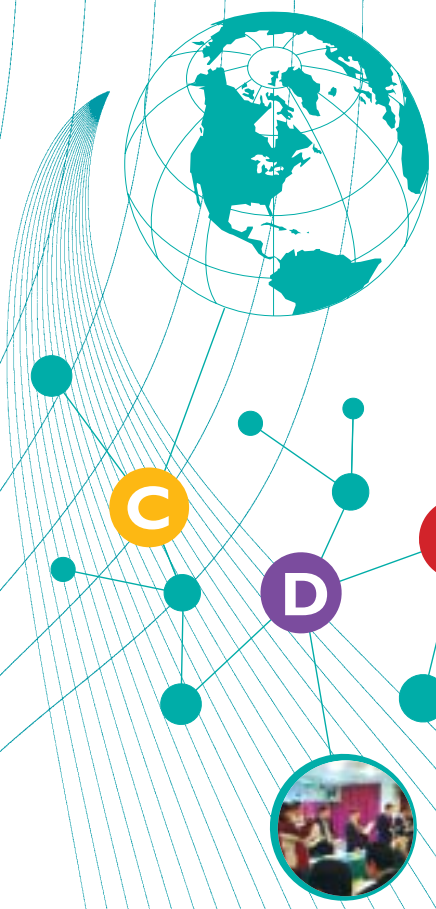
CDC

Annual Report 2006

Center for Disease Control, Taiwan



Annual Report 2006

Center for Disease Control, Department of Health, Executive Yuan

June 2006

CONTENTS

Highlights of activeities in 2006 and future prospects

Message from the Director-General

Welcome to the 2006 annual report from the Center for Disease Control （CDC）, a leading public health agency in Taiwan that plays a key role in protecting the people from infectious diseases. In this report, you will see CDC's outstanding team working around the clock and across the island to ensure a healthier environment for our people. I am proud to have fought some tough battles with the outstanding team at Taiwan CDC, including the SARS epidemic in 2003. We are also actively preparing for the challenges ahead, such as the H5N1 avian influenza and other emerging diseases.

In 1999, Taiwan CDC was established by merging three separate agencies - the Bureau of Communicable Disease Control, the National Institute of Preventive Medicine and the National Quarantine Service - with a new mandate from the vastly amended Infectious Disease Control Act. During the past seven years, we have stayed true to our motto: "Disease prevention should be regarded as a battle. Unity, professionalism and action are the keys to success."

We are better prepared than ever to rapidly respond to an emergency, as we have built a multi-dimensional disease surveillance portal that utilize web-based technology to facilitate real-time information gathering. Furthermore, we have established an immunization information system to monitor vaccine coverage and orchestrate the government's vaccination programs. In short, Taiwan CDC has developed a comprehensive information system to control diseases and minimize damage.

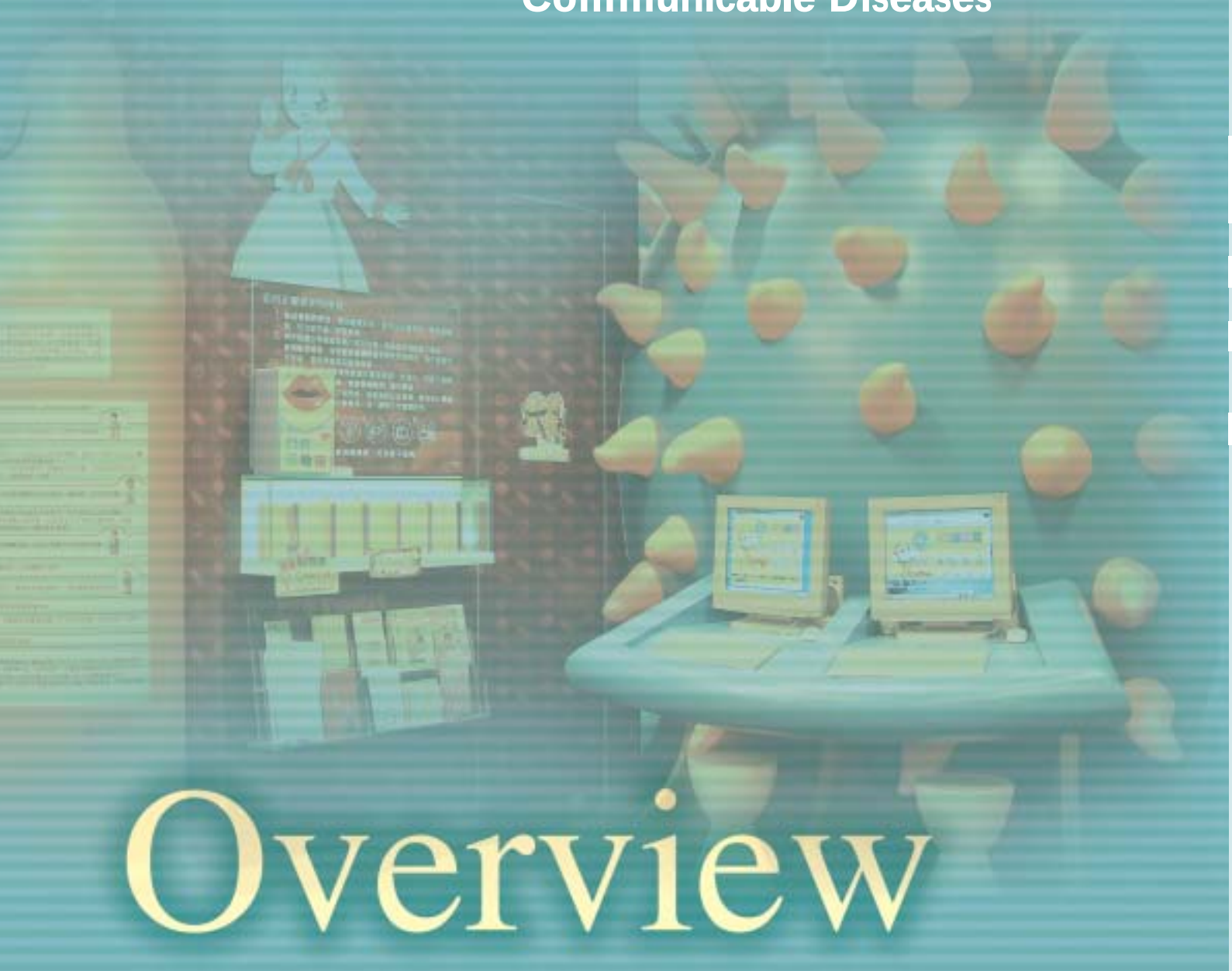
Since 2003, many countries in Asian have been affected by the highly pathogenic avian influenza (HPAI), also known as bird flu. Human H5N1 cases have been reported in Vietnam, Thailand, Cambodia, etc., and the mortality rates of the cases were as high as 57%. Fortunately for Taiwan, only the lowly pathogenic strain (H5N2) was detected in fowl and no trace of HPAI has ever been found. Nevertheless, Taiwan CDC has stepped up its effort in detecting human avian flu cases and irregular clusters of influenza-like sickness through a multi-sources surveillance system. We have also established a lab surveillance system with 13 participating virology laboratories located at medical centers throughout Taiwan. We believe rigorous surveillance has help kept Taiwan bird flu free.

Meanwhile, we realize that participation in international affairs is critical and necessary in this age of globalization. As a responsible member of the international community, we seek to work with partners throughout the globe to improve health services for all. In recent years, we have been actively participating in international activities, promoting bilateral and multilateral cooperation as well as providing international healthcare assistance to needed allies and organizations. We seize every opportunity to contribute our knowledge and experience to build a better world and fulfill the vision of a healthy life for all.

Taiwan CDC's medical and research personnel always stand at the frontline to battle against epidemics, and they devote every effort to helping patients and their families cope with infectious diseases physically and mentally. I would therefore like to dedicate this annual report, which details our endeavors and achievements during the past year, to all Taiwan CDC staff as well as our partners and supporters I sincerely hope that you enjoy reading the report and continue to support us with your recommendations and feedback.

Steve Hsu-Sung Kuo, MD, MPH, PhD
Director-General
Taiwan Center for Disease Control

• General Information On Communicable Diseases



Overview

General Information On Communicable Diseases

Table.1 Past-Year Major Disease Control Accomplishments in Taiwan

1. 1948-plague was eradicated.
2. Since 1948-Immunization program was implemented (1948 Diphtheria toxins, 1955-DPT, 1956-BCG. 1966-OPV, 1968-Japanese encephalitis vaccine, 1978-Measles vaccine, 1984-Hepatitis B vaccine, 1986-Rubella vaccine, 1992-MMR) to lower the incidence rate of the aforementioned communicable diseases.
3. 1955-Smallpox was eradicated.
4. 1959-Rabies was eradicated.
5. 1965-Malaria was eradicated.
6. 1984-Hepatitis B vaccination program was implemented, reducing the children-carrying rate by 84%.
7. 1995-Hepatitis A vaccination program was implemented, successfully eliminated the outbreak in the mountainous areas.
8. 1998-Influenza vaccination program for elderly was implemented, lowering the hospitalization by 54%.
9. 2000-Polio was eradicated.

Background

Since the ancient times, the threats of infections diseases have never come to an end. Fortunately, there is a group of people who are fighting gallantly against the enemy. Thanks to their efforts, numerous indigenous communicable diseases such a plague, smallpox, rabies and malaria (see Table 1) were successfully eradicated in Taiwan during 1948-1965.

The fight against communicable diseases is an ever-changing and fast-moving affair. To meet the challenges, the Center for Disease Control was established under the Department of Health by effectively merging the Bureau of Communicable Disease Control (BCDC), the National Quarantine Service (NQS) and the National Institute of Preventive Medicine (NIPM). This effort has brought the nation's resources for disease control under one command, so the prevention and control of communicable diseases can carried out more effectively.

To meet the challenges of disease control in the 21st century, the reinvented Center for Disease Control has made "prevention and control " the central thrust of its effort and geared its effort to the surveillance and research of communicable diseases. Taiwan CDC is under the command of the Director-General, who is assisted by the Deputy Director-General and Secretary-General. This headquarters for Taiwan's disease control is composed of the Planning Division, Infection Control Division, Emerging Infection Diseases Division, Quarantine Division, Prevention Division, AIDS and STDs Division, Immunization Division, Surveillance Division, Tuberculosis Division, Resources Management Division, Laboratory Research and Development Center, Vaccine Center, Information Management Office and six Branch Offices (see Table 2).

