



Chapter 11

Surveillance System for Disease Control and Public Health Emergencies

1. Public Health Emergency

Talking about a “medical emergency”, everyone will think of a patient in a critical condition, on the borderline between life and death, relying on the rapidity and preparedness of the medical team to diagnose and treat correctly. For instance, a patient with an acute heart attack in a shock condition or a respiratory failure may die within a matter of minutes or hours if he/she does not receive a proper medical attention.

A “public health emergency”, the term that has been increasingly talked about lately, has a slightly different meaning in that, rather than happening with an individual patient, it occurs in a community with a large number of residents being threatened rapidly with a disease or disaster. If the health team lacks the preparedness and rapid response capacity to appropriately diagnose and control the disease or disaster, a large number of the community members will get sick within a short period of time, say a few days, a week or a month, severely affecting the economic and social conditions. Public health emergencies may include an epidemic (such as severe acute respiratory syndrome or SARS, avian influenza), food poisoning (botulism) from canned bamboo shoots, chemical poisoning from contaminated food or water, a natural disaster, including intentional use of biological or chemical substance for human destruction. These days we have seen a rising number of new kinds of public health emergencies and the responsibility for coping with them cannot be transferred to local authorities or the private sector as the response has to be undertaken in a systematic, rapid and immediate manner within the country and in cooperation with other countries.

This report aims to illustrate the benefit of the disease/disaster surveillance system of Thailand, which has been trying to improve itself to help the national health system to better respond to public health emergencies.



2. International Health Regulations 2005 and Response to Public Health Emergencies

In 1969, WHO Member States adopted the first International Health Regulations which required all countries having cholera, plague or yellow fever to report to WHO whether there were any patients with any of such diseases; if so, how many cases, in which city. That was because these diseases can spread from one community to another, from one country to several other countries, across the continent or the world. At that time, emphasis was placed on measures related to seaport and airport checkpoints as they were believed to be the entry and exit point of communicable diseases.

Later it was found that the International Health Regulations 1969 did not receive adequate attention and practice due to the fact that if any country reported on any of the diseases to WHO or the international community, there would be a negative impact on exports, tourism and image of that country. So a lot of countries did not cooperate in following the regulations.

In the late 1990s, WHO tried to review the International Health Regulations and there was an outbreak of SARS because the People's Democratic Republic of China, the source of the outbreak, did not report on the cases of pneumonia of unknown cause, which had a high case-fatality rate. The disease spread continuously to 32 other countries, causing a vast negative health, social, economic, travel and political impact. As a result, all WHO Member States recognized the importance of cooperation in conducting a surveillance system of a disease or event that may constitute a "public health emergency of international concern", which is the essential part of the revised International Health Regulations, endorsed in 2005 and entering into force in mid-2007 for all Member States to implement.

A "public health emergency of international concern" means an extraordinary event which may be a communicable disease, a chemical contamination, a natural disaster that may potentially cause a disease outbreak or illness among the populations of other countries, and that requires international cooperation in coping with such an event. If such an event occurs, the member state has to report to WHO urgently. In case there is no report from the originating state, WHO, based on the information received from other sources, will implement direct or indirect measures to obtain the facts about that particular event. The criteria for determining whether any event should be regarded as a public health emergency of international concern include: its severity higher than normal situation or expected level, its impact on international travel or trade, etc.

Besides, the World Health Assembly has urged Member States to build, strengthen and maintain the capacities required for the surveillance and control of public health emergencies. So the MoPH should carry out and examine its national capacities and preparedness for such purposes.

3. Communicable Disease Surveillance System and Development in Thailand

The MoPH's disease surveillance system has continuously evolved, beginning with the

notification of diseases of public health importance in the early stage, i.e. malaria and yaws, implemented as vertical programmes with their own personnel for case detection, collecting data on patients from the provinces for use in monitoring the trends in morbidity, mortality and spread of disease, and implementing control measures in a complete-cycle manner. Later, there were other disease prevention and control efforts for the entire country such as the cholera epidemic control, the smallpox eradication project, and the childhood immunization programme against poliomyelitis, diphtheria, pertussis and tetanus. Thus, there was a need to set up a national unit for disease surveillance and investigation, using the integrated disease notification principle.

