

Networks of Institutions as a Part of Global Vigilance System on Communicable Diseases

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1. Introduction

The World Health Organization (WHO) declared the eradication of small pox in 1979. It was widely believed that the era of communicable diseases would soon be over. It looked as if the ultimate goal of control of leprosy, tuberculosis, measles, and malaria was within our reach. However, the reality in the late 1990s is quite different from that optimism both in developed and developing countries. HIV/AIDS, for example, emerged in the early 1980s. And a number of new diseases appeared during that period. In addition to the new diseases, old diseases came back with drug resistant strains causing serious public health impact at a global level. The complacency in 1980s has now given way to a new realization. In order to combat against these communicable disease threats, a degree of international cooperation has been initiated and strengthened at regional and global levels in collaboration with international, governmental, and non-governmental agencies and institutions. In this session, the author overviews some of the on-going disease surveillance activities (networks) coordinated by the WHO and non-governmental agencies and institutions, which are already functioning as effective regional and global vigilance mechanisms.

2. Situation of new, emerging and re-emerging communicable diseases in the world

During the last two decades, more than 30 new infectious diseases have emerged. These include Ebola haemorrhagic fever in Zaire, HIV/AIDS in the USA (the virus possibly originated in Africa), *E. coli* O157 in USA, Morbillivirus infection in Australia, Bovine spongiform encephalopathy which was first identified in Britain in 1986 followed by the emergence of new variant form of CJD among humans in 1990s. Most recently, a new type of influenza A (H5N1) has been identified in Hong Kong, China in 1997. The fact is that such new communicable diseases have emerged from all over the world including both tropical and temperate zones.

Also, old diseases still remain as public health concern worldwide. In 1995 for instance, Cholera outbreaks were reported in a number of countries of Asia, Africa and South America, plague in Mongolia, dengue and dengue haemorrhagic fever in Asia, Central and South America. Yellow fever also re-emerged in Africa and the South America. Situations of other years are more or less the same. It is still fresh in our minds that Japan experienced a serious outbreak of *E. coli* O157 in 1996. It is clear that no country is spared from the threats of

communicable disease outbreaks. This is the reality of late 1990's and thus establishment of a global early warning system on such epidemic diseases is essential for effective containment of the diseases.

3. Development of a global vigilance mechanism on communicable disease

Response by WHO

In 1995, the World Health Assembly, the highest governing body of the World Health Organization, adopted a resolution (WHA 48.13) on control of new, emerging and re-emerging communicable diseases, noting the above serious global situation of the communicable disease outbreaks. The resolution urged the WHO and its member states to put in place immediate effective measures on control of the diseases. The resolution also urged the WHO to revise the International Health Regulations (only one international legislation relating to communicable disease management) to facilitate international collaboration on epidemic disease management.

Before 1995, the WHO conducted several programmes to implement communicable disease control activities including the tropical disease control programme. In response to the resolution, the WHO immediately made a partial restructuring of its organization and established a new division; Division of Emerging and Other Communicable Disease Surveillance and Control (EMC) headed by Dr David Heymann. This enabled the organization to conduct more effective and timely action on emerging and other epidemic communicable diseases at a global level as demonstrated in the event of the Ebola haemorrhagic fever outbreak in Zaire in 1995.

The WHO's strategy on control of emerging and re-emerging diseases

The strategy for control of communicable diseases under the EMC programme is composed of four major components.

Those include:

- 1) to support the establishment of national disease surveillance and control programmes;
- 2) to develop and maintain global information networks of various centres, institutions, organizations, and individuals to monitor diseases;
- 3) to develop and maintain rapid information exchange networks through most effective ways to provide information for policy and decision making, facilitating international collaboration, minimizing damages on travel and trade caused by communicable disease outbreaks; and
- 4) to ensure preparedness for rapid containment of outbreaks at international, regional and, national levels.

In order to implement these activities, collaboration with research institutions in the world is an indispensable factor in the development of effective surveillance, and in mobilization of experts during epidemics. WHO does not possess its own research institution since it was founded in 1948. Instead, WHO designated eminent research institutions and laboratories as WHO Collaborating Centres and utilized their resources and expertise in the activities mentioned above. In on-going and future communicable disease control programmes, the

role of these WHO collaborating centres and other collaborating laboratories seems to be getting more important than ever.