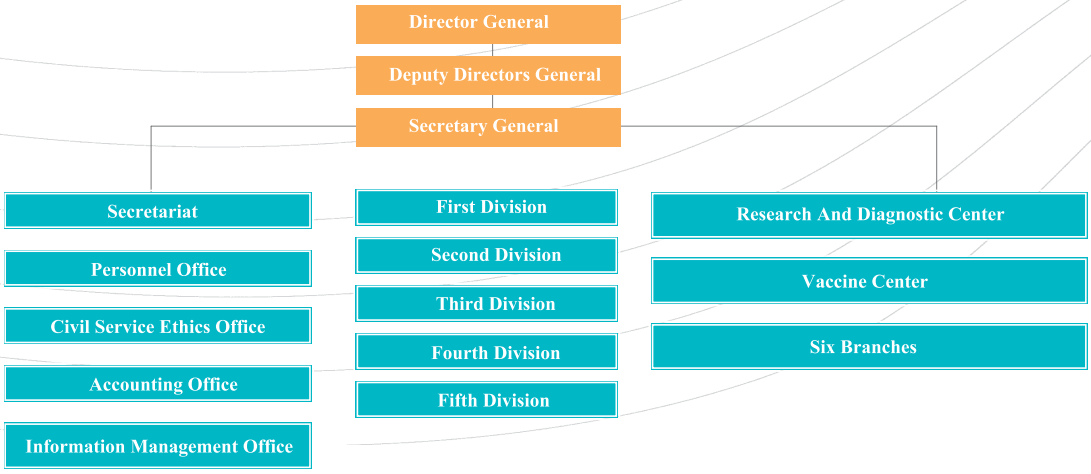


Table 2:Organization of Centers for Disease Control, Taiwan

Currently, Taiwan CDC has 798 employees, with an average age of 42.8 years. Of the staff, about 76% are under 49 years old, 76% have college degrees, and 27% have advanced degrees (see Figure 1 and Figure 2). With a team that combines credibility, vitality, and innovation, Taiwan CDC is working hard to foster a disease-free environ for the people of Taiwan. To attain this goal, it counts on professional disease control measures, timely disease surveillance systems, state-of-art research, and innovative health publicity and education.

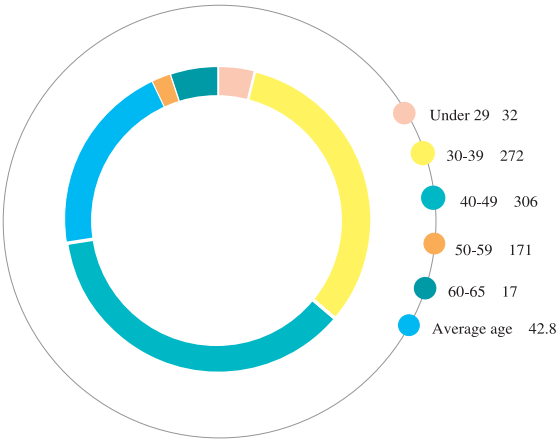


Figure 1:Age Statistics of Center for Disease Control, DOH

Achievements in Recent Years

Infectious Disease Prevention

In recent years, Taiwan CDC has focused its energy for communicable disease control on enteroviruses, bacillary dysentery dengue fever, AIDS, tuberculosis, prevention against bio-terrorism and preparedness against pandemic influenza.

In 1998, enteroviruses broke out in large scale in Taiwan, causing great panic in society. The Department of Health (DOH) immediately established a surveillance system and a medical consultation committee to deal with the problem. Then, Taiwan CDC launched a movement to teach people the correct way for washing hands, enabling

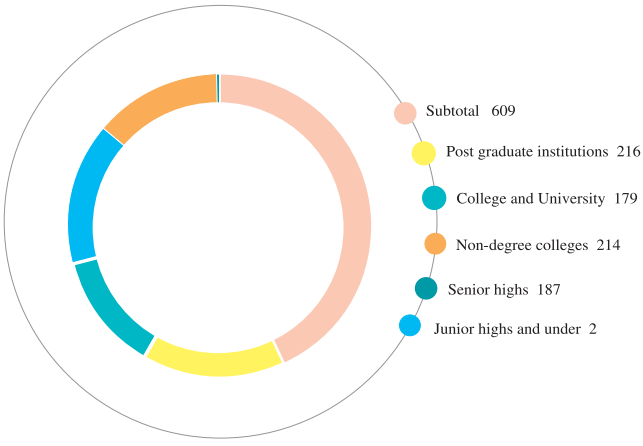


Figure 2:Educational Status of CDC Employees

them to prevent the epidemic in their daily lives. As bacillary dysentery occurs more frequently in certain groups, a plan that enlisted the effort of schools, churches, community volunteers, and local leaders was carried out in aboriginal districts during 2001-2004 with remarkable success.

In the control of dengue fever, Taiwan CDC has strengthened the reporting by doctors and the general public and, at the same time, conducted a vector distribution survey in order to effectively control disease-carrying mosquitoes. It has also taken body temperature for inbound passengers at the airports and tracked the health state of passengers from Southeast Asia Toward sustainolle cootool of dangue fever. Initiaties to involve the commanties to clean up breeding sites have also been launched.

With regard to AIDS control, since the first case was reported in 1984, Taiwan CDC has taken measures to ensure safe blood transfusion and safe sex and strengthen the AIDS surveillance network. As a result, the spread of AIDS was much curbed, making Taiwan a low-infection country. Unfortunately, the number of reported cases surged 77% in 2004 over 2003 with a seven-fold increase in the infection among people sharing syringes. To stop the tendency of prevalence, Taiwan CDC implemented a trial harm-reduction program in 2005 in the hope that, through a joint effort, the spread of AIDS among drug users can be brought under control.

In Taiwan tuberculosis is the most notorious notifiable communicable disease in terms of either the number of incidences or the number of lives lost. Since November 2001, Taiwan CDC has used Web for registering reports on tuberculosis cases and for fatality check in an effort to make the reports more complete. At the same time, it has strengthened the training of doctors working on the base level and intensified, through these doctors, the publicity of the advice: “ See a doctor immediately, if the cough has lasted for three weeks. ” This tactic has much improved the reporting and management system for tuberculosis. Since 2002, Taiwan CDC has tightened its case-tracking management by specifically assigning each TB case to a public health nurse. In 2004, TB control was further strengthened by including TB treatment in the National Health Insurance Program. It mapped out a plan for providing better care to tuberculosis patients. As an incentive for seeking treatment, the Bureau of National Health Insurance (BNHI) waived the premium to be paid by tuberculosis patients in July 2004.

In recent years, most of the emerging infections reported in the world were mutually communicable between animals and humans (for instance, the Hanta virus pulmonary syndrome reported in the USA in 1993, the bird flu reported in Hong Kong in 1997, and SARS reported across the world in 2003). Taiwan CDC has placed the control of zoonoses at the top of its agenda. Its major tactics include formulation and implementation of policies, collection and analysis of medical information, mobilization for the control the disease, proactive monitoring of world situation, preparation of perfect control plans, and cultivation of disease-control capacity through training and exercises. All this is intended to cut off the inroad of zoonoses and their affection and spread for the protection of people’s health.

In view of the shock caused by the SARS epidemic and in coordination with the Executive Yuan’s preparations for total defense of the people, Taiwan CDC has consolidated its mobilization capability for epidemic control by integrating its efforts with medicinal mobilization, administrative medical mobilization, and emergent medical-care system. It has striven to ensure the people’s safety by establishing a mutually supporting system under the government’s strategy of all-people defense.

Immunization

Taiwan has successfully reduced and even eradicated a number of communicable diseases through vaccination for babies and the elderly. On October 29, 2000, the World Health Organization declared Western Pacific as a polio-free area, marking a final recognition of Taiwan's efforts made for so many years.

Taiwan is the first nation in the world in to administer vaccination against Hepatitis B. After year's effort of the government, the number of Hepatitis B pathogen carriers has reduced from 10.5% in 1989 to 0.84% in 2005 of the population. Hepatitis A is more common among indigenous people living in the mountains. The DOH began to vaccinate the children in the mountainous villages and nearby lowland villages in June 1995 and brought about good results. In the mountainous villages, the incidence rate of acute Hepatitis A plummeted from 90.7cases per 100,000 people in 1995 to zero case in 2005.

In addition, the mini-Three Links with China, which have greatly increased personal contacts and commercial exchanges between the two sides of the Taiwan Strait, might lead to the importation of hepatitis A virus from China and threaten the health of children in Taiwan. Therefore, free hepatitis A vaccination is being carried out for children aged 2 in Chinmen and Matsu regions. Researches revealed that most of the people under 30 living in Taipei City do not have Hepatitis A antibody. Therefore, publicity on Hepatitis A has been strengthened for this category of people to prevent the outbreak of the epidemic.

Current State of Immunization

In an effort to prevent the outbreak and to curb the spread of the various communicable diseases, the government provides babies with routine immunizations, of which the items and schedules are shown in Figure 1. Hospitals and clinics in various counties and cities have been contracted to offer the service

Age Vaccine	24 hr	2-5 days	1m.	2m.	4m.	6m.	9m.	12m.	15m.	18m.	24m.	27m.	30m.	6yrs yrs	≧65
BCG	BCG														
Hepatitis B		HepB1	HepB2			HepB3									
Diphtheria, tetanus, Pertussis				DTP1	DTP2	DTP3				DTP4				Td	
Polio				OPV1	OPV2	OPV3				OPV4				OPV5	
Varicella *								Var							
Measles, Mumps, Rubella©								MMR1						MMR2	
Japanese Encephalitis ☆									JE1,JE2			JE3		JE4	
Influenza						Influenza (yearly)									Flu (yearly)
Hepatitis A#											HepA1		HepA2		

* Varicella vaccine is given to children born after January 2003 and aged 12 months or older.

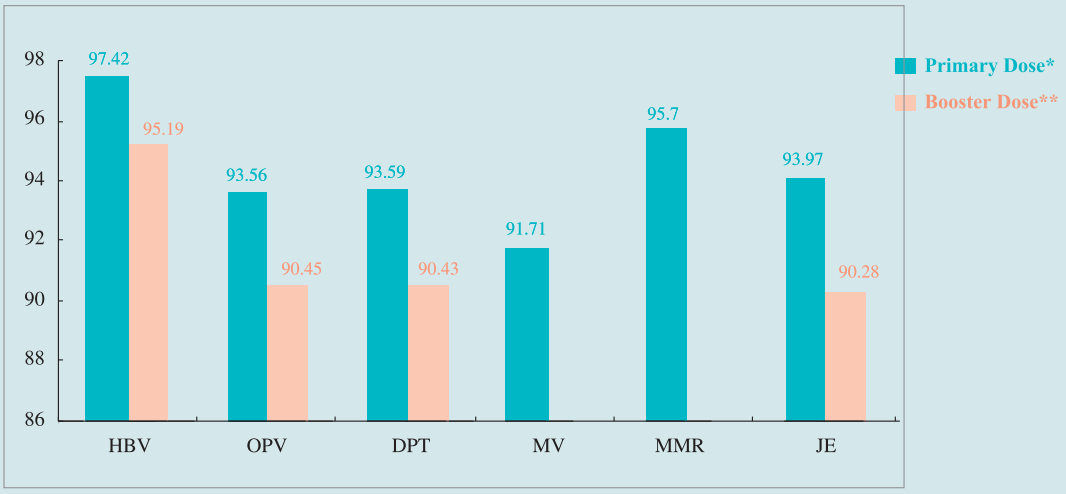
☆ Two weeks interval between dose1 to dose2.