According to the reorganization of the MoPH in 1972, a Division of Epidemiology was established under the Office of the Permanent Secretary for Public Health. The Division had its own epidemiology officials assigned to collect data on illnesses, deaths and other epidemiological information on diseases of public health importance and then prepare a patient and disease notification card (Ror Ngor 506) for use at the provincial level for reporting to the central administration.

Initially, the provincial epidemiological workers received salaries directly from the Epidemiology Division. Later on, since the disease surveillance/epidemiology was integrated into the provincial health programme, the Epidemiology Unit has become part of the Planning and Evaluation Section of the Provincial Public Health Office (PPHO), each province has one or two staff members. For regional, general and community hospitals, each has to assign one of its workers to serve as disease reporting workers. Each year training courses were organized to train new workers to take on this assignment. In the disease notification system when the reports are sent to the PPHO, the epidemiology worker will analyze the data and prepare a weekly disease surveillance report for submission to the Provincial Chief Medical Officer. If an unusual event is noticed, the epidemiology worker as well as a disease control worker (of the Disease Control Section) will go out to conduct the disease investigation and take appropriate action for controlling the event.

Even though the disease surveillance system has been continuously implemented and revised, there are still some problems as follows:

1. The negligence of the original intent of surveillance. The number of notifiable diseases has been steadily increased from only 20 diseases initially to more than 70 at present, only to know how many people were sick with such diseases, which is the concept of data collection for statistical presentation purposes. But for disease surveillance, actually its concept is to conduct surveillance on priority diseases only, such as those with potential to cause an outbreak in a short period of time. So the disease surveillance system places emphasis on the rapidity in getting the information; thus a disease investigation team is sent out to the community in which the patient live to find out the facts so that suitable actions can be undertaken to control the disease or immediately eliminate the risk factors.
2. A misconception that the outbreak occurrence is a mistake. A lot of health administrators

think that if the number of reported cases of a priority disease is high, they will be regarded as being inefficient in their disease control programme. So there are delays in reporting cases; only those with laboratory confirmations are reported. Sometime, they do not report at all; some report under another disease such as reporting cholera as acute diarrhea.

3. Unity of disease surveillance and disease control. In the past, the programmes on epidemiology and disease control were normally not under the same department: at the central level, the Epidemiology Division was under the Office of the Permanent Secretary, not the Department of Disease Control; but at the provincial level, the Epidemiology Unit was under the Planning and Evaluation Section; then all the relevant efforts were not made by a single team. After the public sector reform in 2003, the Division of Epidemiology was upgraded as the Bureau of Epidemiology and transferred to the Department of Disease Control. At the provincial level, even through the Epidemiology Unit and the Disease Control Unit were put under the same section, the Technical Support Group, some epidemiology activities remain under the Planning and Strategy Section. This structural change placed the emphasis on surveillance for action, not only for making a budgetary request, which should be in the right direction. However, the number of full-time disease surveillance personnel is too small, on average only one or two officials in each province and there are no established positions in regional/general or community hospitals.

4. Surveillance and Rapid Response Team (SRRT)

Over the past four years, Thailand were faced with several major public health emergencies, i.e. SARS in 2002, avian influenza in 2003, tsunami in 2004, and most recently botulism food poisoning from canned bamboo shoots in 2006. These events will be elaborated in the next sections as to how the country's surveillance system responded to such public health emergencies.

In the past, when there was a major epidemic, a "war room" or "ad hoc operations centre" would be established to handle such an incident. Occurring quite frequently was the cholera epidemic, for which a team of epidemiology workers, disease control workers and sanitation workers as a "Special Response Team" had to rush out to the place of occurrence with the capacity to identify the case, source of transmission and risk factors, and to improve sanitation conditions or other factors that may cause the epidemic. Once the mission had been accomplished, the team would be dissolved.

