analysis and reversion by the Ministry of Health, Labor and Welfare, and the National Institute of Infectious Diseases as data for all the nation (Fig. 2). The information

by which individuals’ personal data are identifiable is excluded before public release.

### 7. Feedback and Offer of Information on Surveillance of Infectious Diseases

When it comes to the categories 1-5 of infectious diseases, which are subject to the Infectious Disease Control Law, the Infectious Disease Surveillance Center of the National Institute of Infectious Diseases offers and reverts on the latest information in the findings of surveillance in the Infectious Agents Surveillance Report (IASR) and the Infectious Disease Weekly Report (IDWR). The information contained both in IASR and IDWR is released in the home pages of the Infectious Disease Surveillance Center<sup>1</sup>. Also, both IASR and IDWR not only offer surveillance data but also information on infectious diseases both at home and abroad as well.

### 8. Field Epidemiological Training Program (FETP)

Routine surveillances are of the kind which is of a passive nature, as they are done in response to reports. The Infectious Disease Control Law stipulates that the national government and the prefectural governors may be able to perform active epidemiological surveys, if necessary, in order to identify the outbreak and causes of infectious diseases. The Infectious Disease Surveillance

1. <http://idsc.nih.go.jp/index-j.html>

Center carries out Field Epidemiology Training Program (FETP) to produce qualified talents. In FETP, on-the-job training is provided for 2 years. Should there arises a call for an epidemiological survey at the outbreak of an infectious disease at home or abroad, trainees are dispatched with staffs of the Infectious Disease Surveillance Center to perform a field epidemiological survey with the cooperation of the local staff members and make suggestions to cope with the outbreak. In their daily work, workers placed under FETP are on the lookout for infectious diseases both at home and abroad, assess whether countermeasures are required, respond to inquiries from people in general about infectious diseases, present simulations at a study and other meetings on surveillance, and perform studies for improvements in the surveillance system. The participants of this series of on-the-job training are physicians, veterinarians, nurses, pharmacists, and clinical laboratory scientists who have experienced in clinical work, basic medicine, or public health.

FETP activities are more active abroad than at home and considered important as the basics of measures against infectious diseases, including EID/REID and training is conducted at a national level. Historically, FETP activities started in the Philippines, Thailand, and other Asian countries nearly 30 years ago. This system started in Japan in 1999, almost at the same time as in China and Republic of Korea. Recently, there has risen the atmosphere to mutually step up the activities of FETP work as measures against EID/REID and against ordinary infectious diseases. The acronym "FETP" is not widely known in Japan, but it is firmly established in the domain of public health in other countries.

## 9. Revision of WHO's International Health Regulations

The International Health Regulations (IHR) came out under Article 21 of the WHO charter. Three diseases (yellow fever, cholera, and plague), although smallpox was included earlier, were taken up by the IHR, but as they were unable to cope with SARS, avian influenza, and other EID/REID, had a lack of order in the assurance of compliance by each member country, system of cooperation between WHO and each member nation, and the necessity of reinforcing measures against terrorism, which is a real threat, the IHR were revised at the WHO General Assembly in June 2007.

The main revisions are as follows:

- (1) Any event that may constitute a public health emergency of international concern (PHEIC) must be reported to WHO within 24 hours of assessment.  
To decide on need for notification any public health event can be assessed by the following criteria  
Is the public health impact of the event serious?  
Is the event unusual or unexpected?  
Is there a significant risk of international spread?  
Is there a significant risk of international travel or

trade restrictions?

- (2) As a system of communication, a national IHR focal point is established for communication with WHO at all times. In Japan, the Infectious Disease Surveillance Center of National Institute of Infectious Diseases to communicate with that point is the Health Science Division of the Ministry of Health, Labor and Welfare.
- (3) Definition of member countries' core capacity: Stipulations are prepared on the least degree of capability that has to be equipped for the surveillance of, and response to, the outbreak of emergencies, daily public health control, and responses to the outbreak of emergencies at airports, seaports, and along the national border.
- (4) Active application of informal information: Regarding the information gained from various sources beside official channels secured from its member countries, WHO is able to occasionally inquire the concerned member countries about the information gained and seek verification. The member countries, which are asked to make the verification, must come out with the primary response within 24 hours. In cases where the member countries have not accepted a WHO request for cooperation, WHO is able to share the acquired information with other member nations where the refusal may be justified in light of the risks on public health.

In the outbreak of pandemic started 2009, Mexico filed reports with WHO on April 12, 2009, about the fact that people had died of pneumonia and that the outbreak of influenza-like illness was on the rise in accordance with the IHR. The virus separated from 2 mild influenza-like illness patients in South California on April 15 to 17, the same year, turned out to be the kind mankind has never experienced before. On April 24, WHO described the outbreak as Public Health Emergency of International Concern (PHEIC). On April 27, WHO raised the pandemic phase from 3 to 4.