In selected aboriginal areas.

© From 2006 onward, Measles vaccine is removed from the immunization program and the age for receiving the first dose of MMR has been revised to be between 12-15 months.

Figure 1. Current Immunization Schedule in Taiwan

in order to make immunization more convenient and raise the immunization rate. So far, there are more than 1,600 such contractual hospitals and clinics across the nation. In 2005, more than 4,000 hospitals and clinics participated in the flu immunization program (including vaccination for children). The immunization coverage rates for infants and young children are shown in Figure 2. Primary school pupils are checked for their immunization records at the time of enrolment and make-up vaccination is given at the spot. The immunization coverage rates are shown in Figure 3:

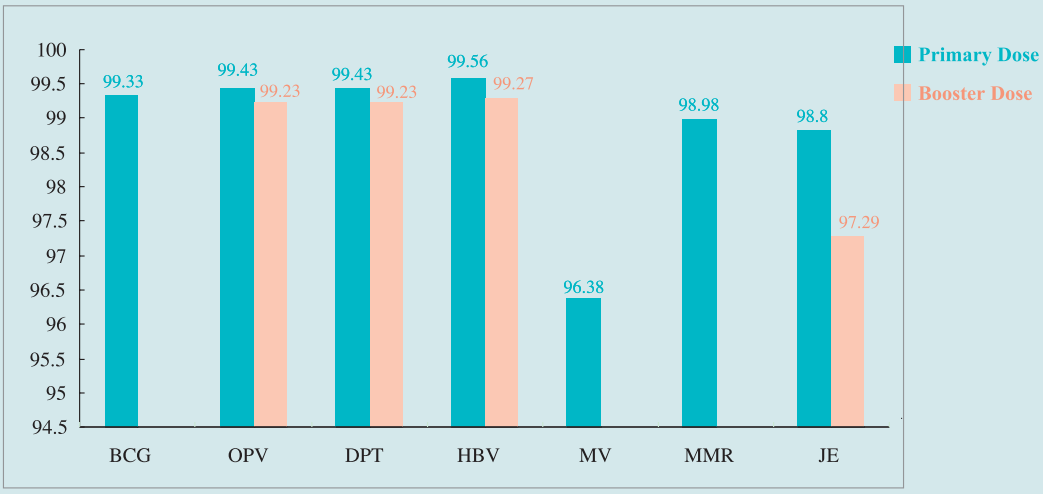


Source:The values were calculated in January 2006 on the basis of the immunization data registered under National Immunization Information System.

*Primary dose for the infants born in 2004.

**Booster dose for the infants born in 2003.

Figure 2: Immunization Coverage



Source: inspections of immunization cards of elementary school entrants

Figure 3:Immunization Coverage Among Primary School Entrants, september 2005

General Information on Communicable Diseases

The role of the Fifth Division and National Health Command Center are detectors of outbreaks and clustering of communicable diseases, sentinels of emerging and re-emerging infectious diseases and firewalls to bioevents and bioterrorism. By developing and fine-tuning our disease surveillance network, including the Notification Disease Surveillance and Reporting System and the detection system, we are capable of detecting and responding to the unusual events, clustering and outbreaks at the earliest moment to impede the spread of transmission.

To capture and response to both *naturally occurred* and *intended released* communicable diseases, the Investigation Taskforce for Diseases of Unknown Causes integrated the team efforts of the Field Epidemiology Training Program, non-government organization, resources from scientific institutions, medical and surveillance initiatives, and laboratories networks to support national and existing public health infrastructure, which satisfying the guidelines of Global Outbreak Alert and Response Network of WHO. The joint efforts ensure not only the effective coordination and response to combat the international spread of outbreaks, ensures appropriate technical assistance reaches affected areas immediately, but also fulfill the global capacity building to improve epidemic preparedness.

In response to the impact of global SARS epidemic in 2003, the Taiwan CDC established a unified central command system that includes the Central Epidemic Command Center, Biological Pathogen Center, Counter Bio-terrorism Command Center and Central Medical Disaster Emergency Center to serves as a unified central command system for preventing major epidemics with, the National Health Command Center with superior information management and dissemination infrastructure.

Our future directions to fulfill major challenges are to integrate school-based surveillance, autopsy-related surveillance, syndrome surveillance, nosocomial infection surveillance, surveillance for indexes of the Global Plan to Stop TB 2006-2015, hospitalization status surveillance of TB smear positive cases, monitoring the magnitude of adaptation workable measures of DOTS observers, and onset alert of TB contacts into a comprehensive surveillance network for prompt preventive measures.

Infection Control

Network for Infectious Disease Control and Treatment

Taiwan CDC has developed an “Online Hospital Referral and Bed Management System for Patients Suffering Infectious Diseases” to allow hospitals to make enquiries before assigning hospital beds. When an infectious disease breaks out, Taiwan CDC can mobilize the hospitals designated for treating infectious diseases according to the gravity of the situation. This system can also be used for referring patients to designated hospitals for treatment. Taiwan CDC has established an “Infectious Disease Command Center” in each district- Taipei, North, Central, South Kaokaoping and East. Each command center is made up of representatives of the local health bureaus ignated hospital superintendents and medical centers. The commanders and deputy commanders of the centers are charged with infectious disease control and prevention in their respective areas. When an infectious disease breaks out, the command centers can

mobilize the various hospitals for infectious disease hospitalization according to the need of the emergency. When SARS hit the world in 2003, people began to recognize once again that in-hospital control of infection is a vital link in the control of an epidemic. Just in case, the DOH added “strengthening the control of infections” to the list of the global budget for expense growth imposed on the various medical agencies under the National Health Insurance Program. It also mapped out an implementation and supervision plan at the beginning of December 2003. After thorough discussions among concerned government agencies, academics and specialists, the plan was launched on February 4, 2005.

Enforcement of Plan in Different Districts

According to article 45 of the Medical Treatment Act formulated in 2002, a hospital shall establish a nosocomial infection control system and a lab test quality control system, which are subject to review and evaluation. This is also provided for in the Enforcement Rules of the Medical Treatment Act. Article 41 of the Enforcement Rules says that, according to Article 45 of the Medical Treatment Act, a hospital shall establish a quality control system for medical tests. In pursuance of these provisions Taiwan CDC formulated “ Regional Guidelines for the Control of In-hospital Affection ” in an effort to help hospitals improve their medical quality, protect public health, and save medical resources. Under the plan, 122 hospitals and clinics across the nation received the guidance in 2002 and 195 in 2003. Three years later, infection control business of various hospitals was put on the right track. Starting from 2004, the emphasis was shifted from guidance to survey.

Laboratory Research

In addition to tightening internal control, Taiwan CDC collaborated with the US society of Pathological Medicine; the WHO laboratory in Melbourne, Australia; and the US Center of Disease Control for the improvement of lab tests. As for the control of the frightful enteroviuses, Taiwan CDC has used state-of-art biotechnology to develop enterovirus 71 vaccine. To cope with the inroad of the infection by arachnidan, it has established Asia’s largest flavivirus center.

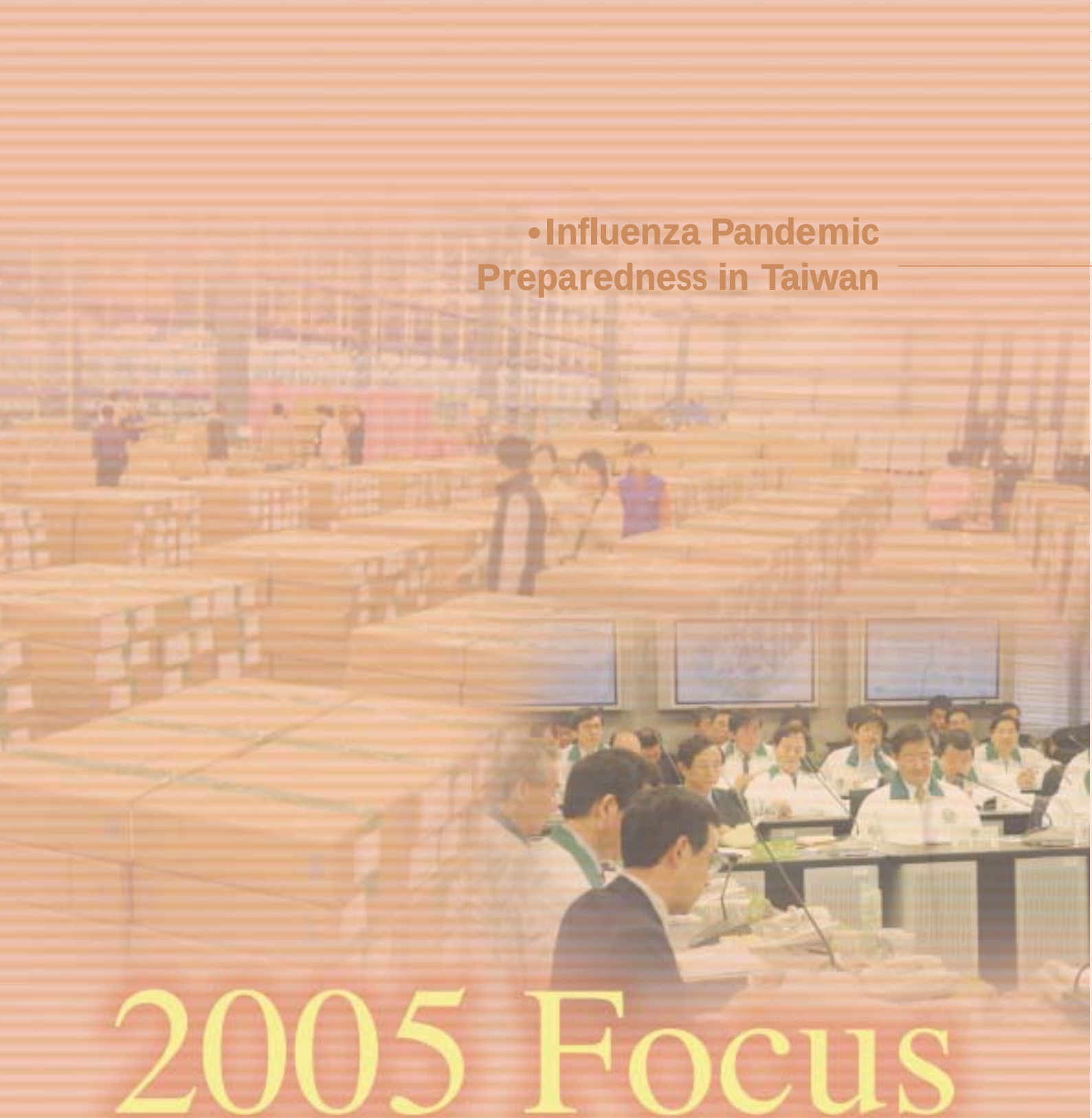
Health Publicity and Education

Taiwan CDC has established a virtual magazine, a virtual station, and 15 color signboards across the island. Up to now, people throughout Taiwan can get animated color messages on disease control. Besides, it has set up a "digital museum,"a"children’s website,"and a"game website"for children, parents and teachers to download at any time the disease-control information laboriously designed by Taiwan CDC.