When the SARS outbreak occurred, as proposed by the Department of Disease Control and approved by the MoPH, each province set up at least two operations teams consisting of a physician, an epidemiologist, a lab technician and a disease control officer, and tasked with identifying SARS contacts. The teams were on duty 24 hours a day; as soon as they were notified of a suspect, they were able to rush to the site immediately. When the outbreak was over, the concept of health emergency response team was adopted and a permanent team has been set up at each level.



During the avian influenza outbreak, the MoPH renamed the team as “Surveillance and Rapid Response Team or SRRT” and set the target for each and every district to have at least one team and at least one provincial SRRT in every province, including Bangkok, which has got a team located at every public health centre. At the regional level, there is a Regional SRRT and at the national level, the Central SRRT.

In order for the SRRT operations to be efficient, the MoPH has made efforts to develop four major elements as follows:

Element 1: Development of policies and strategies

- Adopt the concept of SRRT as a policy and include it in the national strategic plan on avian influenza prevention and control (2005-2007)
- Set up a committee at the ministerial level to oversee this matter and also adopt it as a key performance indicator of the Public Health Development Cluster and the Department of Disease Control.
- Adopt SRRT as a key mechanism in implementing the IHR 2005 by setting up a surveillance unit in each and every service unit.

Element 2: Development of surveillance system

- Reduce the number of notifiable diseases so that only priority diseases remain on the list and their data are extremely essential for responding to the health threats.
- Develop operational standards for each disease, including the importance of the notifiable disease, definition, reporting criteria, public health measures to be taken and up-to-date knowledge.
- Use information Technology to support the rapid reporting and the reduction of workload, such as reporting via the Internet, beginning with avian influenza in the areas with frequent outbreaks.
- Promote the collaboration with agencies within and outside the ministry in sending samples/specimens for laboratory analysis so as to know about the causative agent or chemical.

Element 3: Personnel development

- Train SRRT members in all provinces and districts in 2004-2005.
- Learn from field operations, in real-life disease investigations and case studies such as the case of food poisoning from canned bamboo shoots.
- Organize a short-term training course for medical doctors/team leaders and other technical officers.

- Produce more epidemiologists in the FETP to serve as the knowledge base.

Element 4: Promote personnel and information networks in-country and abroad

- Develop information exchange networks and “Outbreaklist” for disseminating outbreak news and up-to-date news from within and outside the country for SRRT members across the country as soon as the event occurs.
- Organize annual meetings for network members within each province, each region and across the country, for presentations of SRRT operations and other technical advancements.

5. Case Studies on Surveillance of Diseases/Health-Risks in Response to Public Health Emergencies

5.1 SARS

In late 2002, the outbreak of severe acute respiratory syndrome (SARS) originated in Guangdong Province of China, with the first reported case of atypical pneumonia that did not respond to antibiotics. The disease rapidly spread to other countries. The World Health Organization received reports on SARS from 32 countries (8,436 cases, 813 deaths). Finally, it was found that the causative agent is a new strain of coronavirus (SARS-CoV). Thailand was one those countries, the first case being a WHO official coming into the country for medical treatment.

The Department of Disease Control issued the guidelines for disease surveillance on 14 March 2003, signaling agencies concerned to pay attention to atypical pneumonia through the weekly disease surveillance report. The MoPH sent out a formal directive on 19 March 2003 requiring that all agencies undertake a strict surveillance measure. On 1 April 2003, a conference was held by the MoPH to lay down measures to cope with disease outbreaks that might occur in the country. Situation reports were sent from all provinces and summarized as a ministry’s report for 96 consecutive days.