WHO collaborating centres

At the moment, WHO has designated more than 1000 WHO Collaborating Centres worldwide. Among those, about 200 centres are those relating to communicable diseases. Among those 200 centers, many are located in developed countries such as the United State of America, Japan and countries in Europe. Many of these countries have more than 10 centres on communicable diseases. Here in Nagasaki, for example, the Institute of Tropical Medicine of Nagasaki University is designated as a WHO Collaborating Centre for Research and Reference on Tropical Viral Diseases. On the contrary, a relatively small number of WHO Collaborating Centers are located in developing countries in Southeast Asia, Africa, and South and Central America. Development of WHO Collaborating Centres in such developing countries, which are mainly in tropical zones, is an important issue to be addressed in the very near future in order to strengthen emerging disease surveillance mechanism at a global level. The EMC/WHO is currently planning to increase WHO Collaborating Centres in developing countries.

Contributions of these centres to the WHO's global surveillance and control activities are really noteworthy. For example, in the WHO Western Pacific Region, for which I worked as a WHO staff member during the last three years, a number of outbreaks occurred during the period of my employment. In 1997, an unusual increase of deaths among children possibly caused by enterovirus occurred in Malaysia. In this outbreak, the WHO Collaborating Centre in Malaya University first reported the event. And soon after, WHO Collaborating Centres on enterovirus in the Center for Disease Control (CDC) in Atlanta and the National Institute for Infectious Diseases (NIID) in Japan participated in the disease surveillance and made enormous contribution within very short time. Also in 1997, with an outbreak of a new type of influenza (Influenza A H5N1) in Hong Kong, WHO Collaborating Centers for influenza in CDC and NIID played a vital role in emergency disease surveillance and investigation and development of vaccines.

Global influenza surveillance network

Among global infectious disease surveillance networks under WHO coordinated programmes, influenza surveillance is one of the well developed and most important systems. This is a good example of a network of institutions for epidemic disease surveillance and control.

As of June 30th 1998, the WHO has four WHO Collaborating Centres on influenza in Australia, Britain, USA and Japan. Also, the WHO has established 110 WHO influenza surveillance sites worldwide. Details of these sites are available from the WHO Web Site (<http://oms.b3e.jussieu.fr/flunet/>). In this system, the 110 laboratories are routinely monitoring the activity of influenza viruses and report their data to the WHO Collaborating Centres or directly to WHO Headquarters in Geneva. The activities include virus isolation and serologi-

cal examination of flu patients. If and when necessary, isolated viruses are sent to the WHO Collaborating Centres for further analysis. These data are utilized in epidemic warning and in the determination of vaccine strains for the following epidemic season.'

With the event of the emergence of new Influenza A (H5N1) in Hong Kong last year, one of the above 110 WHO influenza surveillance sites identified the first human case of H5N1 infection. And for confirmation, the isolated virus was immediately sent to the WHO collaborating centres on influenza. As appearance of a new type of influenza A virus may cause the next pandemic, such confirmation had to be done very quickly. This enabled the WHO and the health authority of Hong Kong to take timely action in intensified disease surveillance followed by proper and timely action taken by the local government of Hong Kong. Also the detection of the new virus at a very early phase of its emergence gave us time to prepare vaccine and pandemic plans. During the event, information on the outbreak was disseminated to all 110 sites, member states, and to the public through international media. This is a good example to demonstrate that such a global surveillance is really beneficial for epidemic disease control.

Regional and inter-regional activities on disease surveillance (dengue as an example)

As for other communicable diseases of regional concern, such as many tropical diseases, regional and inter-regional networks have been strengthened. Some of the developments in the WHO Western Pacific Region are overviewed referring to, as an example, activities in the dengue control programme.

Among the diseases classified into tropical diseases, dengue infection is the most important vector-borne viral disease in the tropical zone. Dengue virus infection is seriously prevalent in the American Region, the Southeast Asia Region and the Western Pacific Region. It is estimated that 20 million cases of dengue infection occur every year, and 2.5 billion people are living in high-risk areas, mostly the tropical zone. There is a trend that dengue cases are increasing since the late 1980s and dengue could be designated as one of the re-emerging infectious diseases in the above areas.

Resurgence of dengue in newly industrialized countries in Asia (in so called Tiger Countries) is, in particular, a really serious situation. In these countries such as Singapore, Malaysia, Indonesia, dengue incidence once declined possibly due to well-developed disease control programmes in the 1980s. However, since the early 1990s, the number of dengue cases is continuously increasing. Dengue is among the serious public health problems in both developing and newly industrialized countries in the Asia-Pacific region.