Disease-control diplomacy

Although it has been isolated from world organizations since 1972, Taiwan has never ceased to dispatch medical teams to offer humanitarian assistance, provide medical materials, make financial donations to medical activities, conduct medical trainings, and give technical support. In addition, it has followed the APEC model of cooperation in the surveillance of communicable diseases and in other international health activities.

• Influenza Pandemic Preparedness in Taiwan



2005 Focus

Influenza Pandemic Preparedness in Taiwan

Background

Three influenza pandemics hit the world in the twentieth century, in 1918, 1957 and 1968 respectively. The 1918-19 pandemic took a toll of 20-40 million lives; the 1956-57 pandemic in Asia killed more than one million people, and the 1968-69 pandemic claimed 700 thousand lives, also in Asia. In 1997, H5N1 avian influenza virus hit Hong Kong, registering 18 cases involving 6 deaths, marking a fatality rate over 30%. Since, the world has heightened its alert on the next influenza pandemic. Between 2004 and 2006, many Asian nations were attacked by high-pathogenic avian influenza (H5N1). Later, attacks on humans were continuously reported in Vietnam, Thailand, Cambodia, Indonesia, China, Turkey, Iraq and Azerbaijan, which had a fatality rate as high as 50%. There were even sporadic reports of limited human-to-human transmissions of the disease. In Taiwan, the surveillance of avian flu is in the charge of the Council of Agriculture, which keeps tabs on hogs as well as birds, chickens, ducks, and geese. But between December 2003 and March 2004 only low-pathogenic H5N2 was detected, leading to the destruction of 370,000 domestic poultry. Fortunately, no sign of high pathogenic H5N1 has ever been discovered. Taiwan's Center for Disease control (CDC) has built multiple surveillance systems to detect human avian flu cases and unusual clustering of influenza-like illness. Furthermore, 12 virology laboratories belonging to medical centers have joined the laboratory surveillance system, which offer more information about influenza. Thanks to aggressive surveillance and case investigation, so far there is no human avian influenza case has been reported in Taiwan. Although H5N1 has not yet made effective human-to-human transmission, it has become an endemic in certain Asian countries, indicating the condition for a pandemic is being gradually built up. In the next few years, the avian flu currently hitting Asia threatens to trigger a pandemic.

Objectives and Strategies

In 2004, Taiwan completed its preparedness plan and established an inter-ministerial mechanism for the control of influenza pandemic. The plan was built on the framework of "three main strategies and four lines of defense."

Three Strategies: public health interventions, antiviral agents, and flu vaccine.

Public Health Interventions

Before an ample supply of vaccine and antiviral agents are available, non-medical interventions provides the major protective. According to WHO suggestions, non-medical interventions include reducing risk of infection by patients, reducing risk of contact infection, increasing social distance, shortening interval between symptom onset and patient isolation, and disinfection.

Under Taiwan's Communicable Disease Control Act, the government can make these non-medical preventions: suspending classes in schools, outlawing assemblies, restricting the number of people accommodated in a specific facility, controlling the traffic of a specific district, evacuating a specific district, forbidding patients using public means of transportation or entering or leaving a specific facility, and enforcing compulsory quarantine and treatment. During the rampage of SARS, government agencies have started to plan these measures. Currently, avian flu virus seems to be in the stages of

genetic re-assortment, which may lead to the emergence of new strains and trigger a global pandemic. In Taiwan, vaccination is available to poultry operators every year, for free. Once high-pathogenic avian flu raises its ugly head in Taiwan, disease-control workers, while destroying the poultry, will provide appropriate protective equipment, apply antiviral medications, and enforce a strict surveillance on the health of poultry operators.

Antiviral Agents

To contain avian flu, one of Taiwan's strategies is to administer antiviral medications to suspect patients in time. Currently, free antiviral medicines are offered to those who have clinical symptoms and epidemiology-related conditions as well as patients having rapidly deteriorating pneumonia.

In the future, when an avian flu strain emerges and threatens to trigger an epidemic in Taiwan, the government will apply medication in a large scale where the strain is found in order to prevent its spread. For this reason, the government has begun to stockpile anti-flu medications for use by 10% of the population. We can reach the target by June 2006.

Flu Vaccine

Bearing the long-term need in mind, Taiwan is beginning to build up its capability of making anti-avian-flu vaccines in cooperation with vaccine business. It is expected a vaccine plant will be built by 2008. To cope with the immediate need and reduce the damage of avian flu, the government is bent on the development of H5N1 vaccine for emergence use and planning to procure H5N1 vaccine on the international market for use by first line medical workers when avian flu hits Taiwan.

Four defense lines: off-border battle, on-border quarantine, control in community, and normal operation of medical system.

First Defense Line - Battle Out of Border

Currently, the main battlefield lies in the Chinese mainland and Southeast Asia. To stop an emerging pandemic virus at the source has become the consensus of world public health circles. The primary approach is to detect human-to-human transmission and to take control measures immediately. For instance, if an emerging infection is reported abroad, Taiwan should join the international efforts to control the nascent outbreak.

Second Defense line -Quarantine on Border

To prevent the import of avian influenza, Taiwan will carry out quarantine work at the airports and seaports and provide international travelers with information about the risks of avian flu. Measuring body temperatures with infrared thermal monitors has been conducted routinely at the international airports and seaports. All passengers found running a temperature or having the symptoms of pulmonary disease will be subjected to further examination.

When the WHO announces that the flu pandemic has entered Phase 5 and if at that time no avian-flu case is found in Taiwan, the government may announce that in-bound passengers will be concentrated in specific facilities for an at least seven days' observation. These quarantine facilities, which are still under planning, will maintain the normal life and normal channel of communications for the passengers under observation.

Third Defense Line -Control Within Community

At the current stage, the government is using multiple channels to make the public know what the avian flu is and what they should do in case of a major outbreak. It has installed a specific homepage on the

Internet to serve as a platform of communication with the public.

Once the novel flu virus strain is determined, measures will be taken to contain it to a limited area and prevent it from large-scale spreading in the community. Other measures to be taken are quarantine and control of activities in the community.

To convey to every citizen the correct concept of communal control of the pandemic, the government has completed educational training for about 1000 entrants and organized volunteer seed trainers.

Fourth Defense Line - Normal Functioning of Medical System

The failure of hospital defense during the rage of SARS has caused great panic. When an epidemic breaks out, hospitals become the last ditch defense, which must be kept intact for normal functioning. Since the rage of SARS, Taiwan has strengthened its capability of preventing nosocomial infection and established a medical network for the control of infectious diseases. This network comprises 23 county- and city-level hospitals. If a novel flu breaks out, these hospitals will be activated to deal with the disease according to the need of the time so that other hospitals can function as usual and avoid nosocomial infection.

Achievements

1. On December 29, 2004, DOH declared novel influenza virus infection a notifiable communicable disease. The declaration covered the case definition and the level of health risk of a pandemic threat. It empowered the DOH and the county and city health departments to take compulsory measures according to Communicable Disease Control Act during Pandemic periods.
2. A total of 433 hospitals were designated as sentinels for novel influenza sampling. They will actively monitor infections and when they find a patient meet the sampling criterion, they will immediately take the specimens, notify the health authorities, and treat the patient using antiviral medicines.
3. On the basis of the experience learned from SARS control and the WHO proposed strategy, Taiwan CDC has mapped out specific plans for infectious disease surveillance, quarantine, case investigation, laboratory examination, nosocomial-infection control, and procedure for health self-management. These plans have already been put in force.
4. In addition to the completion of preparatory plans by the central government, local government all have completed their preparatory plans, established their inter-departmental mobilization mechanisms, and conducted exercises on assumed situations.
5. The president has presided over three meetings on the control of avian flu.
6. On national level, table-top exercises have been held three times and other exercises have been conducted 30 times.

Future Prospects

Because Taiwan is not a WHO member, if avian flu breaks out on a large scale, it is doubtful that Taiwan can get an equitable allotment of disease-control resources. This is to say that for Taiwan there are stern challenges ahead. It is hoped that the technology for the development of vaccines against novel influenza virus will become more mature and that Taiwan can start to procure new vaccines or develop its own. If influenza pandemic occurs, Taiwan can rely on its current preparedness to reduce the number of infections and its impact on society.

National Disease Surveillance Systems

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Vision

The vision of national disease surveillance systems is to monitor national health status to detect outbreaks rapidly by integrating various infectious disease surveillance networks.

Mission

The mission of NDSS is to:

1. Construct diversified disease surveillance systems.

2. Collect and monitor data for disease trend analyses, disease prediction and disease alert.

3. Provide the analysis and assessment for global and indigenous infectious diseases regularly.

Background

After Taiwan CDC reorganized in July 1999, the national disease surveillance systems have been taking responsibility for surveillance of infectious diseases in Taiwan. It began with notifiable diseases surveillance and sentinel surveillance to detect epidemics. Later on, several systems were built up to help collect timely, complete and precise information of infectious diseases.

Establishing multi-surveillance systems

1. Notifiable Diseases Surveillance System: The first stage of web-based version of Notifiable Diseases Surveillance System was accomplished in July 2001, which enabled easier and more complete transmission of reported information. To strength the surveillance system, the second-stage of the system was accomplished in September 2004. The third stage of the system, which will effectively integrate the Symptom Surveillance System, Syndromic Surveillance System, and Notifiable Disease Surveillance System, is scheduled for operation by August 2006.

2. Syndromic Surveillance System: The system was implemented as a pilot project from July 2000 to December 2001 and return to CDC management in 2002. Since the system has proved to be effective, it has expanded to include district hospitals, regional hospitals, and medical centers in August 2002. The purpose of this system is to detect emerging and reemerging infectious diseases by reporting severe suspected infectious cases with unknown causes, and also intends to improve the deficiency of traditional surveillance system. It is expected that the effectiveness of the project will be evaluated in 2007.