The SARS coronavirus is an emerging infectious agent; and nobody knows clearly about the agent, its mode of transmission and disease progression. What was known in the beginning stage of the epidemic was that it was a virulent infectious disease with a high case-fatality ratio and health personnel were the high-risk group. And the information about the agent, disease progression and disease control guidelines implemented by various countries and organizations were changing all the time. The public and the media were very much interested in the epidemic. The public perceptions about anything related to the patients and health facilities had a social impact on both patients and hospitals as SARS had an image of a dangerous infectious disease. So all kinds of information were regarded as secret and, as a result, it was more difficult to undertake measures relating to coordination as well as patient and contact isolation. Most health personnel had no direct experience in this kind of operation; materials for prevention of catching the respiratory tract infectious agent, which were N95



masks, and other protective devices were scarce because they were not prepared in advance and thus assistance had to be sought from WHO.

However, the disease surveillance system was established by:

- Preparing a manual for disease investigation (three revisions) and distributing it to all trainees, provincial public health offices, regional disease control offices (Nos. 1-12), and via the Internet at <http://epid.moph.go.th/sars/investSARS%2020_06_46.doc> and <http://www-ddc.moph.go.th/sars_center.html>
- Training approx. 250 officials from provincial public health offices and regional disease control offices.
- Accepting notifications of probable cases and undertaking disease investigation or coordinating the investigation of 313 cases in 52 provinces; resulting in a conclusion that there were 31 suspects and 9 probable cases.
- Following up on all contacts that health officials were notified of until a decision could be made as to whether they were not ill, suspects or probable cases; for the suspects and probable cases, a total of 1,016 cases were put under surveillance for 10 days after the last day of contact with the patient; they were:

132 household contact cases (avg. 3 cases/patient)

154 close contact cases (avg. 4 cases/patient)

730 health personnel contact cases (avg. 18 cases/patient)

- Collecting specimens from 110 patients for lab confirmatory testing for coronavirus; it was found that 1 was SARS coronavirus and 2 were mycoplasma (the results were used in excluding 2 non-probable cases; thus, there were actually only 9 probable cases). For most cases, the interpretations of the lab tests could not be clearly made since the second specimens could not be collected as the patients were foreigners.

Lessons learned from the disease surveillance, investigation and follow-up are:

- The preparedness of hospitals and personnel with respect to the isolation of severe infected cases were not as efficient as expected because the infrastructure of the hospital was inadequate and the personnel were lacking confidence and skills in patient care, making them scared.
- There was a lack of proper preparedness plan and drills for health agencies to conduct disease surveillance, investigation and control measures in emergency situations; and there were no reserves of necessary equipment/supplies for surveillance and investigation.
- The enforcement of laws related to epidemic control was problematic in some practical aspects, such as loss of income while being isolated at home and expenditure incurred while being quarantined at the hospital.

- The fear of society of the epidemic during the critical period, viewing the patient as objectionable; even when the patient had died, the people did not allow religious/traditional funeral rites to be held as usual.

5.2 Avian Influenza

Even though the SARS epidemic has subsided for some time since July 2003, Thailand is not complacent about it. Rather, the MoPH has drawn up a SARS preparedness plan in case the epidemic re-occurs; and a system for surveillance on pneumonia patients coming in from abroad is underway.

In around November 2003, there were internal rumours about unusual deaths of farm and domestic chickens in Nakhon Sawan province. Later, there were reports on unusual deaths in other provinces in the central region. An investigation team was sent out by the Bureau of Epidemiology to Chachoengsao province; samples of the chickens with unusual deaths were collected and sent for lab testing at Mahidol University. The lab results revealed that the infection with influenza group A (not H1 or H3) viruses was found in several organs of the dead chickens. Then the MoPH instructed the Provincial Public Health Offices in the provinces with unusual deaths of chickens to undertake surveillance on illnesses and deaths due to influenza or pneumonia. Until mid-January 2004, there were two reported cases/deaths of acute pneumonia in Suphan Buri and Kanchanaburi provinces; lab tests confirmed influenza group A (H5N1) viral infection in both cases. On 23 January 2004, the MoPH made the first announcement that cases of avian influenza patients were found and all provincial public health offices were instructed to set up a team ready to conduct a disease investigation as soon as the hospital found a suspected case. The investigation team had to go out to the affected village, inspect the environmental condition, find out whether there have unusual deaths of poultry, find additional cases of suspected cases, educate the villagers about avian influenza, and monitor the illness among villagers in that village for at least 10 days.