The fact that "all phenomena that may become an international threat in terms of public health, regardless of the causative factors" have to be reported to WHO under the revised IHR is the most difficult matter that has to be put into consideration, but the idea seems to be that "the spread of any unknown disease should not be left unattended."

## 10. Conclusions

Today, infectious diseases are no longer fatal enabling many people to live without anxiety. On the other hand, there are not a few diseases, which are new or once again taken up as is the case with EID/REID. The situation of infectious diseases is favorable in some countries, to be sure, but it may be pointed out that no improvements have

been made on a global dimension. Rather, they remain a grave issue as a cause of death. It must be taken into account that Japanese people will sometimes happen to suffer overseas from infectious diseases whose outbreak is quite rare in Japan. It is quite sad that smallpox, the supposedly successfully eradicated disease, has once again become the focus of attention as a weapon for bioterrorism. Biological terrorism is hard to deal with, because the kind of pathogen that will be put to use is unpredictable, so are when, where, and how. To terrorists, the use of pathogens turns out to be a means of raising havoc by verbally threatening the possible use of pathogens. As the initial symptom of any infectious disease is the symptom of a cold or the sign or symptom of acute gastroenteritis, it is difficult to distinguish those symptoms from what is generally known as a common disease. But, the diseases used for biological terrorism look like the "same old individual infectious diseases," as long as they are not artificially produced and deliberately put to use. The new infectious diseases typified by SARS are conventional in the initial phase, as long as the affliction remains unknown. The important thing is to keep the measure of infection in good order to cope with infectious diseases at any time while watching out for the outbreak of a possible infectious disease at all times.

In April 2009, pandemic influenza H1N1 broke out, spreading around the world in a short span of a few months. In tune with man's movement, this endemic proliferated from man to man in the blink of an eye. It would be difficult for humans to check the breakout of influenza pandemic or other new diseases. Rather, the disease is something that should be looked upon as existing in the natural world. The thing we can and should do is to make its scale as small as possible and minimize health damage and confusion in society. It is necessary to come out with realistic measures each time an infectious disease breaks out. The year 2009 will remain intact in the history of infectious diseases. The measures against the influenza pandemic were not just an issue of health control. They are designed for risk control for the whole society and will be assessed from various viewpoints. By making full use of those experiences, it is necessary to reinforce daily measures against infectious diseases in Japan in order to cope with the outbreak of not only influenza pandemic but also other EID/REID.



**Name:**  
Nobuhiko Okabe

**Affiliation:**  
Director, Infectious Disease Surveillance Center,  
National Institute of Infectious Diseases

**Address:**  
1-23-1 Toyama, Shinjuku-ku, Tokyo 162-8640, Japan

**Brief Career:**  
1978-80 Research Associate, Pediatric Infectious Diseases, Vanderbilt University School of Medicine  
1982-88 Faculty, Pediatric Infectious Diseases, National Children's Hospital, Tokyo  
1998-90 Director, Department of Pediatrics, Kanagawa Nurse and Midwife College Hospital, Kanagawa  
1991-94 Regional Adviser for Communicable Disease Control and Prevention, World Health Organization Western, Pacific Regional Office, Manila, Philippines  
1994-97 Associate Professor of Pediatrics, Jikei University School of Medicine, Tokyo

**Selected Publications:**  
• T. Shiino, N. Okabe, Y. Yasui, T. Sunagawa, T. Ujiike, M. Obuchi, N. Kishida, H. Xu, E. Takashita, A. Anraku, R. Ito, T. Doi, M. Ejima, H. Sugawara, H. Horikawa, S. Yamazaki, Y. Kato, A. Oguchi, N. Fujita, T. Odagiri, M. Tashiro, and H. Watanabe, "Molecular Evolutionary Analysis of the Influenza A(H1N1)pdm, May – September, 2009: Temporal and Spatial Spreading Profile of the Viruses in Japan," *PLoS ONE* 2010 Jan 10; 5(6): e11057. doi:10.1371/journal.pone.0011057.  
• N. Eshima, O. Tokumaru, S. Hara, K. Bacal, S. Korematsu, M. Tabata, S. Karukaya, Y. Yasui, O. Okabe, and T. Matsuishi, "Sex- and Age-Related Differences in Morbidity Rates of 2009 Pandemic Influenza A H1N1 Virus of Swine Origin in Japan," *PLoS ONE* 6(4): e19409. doi:10.1371/journal.pone.0019409, 2011

**Academic Societies & Scientific Organizations:**  
• Director, Japan Pediatric Society  
• Director, The Japanese Society for Virology  
• Director, The Japanese Society for Clinical Microbiology