3. Sentinel Surveillance System: The system was established in 1989 and participated voluntarily by representative medical practitioners in small towns and cities. Sentinel physicians report the number of outpatients suspected of catching chickenpox, diarrhea, influenza like illness (ILI), hand-foot-and-mouth disease, (HFMD) herpangina. The system has several features: (1) it evaluates the impact of the reported diseases on people's health, (2) it assesses the efficiency of various plans mapped out

for controlling infectious diseases, (3) it establishes the basic database for endemic diseases, and (4) it forecasts the trend and prevalence of infectious diseases.

4. School-based Surveillance System: In view of the fact that frequent interactions among the students would lead to rapid spread of infectious diseases, Taiwan CDC established this system in 2001. Teachers and school nurses participating in this project were asked to file weekly reports on the number of sick students and the discovery of ILI, chickenpox, mumps, HFMD herpangina, diarrhea, fever, and other infectious diseases.

5. Symptom Surveillance System: The system was established in 2003 for early detection of suspected cases of SARS. Novel influenza was included in 2004. The diseases have to be reported included pneumonia with unknown causes and ILI. Physicians are reminded to report the clinic symptoms of cases meet the criteria of taking speciments. In addition, they also need to take note of the contact history, travel history, and occupation of the patient.

6. Surveillance System for Populous Institutions: The system is aimed at early detection of clusters of infectious diseases in institutions among their inhabitants and workers. It applies to the hospices for the elderly, long-term care facilities, the elderly apartments, institutions for disability, protectories for children and the youth, veterans' homes, prisons, nursing homes, and day-care centers for mental recovery. If an individual or a cluster case of respiratory or gastrointestinal infection is found among their inhabitants and workers, the concerned facility is obliged to file an online report within 24 hours and confirm the reported data and the number of people accommodated once a week.

7. Information Collection System for Infectious Diseases: This system was established mainly for sorting out the latest international epidemic information every day and communicating them to our relevant divisions for undertaking suitable control measures if necessary. The information is simultaneously posted on the web site and can be accessed by general publics. Sources of the information include WHO, the websites of various nations' health departments, letters from diplomatic organizations, public health and epidemiological magazines, newspaper websites, television, Internet and other media. Taking advantage of the rapid publicity of the media and the accuracy of official reports, potential crisis can be evaluated early to prompt necessary moves.

8. Disease Reporting and Consulting Center for General Public: Whereas the experiences of the SARS outbreak during April to July in 2003 showed that in an epidemic, the disease control personnel were often disturbed by media interviews, phone inquiries and administrative business so that they could not concentrate on stamping out the epidemic. Hence, this center was established to provide the public with timely and complete consultation services.

Objectives and Strategies

Enhancing the operational effectiveness of various surveillance systems

1. Establishing management and analysis supporting systems:
   a. Geographical information system (GIS) was used in conjunction with the Notifiable Diseases Surveillance System, Syndromic Surveillance System, and the Sentinel Surveillance System for

epidemic analysis as well as for disease prediction model, which represented disease distribution in wave movement.

b. For providing the newest disease epidemic curve, Electronic Bulletin System (EBS) was designed to gather data from different systems or databases simultaneously, analyze the data and renew the tables or figures automatically through a single interface. The strengthened function enables users to timely view the information corresponding to the epidemic.

c. An Emerging Infectious Disease Hospitalization and Management System was completed in July 2005. The new system is flexible, allowing automatic addition of new diseases and new columns for keeping daily hospitalization records whenever these are required.

d. Various surveillance systems were installed for data inquiries and analysis.

e. On February 24, 2004, Taiwan CDC began to outsource to the telecoms industry the establishment of an Epidemic Information and Inquiry Service Center. People may dial 0800-024582 or 1922 for information. Taiwan CDC has assigned full-time personnel to answer the calls or take messages from callers. Thanks to the experiences of these personnel, the service center has become a platform of communication between Taiwan CDC and the general public. The manpower and service periods are subject to adjustment according to the gravity of the epidemic. Additional toll-free lines are provided in the Sentinel Surveillance Systems to allow sentinel physicians to report on special epidemic situations or to consult on information about epidemic surveillance at any time.

2. Reporting via the Web: To make the surveillance operation more effective, Taiwan CDC has established various web pages on its systems for users to upload information.

3. Integrating the systems: To integrate the information and analysis for more complete presentation and application, Taiwan CDC has been strengthening the integration functions of its surveillance systems, including the Symptom Surveillance System, the Syndrome Surveillance System, and the Notifiable Disease Surveillance System. This task is scheduled to be completed in April 2006.

4. Exchanging information:

a. Besides collating the updated endemic data from the Sentinel Surveillance System, the following weekly reports are published and distribute to sentinel physicians, school nurses, and other related personnel for reference. To increase visibility the contents of the Weekly Reports are posted on the web. Weekly Reports include Sentinel Surveillance Weekly Report, the School-based Surveillance Weekly Report, and the Influenza Express.

b. To effectively utilize the surveillance material, Taiwan CDC collaborates with the academic to conduct research projects every year.

c. Due to the close relations between the distribution and spread of infectious disease cases, pathogens and geographical factors, Geographic Information System (GIS) was often used to analyze the spatial and epidemiological data for further application and research worldwide. Although GIS has been widely developed in disease distribution or the application of map

display, it still needs more advanced research in correlation of disease and spatial data in Taiwan. Since the disease surveillance system works closely with the disease prediction and GIS, CDC organizes symposiums of 'Disease prediction model and GIS' regularly for professionals and CDC staffs to exchange opinions and provide a better understanding and application of GIS.

5. Broadening the use of information:

   a. Both English and Chinese versions of the GIS epidemic inquiry system were completed in December 2004. This has made epidemic information more apparent to foreigners and raised the service of this system to the international level.

   b. A daily updated information bulletin of the domestic and international epidemic has been established and broadcasted through the following systems: (1) the LED systems of the Taiwan CDC's offices and branches, (2) the system of DOH media center, and (3) the specially integrated system of Taiwan CDC's worldwide web and the integrated SARS information network. Besides, Taiwan CDC uses e-mail to forward daily information to Strait Exchange Foundation (SEF), Council of Agriculture, National Security Bureau, class-A tourist agencies, Taiwan Tourism Association, international airline companies, health departments of city and county governments.

6. Offering training and education: Every year, Taiwan CDC offers educational training to users of its various systems to enable them absorbing new information about epidemic surveillance.

Accomplishments

1. Notifiable Disease Surveillance System: In 2005, there were 2,569 notifiable disease cases that were required for reporting within 24 hours, of which 2,533 were reported timely, accounting for 98.6%, which is higher than the 2004 rate of 98.1%. In the same year, the average rate of completeness nationwide was 89.5%, also higher than the 2004 rate of 87.5 %. The following table shows the reported/confirmed case numbers of notifiable diseases in Taiwan in 2005.

2. Syndromic Surveillance System: The system includes 201 regional hospitals currently. In 2005, there were 966 reported cases, comprising 74 acute hemorrhagic fever syndrome cases, 325 acute respiratory syndrome cases, 280 acute neurological system syndrome cases, 265 acute jaundice syndrome cases, and 22 acute diarrhoeal syndrome cases. Except the acute hemorrhagic fever syndrome cases, which were reported mostly in eastern Taiwan, other syndromes were reported most in northern Taiwan. Except for the diarrhoeal syndrome cases, most cases were over 60 years of age. As for the acute neurological system syndrome cases, most occurred in the 0-9 and over 60 age groups in a U-shape distribution. The other syndrome cases tended to increase with age, but the increases were varied. The monthly incidences were shown in Figure 1.

   About 12.4 %(120/966) of reported cases were found positive in CDC laboratory tests. The positive rates were 14.9% (11/74) for acute hemorrhagic fever syndrome, 19.4% (63/325) for acute respiratory syndrome, 8.6% (24/280) for acute neurological system syndrome, 7.9% (21/265) for acute jaundice syndrome, and 4.5% (1/22) for acute diarrheal syndrome. Of the pathogens found, Orientia tsutsugamushi (8 cases) topped the list in acute hemorrhagic fever syndrome cases. In acute

Table 1. Number of Notifiable Diseases in Taiwan in 2005

Diseases	2005	
	Reported	Confirmed
Intestinal Diseases	1226	804
***Cholera**	2	2
EHEC(Enterohemorrhagic E. coli infection)	6	0
Typhoid fever	76	35
Paratyphoid fever	40	13
Shigellosis	214	174
Amoebiasis	283	120
Acute flaccid paralysis	66	61
Enteroviruses infection complicated severe case	275	142
Acute viral hepatitis type A	264	257
Vector-Borne Diseases	3596	834
Dengue fever	1083	306
***DHF/DSS**(Dengue hemorrhagic fever/Dengue shock syndrome)	5	5
***Malaria**	26	26
Japanese encephalitis	306	35
Scrub typhus	2176	462
Respiratory Diseases	25759	16366
Meningococcal meningitis	39	20
Measles	39	7
Pertusis	184	38
Scarlet fever	1713	1132
Legionellosis	943	38
Rubella	43	6
Open pulmonary tuberculosis	12600	8820
Tuberculosis	10066	7046
Haemophilus influenza type B infection	38	12
Influenza severe case	91	33
Other Diseases	643	537
***Hantavirus syndrome**	-	-
Tetanus	16	0
Acute viral hepatitis type B	323	321
Acute viral hepatitis type C	194	172
Acute viral hepatitis type D	14	4
Acute viral hepatitis type E	71	21
Unspecified acute viral hepatitis	16	10
***Leprosy**	9	9

*Includes only confirmed cases.

*All 26 malaria confirmed cases were imported.

*Leprosy includes foreigners.

respiratory syndrome cases, Chlamydia pneumoniae (39 cases) took the lead, which was followed by influenza virus (14 cases). In the acute neurological syndrome cases, Japanese encephalitis virus (JEV) was the chief culprit (13 cases). As for the acute jaundice syndrome cases, hepatitis E virus (HEV) headed the list (10 cases), which was followed by Leptospira (6 cases).

3. Sentinel Surveillance System: Like in previous years, the major wave of ILI epidemic in 2005 appeared in the winter and a comparatively mild one came in the summer. As for enterovirus infection epidemic, it peaked in spring and summer, but a comparatively large wave emerged in early winter. Chickenpox epidemic period used to prevail in the interval between winter and spring. Diarrhea epidemic peaked in winter (see Figure 2).