Between early 2004 and the end of December 2006, Thailand reported 25 confirmed cases of avian influenza and 17 deaths, including:

- 2004: investigation of 2,920 suspected cases; 17 confirmed cases and 12 deaths.
- 2005: investigation of 3,244 suspected cases; 5 confirmed cases and 2 deaths.
- 2006: investigation of 5,641 suspected cases; 3 confirmed cases and all 3 deaths.

The avian influenza surveillance effort has significantly changed the approach of disease surveillance because every time when there is a case notification from the hospital, the disease investigation has to be undertaken, including specimen collection, lab testing, and visits to the community. Daily reports are to be prepared and submitted to high level administrators who will hold a press conference whenever a confirmed case is reported. This is to make the control effort transparent and thus this kind of action is regarded as a real surveillance of disease.



5.3 Natural Disasters and Tsunami

The 25 December 2004 tsunami, a natural disaster whose epicentre was at the Sumatra Island, hit six southern provinces of Thailand and caused a serious damage to the beaches and tourist attractions in Phang-nga, Phuket, Krabi and Ranong provinces and some damage in Trang and Satun provinces, with a total of 5,383 deaths and 8,457 injuries.

The problems arising after the giant waves or tsunami attack were homelessness of the affected people and the lack of food, clean water supply, clothing, etc. The government and local as well as international organizations urgently rushed in to provide temporary shelters, food, water and other necessities. In theory, whenever there are a lot of homeless people living together in a certain place, it is highly probable that there will be outbreaks of communicable diseases. When the provincial SRRT officials in the affected provinces had undertaken other duties such as directing and coordinating relief efforts, the MoPH had to send more than 100 medical emergency service teams to provide medical services to the victims, whereas, the Department of Disease Control also sent central and regional SRRTs regrouped as 12 teams to help for six weeks in the most severely affected provinces of Phang-nga and Phuket.

Each SRRT had two major missions: (1) prevention of diseases, especially vector-borne, including chemical spraying, mosquito-breeding-place destruction, distribution of insecticide-treated bednets, etc. and (2) proactive disease surveillance, investigation and control.

For the second mission, the proactive surveillance focused on disease and risks of public health importance in the affected provinces, which were 22 illnesses in 5 syndromes or groups: diarrhoeal diseases, respiratory tract, fever, cephalomeningitis, and other groups, namely, wound infection, injury and jaundice. Some other diseases of public health importance were related to the list in the following week. The sites of surveillance were 77 health centres 22 public hospitals, and 4 private hospitals 2 disaster victim temporary housing centres, and 2 disaster victim identification centres.

The teams developed forms for recording patient's information, daily disease report, and cause of illness investigation, for all the illnesses under surveillance.

The Department of Medical Sciences supported this effort by sending some medical scientists and provided equipment/supplies for collecting samples/specimens for lab testing including aerobic and anaerobic bacterial culture and virological testing.

At the temporary housing centres, there were mobile medical teams from various agencies taking turn providing services to the victims; and the SRRT members had to collect the diagnosis data by themselves and conduct an analysis to find out whether there were any unusual increases in incidence of any diseases, so that a disease investigation could be carried out immediately.

As a result of the intensive/proactive disease surveillance after the tsunami attack, several



interesting events were noticed leading to nine epidemiologic investigations, seven of which were related to diarrhoea and food poisoning. The responsible SRRT conducted the cause of illness investigation and outbreak control, including giving advice on sanitation improvement and personal hygiene to high-risk groups until there were no outbreaks on a wide-scale and no deaths. For another two events were related to malaria (only a few cases were diagnosed) and dengue haemorrhagic fever, more cases of DHF were reported but no evidence was found to link the increase with this disaster. After that the central/regional teams had transferred their functions to provincial health authorities for further action as the situation had begun to become normal and the local health officials could resume their regular duties.