Dengue infection causes two distinct clinical manifestations; dengue fever and dengue haemorrhagic fever (the sever form of dengue infection). Dengue virus has four serologically distinct serotypes. Although a patient can get lifetime immunity against causative dengue virus serotype, the same patient can be infected with other serotypes of dengue. More than 95 percent of dengue haemorrhagic fever occurs in the secondary dengue infection. Therefore, the monitoring of prevalent serotype of dengue viruses is important for surveillance

information together with information about the density of vector mosquitoes. In order to facilitate exchange of information on the above subject in dengue and to increase collaboration, the WHO Regional Office for the Western Pacific and the Regional Office for Southeast Asia are jointly publishing the Dengue Bulletin since 1997. However, to utilize the information in practical disease control activities, it is expected to develop a network of institutions through electronic linkage.

Non-governmental networks

During last several years, a number of new developments were seen in internet-linked information exchange networks on infectious diseases at a non-governmental level. One of the most widely subscribed networks is the ProMed network which commenced in 1994. Most of epidemic information from all over the world is routinely posted on the network and shared by communicable disease experts, media people and governmental officers. In Japan, ACIH (Agency for Cooperation in International Health) is establishing an NGO-based global emerging disease surveillance network with financial support from the government of Japan. The agency annually conducts an international training course in communicable diseases particularly on polio eradication activities, inviting communicable disease experts and officials from developing countries in Africa, Asia and other areas. The agency is developing a network of the alumni of the training course as a surveillance system. The Institute of Tropical Medicine, Nagasaki University also has the relevant idea to mobilize graduates from its international course in tropical medicine.

PACNET

Another remarkable example of development in NGO-based surveillance and information network is the establishment of the internet-linked Pacific Public Health Network (PACNET) in 1997. The founding members of this network are researchers and government officials in the Pacific Island Countries including Hawaii, Australia and New Zealand, and other international agencies such as the WHO/Regional Office for the Western Pacific (Manila), UNICEF (Suva), and the Pacific Community (an organization of the Pacific Island Countries). The network started with about 60 members in April in 1997.

As of end of January in 1998, more than 120 parties had joined this network. These include the WHO headquarters in Geneva. Composition of subscribers is: research laboratories (11%), government health officials (37%), training institutions (17%), WHO field and regional office staff (11%), officials of the Pacific Community (9%) and others (15%). Thus information from laboratory, health authorities and international agencies can be posted and delivered to relevant parties in a timely manner. About 75% of the subscribers are within the region and the remaining quarter is outside of the region, such as in the USA and in France.

Since its foundation of the network in April 1997, a continuous increase of communication was observed. In particular, during dengue and measles outbreaks in 1997 and 1998, virological, serological and molecular epidemiological data posted by researchers and officials in Australia, Fiji and French Polynesia. Such information was fully utilized by the public

health sectors in the Islands to prepare for possible epidemics. Also, in some countries, such as Vanuatu and Tonga, disease intervention was conducted at a very early phase of outbreaks in collaboration with the WHO and other partner countries and agencies. Also, this communication network allowed the WHO and other international agencies to coordinate international and inter-agency cooperation in a most effective manner. Thus, this network is functioning as an effective action-oriented surveillance system in the region.

Significance of NGO-based surveillance networks

Although reliable emerging and re-emerging disease surveillance is being conducted by a number of governmental and international agencies, NGO-based surveillance networks are still considered to be useful. In the past, outbreaks of communicable diseases often damaged international trade and tourism and the concerned countries were seriously damaged in regards to economic activities. Hence, some countries did not always report outbreaks of infectious diseases to the WHO, resulting in late disease intervention and delayed coordination of international cooperation. However, after the appearance of internet-linked NGO-based networks, such behavior of government officials has faded. Thus, to date, NGO surveillance and information networks are an indispensable component in the regional and global communicable disease control activity.

4. Conclusion

The control of emerging and re-emerging communicable diseases requires active collaboration of research institutions together with public health sectors. Although regional and global surveillance systems have been strengthened by international agencies such as the WHO, it would be desirable if more research institutions could participate in networks of disease surveillance and information exchange to ensure maximum safety against infectious diseases of international concern.

5. Reference

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