4. School-based Surveillance System: At present, 449 primary schools have joined the school-based surveillance system, which monitors 360,000 pupils. Due to promotion of this system, sick leave

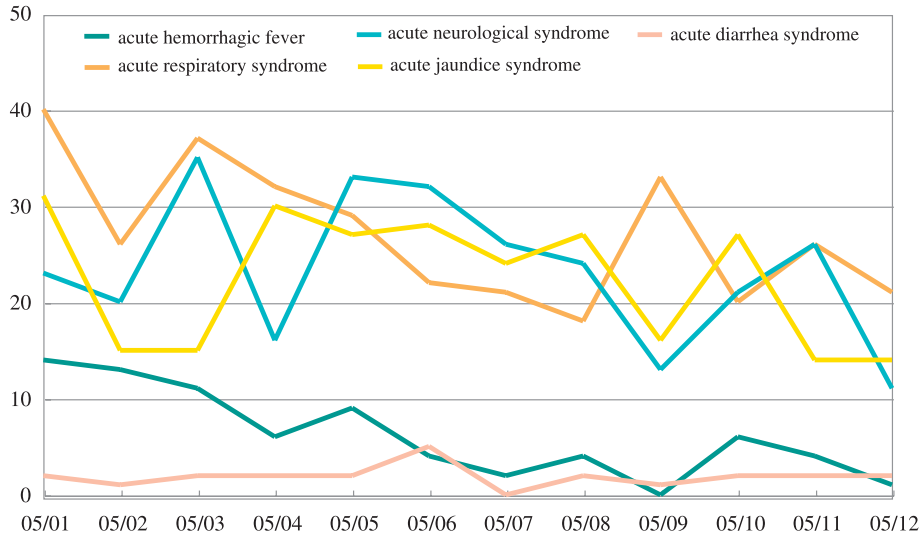


Figure 1: Monthly Distribution of Syndrome Cases Reported in 2005

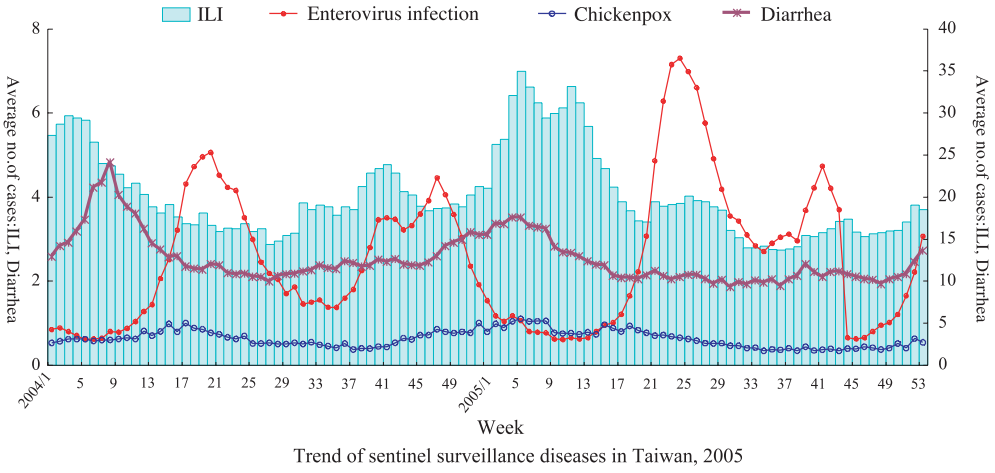
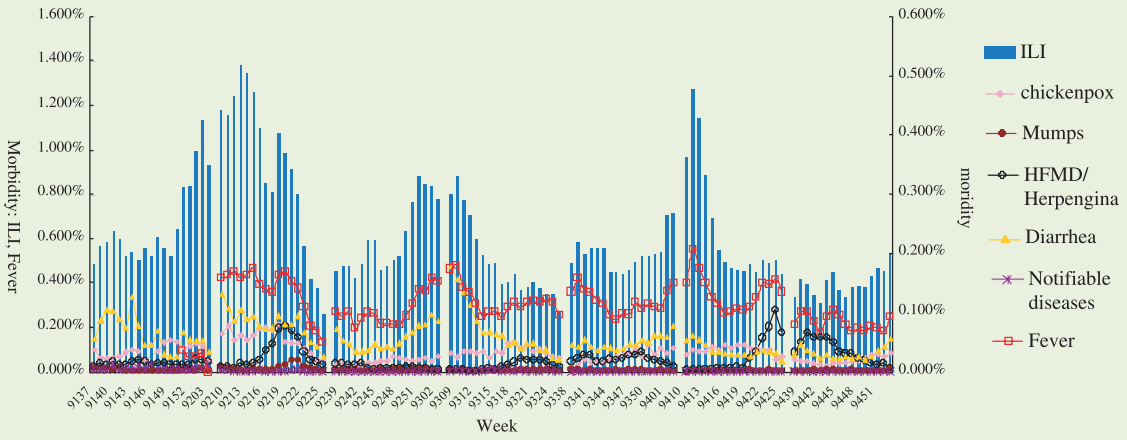


Figure 2: Trend of sentinel surveillance diseases in Taiwan, 2005

proportion has increased nearly 4.4%, indicating this system has effectively increased the attention to the importance of preventing epidemic in schools. Besides, the information about ILI HFMD/ herpangina has been compared each week with data obtained from other surveillance systems (see Figure 3) for evaluation by Taiwan CDC staff. The school-based system focuses mainly on seven epidemic cases: ILI, chickenpox, notifiable communicable diseases, fever, mumps, diarrhea, HFMD/ herpangina. By comparison, the trend found on the system with regard to ILI HFMD/ herpangina were similar to the findings of Sentinel Surveillance System. This is to say that the system has accurately and effectively reflected the prevalence of epidemic diseases among school pupils and can be considered as a major reference for evaluating epidemics in the prevalent season.

5. Symptom Surveillance System: In 2005, 71 specimens were taken from patients infected with pneumonia of unknown causes. All of them belonged to low-risk groups and nine were found flu positive. In the year, 85 species were taken from novel influenza case, of which six tested influenza virus positive (4 were influenza A H3 and 2 were infleuza B).

6. Surveillance System for Populous Institutions: By the end of 2005, over 1600 institutions had participated in this surveillance system. These institutions had about 190,000 workers and inhabitants. In 2005, a total of 1317 people were reported for contracting suspected respiratory tract infections and 123 for showing gastrointestinal infection symptoms. Lab tests showed that there were 54 flu positives of 52 suspected respiratory tract infection clusters, 22 Norovirus positives of 13 suspected gastrointestinal infection clusters and 8 were found as having Bacillary Dysentery .



The Morbidity of Disease Reported by Sentinel Schools in Taiwan, (2002.09.08-2005.12.31)

Notes:
1. Infection rate = infectious student number / total weekly attendance x 100.
2. 2004 participants were 451 primary schools and their kindergartens.
3. In 2002, 51 weeks were conducted in Pingtung City; in 2003, ever" was included for reporting from the ninth week.
4. In the 17th week, 2003, Hoping Hospital was isolated for SARS infection, causing panic in society and suspension of classes in schools.
5. Please see left-hand Y-axis for flu-like illness, and right-hand Y-axis for other disease.
6. Year of 91=2002; year of 92=2003.

Figure 3: The Morbidity of Disease Reported by Sentinel Schools in Taiwan, 2005

National Health Command Center (NHCC)

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Origin（Strategy for Long-term Success）

In 2003, SARS became a global epidemic that severely tested Taiwan's capabilities for managing medical crises. In response, the government established the National Health Command Center (NHCC), a well-equipped communications facility designed to coordinate the actions of officials at all levels and provide decision makers with critical information on medical crises.

The NHCC, based in the Center for Disease Control (CDC), is part of a unified central command system that includes the Central Epidemic Command Center, Biological Pathogen Center, Counter Bio-terrorism Command Center and Central Medical Disaster Emergency Center. This joint framework serves as a comprehensive means for preventing and controlling major epidemics.

Framework（Victory through Perfect Teamwork）

The NHCC's success hinges upon state of the art technology, urgent medical information integration, and a complete command system. Therefore, its planning team established standard operation procedures (SOP) that incorporate elements of the U.S. Incident Command System and the SARS Command System SOP.

In terms of operational framework, NHCC is designed to coordinate with district, regional and central government officials. When the scale of a disaster warrants action, NHCC will set up a crisis command center with a designated chief commander. The job of the chief commander is to form task forces, decide on the level of government involvement, and once the crisis has been brought under control, propose to officials to disband the crisis command center.

Organizational Layout（Resources at the Ready）

The NHCC, based in the CDC, is composed of the following units: Coordination Center, Situation Room, Commander Office, Administrator Office, Conference Room, Media Watch Room, Operation Room, Data Room, Utility Room, Records Room, and Lounge. This organizational design is intended to achieve effective coordination and operations.

Facility Designs（Technology on the Frontlines）

Epidemic prevention attains maximum effectiveness when assisted with information technology. Using cutting edge equipment and an advanced communications network, the NHCC plays a vital role in relaying and analyzing up-to-date crisis information for decision-making purposes.

* Videoconferencing: Conduct Internet videoconferences on large screen TVs, communicating with domestic authorities and governments worldwide.

* Media reception and satellite communication: to provide a constant flow of first hand information.

* Communication system framework: to integrate NHCC phone networks and maintain accessible hotlines to each command center.

* Environmental control and AV equipment: to provide decision makers with up-to-date information through the use of multiple high-tech visual media resources.

* Hardware control integration platform: to allow managers to effectively control visual media displays, videoconference settings and network configuration.

* Alternate site support: to be activated in the event that forces beyond our control result in the loss of operational capabilities.

Information Integration（Command by Grasping the Whole）

The collection and integration of up-to-date information is the key to victory in the war against an epidemic. Hence, an important goal of the NHCC is to set up a smooth and complete platform for information exchange.

Inter-departmental information platform

Initially, the platform will utilize an information framework consisting of Taiwan CDC's existing platforms, such as the "Epidemic Bulletin Board System," "Epidemic Location Information System" and "SARS Hospitalized Cases Report and Management System." From this framework, the NHCC commander receives integrated data regarding 6 infectious diseases (SARS, anthrax, dengue fever, influenza, bacillary dysentery and tuberculosis), counter bio-terrorism intelligence as well as medical resources and logistics for prompt decision-making. Future plans call for the incremental development of software for epidemic prevention or management or both.

* Decision support analysis software: Spotfire

Powerful analysis capabilities allow this software to process copious quantities of data, placing meaningful information at decision makers' fingertips.

* Meetings and Follow-up Evaluation Management System:

The system provides medical crisis meetings with the means for automatic reporting and follow-up management.

Future prospects (the power of uniting as one)

In the post-SARS era, we are employing modern technologies, smooth data exchange systems, and complete information platforms to achieve the 3 I's: Initiation, Integration and Innovation. That will enable the NHCC to successfully respond to any medical crisis and guard the health of the nation. Furthermore, it is our hope that government efforts to improve coordination will raise the level of people's epidemic prevention awareness, and create a better tomorrow for the whole nation.