5.4 Botulism Food Poisoning Associated with Canned Bamboo Shoots

On 15 March 2006, there was a merit-making ceremony in Nawaimai village of Pakhaluang subdistrict in Ban Luang district of Nan province. The villagers used bamboo shoots that were preserved in cans during the rainy season to prepare the food for lunch for merit-makers when the ceremony had ended. In the afternoon, a few villagers from that village visited Ban Luang Hospital for medical treatment, until at dusk, 10 villagers from that village visited the hospital at the same time with the symptoms of stomach upset and difficulty speaking/breathing; some of them required a respirator, luckily, the attending physician was a former trainee in the Field Epidemiology training Programme (FETP); together with other hospital staff, the physician could investigate and find out that all the villagers were from the same village and all had a history of eating canned bamboo shoots. This had led the physician to think of botulism food poisoning. And as a result, an SRRT was sent out to the village immediately to conduct a disease investigation. The team, via the public address system, requested all villagers who had eaten canned bamboo shoots to see the doctor and collected all remaining canned bamboo shoots in the affected and neighboring villages to destroy all of such bamboo shoots. In this operation, 209 cases of botulism were examined and treated, of whom 134 were hospitalized including 42 with respiratory failure in need of intensive care in an ICU and respirator. Meanwhile, as botulism antitoxin was not available in Thailand, requests were made for the antitoxin from the U.S. Centers for Disease Prevention and Control (50 doses), the United Kingdom (20 doses) and Japan (23 doses). Upon receipt, antitoxin injections were given to severe cases and got 17 cases transferred to other central and provincial hospitals for further medical care. As a result of these efforts, no deaths were reported, primarily because the finding of the outbreak and cause of outbreak investigations conducted by the SRRT, together with the capability of the medical team in case management as well as the critical care management could all be handled effectively. Thus, the loss of life could be prevented in a manner that has never been reported before in the past or in other countries.

6. Lessons Learned and Recommendations

Thailand has had medical and public health development continuously. During the last decade, several changes resulted in such development, one of which is the social tide related to decentralization to local governments and universal health care for the people. The implementation of the capitation budgeting principle has resulted in the health promotion and disease prevention programmes not having their own budget in a clear-cut manner. The MoPH has to transfer missions related to sanitation and medical services to local governments and give the private sector a greater role in the health system. But one of the missions that cannot be transferred to local or private sector agencies is the management of public health emergencies. According to the new International Health Regulations, adopted by the World Health Assembly in 2005, the definition of “a public health emergency” has been expanded to cover a communicable disease, a natural disaster, an accident and an intentional use of biological or chemical substance for harming the community. It is up to the government to build up its own capacity to cope with any of such emergencies for preventing, monitoring and inspecting them, and responding to them immediately with a technical back-up, adequate budget, and trained and highly skilled response team members.

The MoPH has used the experiences in the surveillance of communicable diseases in revising its surveillance mechanism so that it is more intensive, focussing on its application in emergency situations. This is accomplished by creating a Surveillance and Rapid Response Team (SRRT) in each and every district across the country, working without holidays on a network basis. So the MoPH was able to cope with new public health emergencies such as the SARS epidemic, the avian influenza epidemic, the prevention of communicable diseases after the tsunami attack in six southern provinces, and lastly the botulism outbreak due to eating canned bamboo shoots in Nan province.

However, this system is in its beginning stage and encountered with a number of problems. Importantly, the government has to support the MoPH, incorporating the mission relating to public health emergency response into the structure of the ministry, the provincial public health offices, regional/general hospitals, community hospitals, and district health offices, with adequate numbers of physicians and technical officers trained in epidemiology and adequate budget.