• Hospital Infection Control

• Infectious Disease Prevention Network

Infection Control

Hospital Infection Control

Nosocomial Infection Control includes formulating the policy on nosocomial infection control, planning and supervising the surveillance of and reporting on nosocomial infections, calling committee meetings for consultation on nosocomial infection control, advising and checking nosocomial infection control work, training nosocomial infection control specialists, promoting R&D in nosocomial infection control, overseeing hospitals' control measures in the use of antibiotics, and carrying out other nosocomial infection control tasks.

Infection Control Policy and Achievements

A.Before the 2003 SARS outbreak

Prior to the SARS outbreak, nosocomial infection control was the responsibility of the hospitals themselves, and there was a lack of routine supervision by city and county health bureaus. Moreover, each medical treatment center had different definitions and statistical formats with regard to the nosocomial infection cases they monitored, causing problems in categorizing nosocomial infection data. At the same time, hospitals were commonly short of isolation rooms for treating patients with infectious diseases, and this exacerbated the need for a nosocomial infection policy. Furthermore, the severity of bacterial resistance to antibiotics in Taiwan was higher than in other countries, attracting the attention of all circles. Before the SARS outbreak, Taiwan CDC's nosocomial infection control policy was as follows:

1. Establishing an infection control system for regional counseling medical treatment centers .
2. Developing nosocomial infection monitoring and reporting software for hospital use.
3. Subsidizing hospitals for the installation of isolation rooms.
4. Improving the problem of resistance to antibiotics.
5. Launching public health educational campaign on the proper use of antibiotics.
6. Training personnel for nosocomial infection control.
7. Designing R&D programs for nosocomial infection control.

B. After the 2003 SARS outbreak

After the SARS outbreak in 2003, infection control encountered two major challenges: inability to implement nosocomial infection control work and lack of a complete health-care system for classifying infectious diseases. To meet these two challenges, Taiwan CDC instituted the following two important policies:

Improve the Ability of Hospitals to Control Nosocomial Infection

1. Revision of nosocomial infection control policies

Taiwan CDC needs to strengthen hospitals' ability of nosocomial infection control, increase the quality of health care, reduce nosocomial infection prevent the occurrence of infectious disease, and safeguard hospital workers' health and the people's right to seek medical care. Subsequently, it has taken these initiatives: establishing a sound nosocomial infection control system, revising the procedure of operation and the standards for nosocomial infection control, strengthening the surveillance of nosocomial infection, carrying out the consultations and assessments on nosocomial infection and the review of its effectiveness together with the hospital authorities, and offering education and training to people involved in nosocomial infection.



2. Revision of related regulations

a. Infectious Disease Prevention Law

Article 30 of the Infectious Disease Prevention Law was revised obligating medical treatment institutions to care for and treat infectious patients with up-to-date medical techniques. In addition, medical treatment institutions must take precautions against infections occurring within the institutions, and must not refuse to provide medical treatment services. The various levels of controlling authorities are charged with prescribing and implementing prevention and treatment measures such as infection control and preventive vaccination. Medical institutions must not refuse, circumvent or obstruct the admission of infectious disease patients. The prevention and treatment measures carried out by the aforementioned medical institutions, the controlling authorities' assessment bases and other relevant matters are to be prescribed by the central control authority.

Article 30 of the Infectious Disease Prevention Law sets forth precautions against infections and methods of assessing medical institutions' preventive vaccination. It obligates the controlling authority to supervise and assess the performance of medical institutions to see whether the precautions against infections are fully implemented in order to make the effort more effective.

b. Standards for facilities of medical institutions

The standards for negative pressure isolation rooms and ordinary isolation rooms are raised. At the same time, the distance between hospital beds in each medical unit is increased in order to reduce the risk of nosocomial infection. Hospital emergency room facilities must include a fever screening station, independent isolation rooms, equipment and negative pressure isolation rooms.

3. Program to reward hospitals raising the quality of infection control

When confronted with the SARS challenge, the world began to recognize the importance of preventing nosocomial infection to the successful control of infectious diseases. As a post-SARS precaution, in 2004 Taiwan CDC imposed an infection control surcharge on the premium of National Health Insurance and also installed a monitoring and implementation program. The levy is based on the National Health Insurance Medical Expense Standard set forth in Article 12. The organizations that are subject to evaluation are medical centers, regional hospitals, and district hospitals participating in the BNHI contract, totaling 531. By November 1, 2005, 533 medical organizations had been inspected. A plan was implemented for supervising regional hospitals' nosocomial infection control, and a mechanism was established for regional hospitals calling for scholarly and expert counsel on supervision.

Review items under this program include the quality of personnel controlling hospital infection as well as the quality of infection control and infectious disease prevention work carried out by hospitals. The results of the reviews are submitted to the BNHI as a basis for giving rewards. They are also submitted to the Department of Health's Bureau of Medical Affairs and the Taiwan Joint Commission on Hospital Accreditation as a basis for hospital review and appeal.

Future prospects

1. To reduce the risk of nosocomial infections, and raise the quality of healthcare in hospitals.
2. To reinforce hospitals' abilities to deal with the epidemic of new infectious diseases like SARS and emergencies such as biological terrorism.
3. To improve the epidemic control and medical treatment system so that it can integrate medical treatment and public health, utilize the functions of Infectious Disease Prevention & Treatment Hospitals, promote the concept of dedicated hospital care, diagnose and treat infectious diseases and prevent epidemics effectively to safeguard public health.

Infectious Disease Prevention Network

Background

In 2003, the whole world came under the impact of SARS. In Taiwan, SARS spread in Hoping Hospital and Ren Ji Hospital, triggering a strong shockwave in the medical system, which spread to the social public and other areas.

To avoid more clustering breakouts, the DOH announced on May 20, 2003, a plan for graded care of SARS patients and established a medical system for treating infectious patients in accordance with the gravity of the disease and the urgency of the need. In July 2003, Deputy Minister Li Long-teng of DOH went to the Executive Yuan to report to the Cabinet on the plan for controlling communicable diseases aimed at reducing the impact on the medical systems and enhancing the nation's capability to cope with the contingencies of emerging infections.

On August 23, 2003, the DOH approved Taiwan CDC's plan for establishing a network to control communicable diseases. To carry out the idea of graded medical treatment and to make it into a permanent measure and to look into the future, the plan was incorporated into the plans for "post-SARS reconstruction" and the "2005-2008 biological defense against emerging infections."

Objectives

To establish an epidemic prevention and control network which combines medical hospitals and public health systems, the system will be made to enable hospitals to provide safer and more effective treatment to health care personnel and infectious patients and also the hope for avoiding nosocomial infection.

Strategies

1. Dividing the country into six districts—Taipei, North, Central, South, Kaokaoping and East, and contract with 23 hospitals to serve as designated hospitals for the treatment of communicable diseases. The designated wards of these hospitals reach a total of 373 negative isolation rooms and 154 ordinary isolation rooms. The ordinary, managed their hospitals on usual, but when the communicable disease breaks out, these hospitals will be activated immediately to treat patients.

2. Organizing a command center in each district. It is made up by local health bureau, medical centers, the infectious diseare hospitals and other related organizations. A commander and a deputy commander are selected to orchestrate the operations of the infectious diseare hospitals and the installation and improvement of the negative-pressure isolation rooms.

3. Setting up a consulting committee about communicable diseases, which is composed of epidemiologists, lab researchers, emergent medical rescue workers, hospital superintendent, and jurists to offer professional advice and serve as an advisory body in the formulation of policy.

4. Streamlining the reporting system. If an epidemic breaks out, the system will be used for reporting to the health department, the local branch of Taiwan CDC, and the commander of each command

center. After considering the status of the patient, the commander will decide where the patient should be sent for treatment. In doing so, the commander can use the patient referral and hospital bed management system.

5. Strengthening the management of quarantine wards. When a hospital designated for treating communicable diseases is activated, it should first make the quarantine wards ready for use and the second assignment of all isolation rooms, even a whole floor of the building for accommodating patients of communicable diseases. If it is needed, the whole hospital should be emptied to admit patients of communicable disease in order to avoid the spread of the disease and prevent from transmissian other people.

6. Promoting the 23 infection disease hopspitals with the supporting hopstials to cooperate by assisting them in the training of their medical staffs and in the development of their medical services.

7. Firstly, the patients of the all-shore Blands treat at the locol hopstial, if need the medical group go to the Bland, next to deliver the patients to come to Taiwan to grosis.

8. Asking the designated infectious disease hospitals to buidup a name list of their medical personnel and supporting staff. The list is updated all the time. Before pandemic, all stafts need to train by hopstials, or local authority.

Achievements

1. Completion of the signing of contracts with 23 hospitals for taking care of infectious patients.

2. Selection of the commanders and the deputy commanders for the consulting committees charged with the network of medical treatment for infectious patients.

3. Formulation of the guidelines for supporting operations and personnel deployment.

4. Collaboration with related societies and hospitals to train disease control staff and public health personnel for the control of communicable diseases.

5. Preparations for establishing the DOH Infectious Prevention Center.

6. Affirmation of the operation plans for mutual support and cooperation among hospitals contracted by the medical network for communicable diseases.

7. Conduction of 6 courses of health education and training for specialists and technicians engaging in nosocomial infection control.

8. Completion of 6 maneuvers on the control of communicable diseases.

9. Commission of the Institute of Labor Safety and Health under the Council of Labor Affairs to inspect the designalid negative-pressure in the 23 hospitals isolation rooms.

10. Participation in the National Disaster Medical System Conference.

Publications

1. Isolation Room Operation Manual.

2. A Guideline for Infectious Disease Prevention Network.

Future Prospects

1. To continue the operation of the network designed for the prevention and control of infectious diseases until it attains it objectives.

2. To establish an “Infectious Disease Prevention Center” for admitting and treating patients of infectious disease. Besides, it is planned to establish a training center for the cultivation of talented people for clinic treatment of communicable diseases, neighborhood disease prevention, and infection control.

3. To reinforce the ability needed for properly coping with all the contingencies in the prevention and control of infectious diseases.

- Counter Bioterrorism
- Biological Disaster Prevention and Response Plan
- Constructing national security network the all-out defense
- Management Information System (MIS) of Stockpile
- Investigation Taskforce for Disease of Unknown Causes

Emergency Preparedness and Response

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Counter Bioterrorism

Background

The terrorist attacks on the United States of September 11, 2001, and the subsequent incidents of anthrax bioterrorism put the whole world in the grip of fear. Two years later, a severely infectious disease, the severe acute respiratory syndrome, better known as SARS, the outbreak exposed the weakness of the global public health system, biodefense and national security. Either the deliberately distributed biological agents or naturally occurring novel pathogens have proved that they could destroy people's economic well-being and physical and mental health easily.

Therefore, good preparedness for bioterrorism and biological threats from novel pathogens has become a burning task of our times. The key to the prevention of bioterrorism is comprehensive training, perfect preparedness, early detection, real-time mobilization and timely action.

The Executive Yuan of the government has taken the lead to strengthen Taiwan's national security by bringing the intelligence, finance, economic, health and judicial departments together in counter terrorist campaign. Thanks to the cooperation and coordination of related departments, we are able to detect bio-terrorism quickly and act swiftly to stem the onslaught of epidemic diseases and assure the health of our society.

Objectives

(1) Prevention of and preparedness for bioterrorism

To formulate a preparatory plan for countering bioterrorism, including organizing a taskforce; stockpiling vaccines, antibiotics, antiviral treatments and antitoxins for biowarfare; and setting up vaccination and mobilization priorities.

(2) Routine rehearsal of biodefense strategies

To conduct routine training for personnel engaging in bio-defense and emergency medical service and to rehearse mobilization and other actions in the plan for fighting bioterrorism.

(3) Biodefense training for public health personnel

The Taiwan CDC, the Institute of Preventive Medicine, and the Ministry of National Defense have jointly conducted two courses for seed trainers to teach them the standard procedures to be employed against biological weapons.

(4) Information for experts, health care providers and general public fighting bioterrorism

Taiwan CDC has collected related information and compiled handbooks on standard operation procedure against Anthrax and Smallpox for use by public health personnel. It has also posted relating materials on its web pages for public information [http://www.cdc.gov.tw/index1024.htm/].

Notification:

This may be done through the toll-free hotlines: 0800-024-582 and 1922.

Major Events:

1. Policy improvement:
   a. Raising smallpox to be a Type 4 infectious disease in Communicable Disease Control Act.
   b. Drafting the Response Plan of Counter Bioterrism.
   c. Re-edit Bioterrism Warning Singnal and relevant emergency response actions at time in normal.
2. Biodefense related dills:
   a. On April 14, 2005, the Executive Yuan held a table-top exercise on the bio-terrorism attack for Smallpox preparedness drill.
   b. On December 8, 2005, a live exercise on countering bioterroris on MRT stations was staged at Chiang Kai-shek Memorial in Taipei.
3. Biodefense related dills trainings:
   a. Training was held from May 18 to June 2, 2005, for seed personnel of biological defense.
   b. Training was held from October 19 to November 3, 2005, for response personnel of counter bioterrorism.
4. Pre-conference workshop:

   Heads of related government agencies were invited to take part in pre-conferences on public health, economic and legal affairs at the Executive Yuan on December 5 before the opening of the International Conference on BioTerrorism Defense, 2005, Taiwan.
5. International conference:

   A commencement and exercise was held on December 6-8 after the conclusion of the International Conference on Bio-Terrorism Defense, 2005, Taiwan.



6. Publications:

   a. Published the “Handbook of Anthrax for Public Health Personnel” in May 2005.

   b. Published the “Handbook for Smallpox for Public Health Personnel” in August 2005.

7. Education and training:

   a. Conducted four training courses in northern, central, southern and eastern Taiwan for public health and control workers participating in the bio-defense, Anthrax and Smallpox.

   b. Offered 25 biodefense sessions for officals of country/city health deepartmeuts and the general public.

   c. Held four circuit seminars on biodefense across the nation between September 22 and October 13, 2005.

Future Prospects

1. Inviting the Minister of Health and the Minister of National Defense to construct a mobilization and back-up system for dealing with biological events in keeping with the Act of All-out Defense, Mobilization and Preparedness.

2. Establishing the Health Command Center in keeping with the Communicable Disease Prevention Act, which uses GIS, web-conferences, and inter-government cooperation in its operations.

3. Fashioning the standard procedure for dealing with bioagets and standardizing the guidelines for disease examination, treatment, prevention and control.

4. Strengthening the training courses on the defense counter bioterrorism, which will be tailored to the needs of the citizenry, medical staff, public health workers, and emergency handlers.

5. Stepping up drills in the counter bioterrorism aimed at prompt responses in an emergency.

6. Mapping out a preparation plan for the counter bioterrorism, which will include an e-learning educational system and a Counter-Terrorism Action Plan (CTAP) in harmony with the APEC’s strategy.

Biological Disaster Prevention and Response Plan

Background

In recent years, the concern over communicable diseases and the threat of terrorist attacks involving unconventional weapons have increased, and disaster prevention and rescue have transformed from the traditional two-dimensional operation to a task of integrated cross-department collaboration. The capability and performance of integrated response have to be improved significantly, so we need to establish the guide to biological agents. It will contribute to the overall goal of modularizing and systemizing the various rescue resources, including personnel, vehicles, equipment, apparatuses, logistics, and administrative and financial supplies. We introduce the modern US ICS to guide all the disaster-related units in their establishment of ICS, aimed to promote coordination and integration, set up a nationwide disaster prevention network and assure the use of concerted efforts. All this is required in advancing on-site commanding performance, boosting the rescue efficiency, reducing the risks of an emergency incidence and protecting people's life and property.

Introduction

This set of contents is formulated in accordance with the provisions of Article 17 of the Communicable Disease Control Act and Articles 3 and 19 of the Disaster Prevention and Response Act. Regulations governing the mitigation and preparedness of biological agents before the disaster, response actions to the disaster and recovery after the disaster are required. Formulation of such regulations calls for strengthening the capability of digitalization, systemization and standardization of information. When an epidemic outbreak occurs in the country, or during an epidemic induced by terrorist biological agents, the relevant disease control measures should be enforced along with the mobilization of national defense reserves.

Response Action Working Groups

To fight pandenic or bioterrorism, the central competent authority may integrate the resources, facilities, and manpower of concerned organizations and make concrete recommendations on mobilization for disease control. It may also seek the Executive Yuan's approval for the establishment of a central epidemic command center. The functions of the Center are as follows:

1. To evaluate the information of disease surveillance, to formulate and promote emergency policies for disease control.
2. To integrate the resources, facilities, and manpower of concerned organizations needed for disease control.
3. To conduct matters concerning news releases, information and education, use of mass media with priority, control of entry and exit of country(border), house quarantine, liaison and cooperation with international organizations, control of airports and harbors, requisition of transportation means, cleaning and disinfection of public environment, labor security and hygiene, control of

communicable diseases common to humans and animals, and other necessary control measures against major communicable diseases.

The Center may establish a secretariat, department of execution, department of planning, department of logistics, and department of finance; each department may establish several task force sections.

Major Achievements

1. This planned was approved by Disaster Prevention and Response Commission of Executive Yuan on April 7, 2005, and referred to each government agency on May 20 for enforcement.
2. A meeting on drawing up a plan for preventing biological agents from causing disasters was held among counties and cities on July 27, 2005, to held the county and city authorities to work out their prevention and response plans for controlling local pathogens.
3. To facilitate the planning, a point of contact window was established as the first step. Further communication was made at local governments' disaster control meeting. The Taiwan CDC is charged to organize meetings in northern, central, southern and eastern Taiwan to hammer out the mechanism of cooperation among neighboring governments.

Constructing National Security Network the All-out Defense

In keeping with the concept of "all-out defense" and "homeland security network" enforced by the Executive Yuan among the various government ministries and agencies, Taiwan CDC has completed various preparations for mobilization by building up its emergency medical treatment and rescue system. In case of a disaster or eventuality, the system can be used to protect the lives and properties of the people. The major tasks done in 2005 are as follows:

1. Mapped out the preparatory "plan for mobilization against communicable diseases" and the coordinating "county/city preparatory implementation plan for all-out mobilization" in accordance with the "All-out Defense Preparatory Act," the Communicable Disease Prevention Act, the Guidelines for All-out Defense Preparations, the Initiative for Health Mobilization Preparations.
2. Held an exercise on Green Island, Taiwan, on "treatment referral of patients suffering from pneumonia of unknown causes," which was don together with Wan-Ann No. 28 Military Exercise.
3. Participated in the seventh coordination meeting on central-level responses to an eventuality, which was intended to strengthen disaster rescue, civil defense, communicable disease control, horizontal connection between the systems of all-out defense, and information exchange.

4. Taken part in the “2005 touring workshop for cadres of all-out defense to direct health workers on local level to handle their tasks.
5. Inspected and assessed the performances of 25 counties and cities in their mobilization for the control of communicable disease, which was done in coordination with the Executive Yuan’s meeting on all-out defense preparations.

Management Information System (MIS) of Stockpile

During the SARS rampage in early 2003, there happened to be a serious shortage of persond protective equiemonts in Taiwan, such as N95 masks, surgical masks, procedure masks, protective clothing for health care workers (HCWs). However, as the epidemic gradually drew to an end, large quantities of such goods and materials left behind and needed to be sorted out and taken care of. It is an important part of the post-SARS task of Taiwan CDC to review the current epidemic prevention systems and proceed with the hope to better respond to any possible future crisis of similar emerging infectious diseases, such as avian flu. Thus, a revised plan was promulgated on June 23, 2004, and the Resources Management Section, among others, was established on July 1, 2004. The revised plan sets forth in detail such matters as the logistic stockpiles and distribution of personal protective equipments (PPE), relevant information collection, ongoing planning and inspection, and educational training. The Fourth Division of Taiwan CDC took over the work of the Resources Management Section on October 1, 2005.

The year 2004 was definitely decisive to the improvement of our PPE management in terms of both policy and strategy, and there was obvious good progress in the following four major aspects: establishing a safe stockpile of PPE, formulating and setting up a MIS, swift delivery, and long-term planning.

1. About safe stockpile, we channeled those large quantities of the surplus materials handed over by Department of Health into a three-level stockpiling system, i.e. the central, local, and individual hospital levels. In this way, not only is the responsibility spread evenly to every concerned user, each user is also asked to maintain enough quantity for at least one month’s supply. The current stockpiles, for instance, are 3,663,000 pieces of N95 masks, 4,652,000 pieces of coverall protecting clothing, and 23,857,000 pieces of surgical masks, which are all considered above the safe levels.
2. The newly established MIS website posts regularly updated information of their PPE at 556 hospitals, 331 health bureaus, and 24 CDC offices. According to a recent survey, there is an average of 465 persons viewing the MIS website every day, which means a total of 170 thousand visits per year. The latest version of it is having the content divided into four categories or subgroups including the conventional PPE, anti-snake venom plasmas, anti-virus drugs, and vector control pesticides. It has proven to be a most effective way of integrating the real-time information.

3. All the above-mentioned PPE are kept in the air-conditioned warehouse, and transferred effectively with modern and professional logistics. Materials are delivered to users located anywhere in Taiwan and Penghu within 24 hours after an order is received, we can make the delivery in three days whether it comes from Kinmen or Matsu, the two farther offshore islands.

4. On our drawing board there is a four-year long-term plan, for implementation starting from FY2005 to FY2008. The purpose of the plan is to gradually establish a high level bio-safety capacity for confidently responding to am emerging infectious disease. It will also boost our preparedness for possible bio-terrorism incidents in the future.

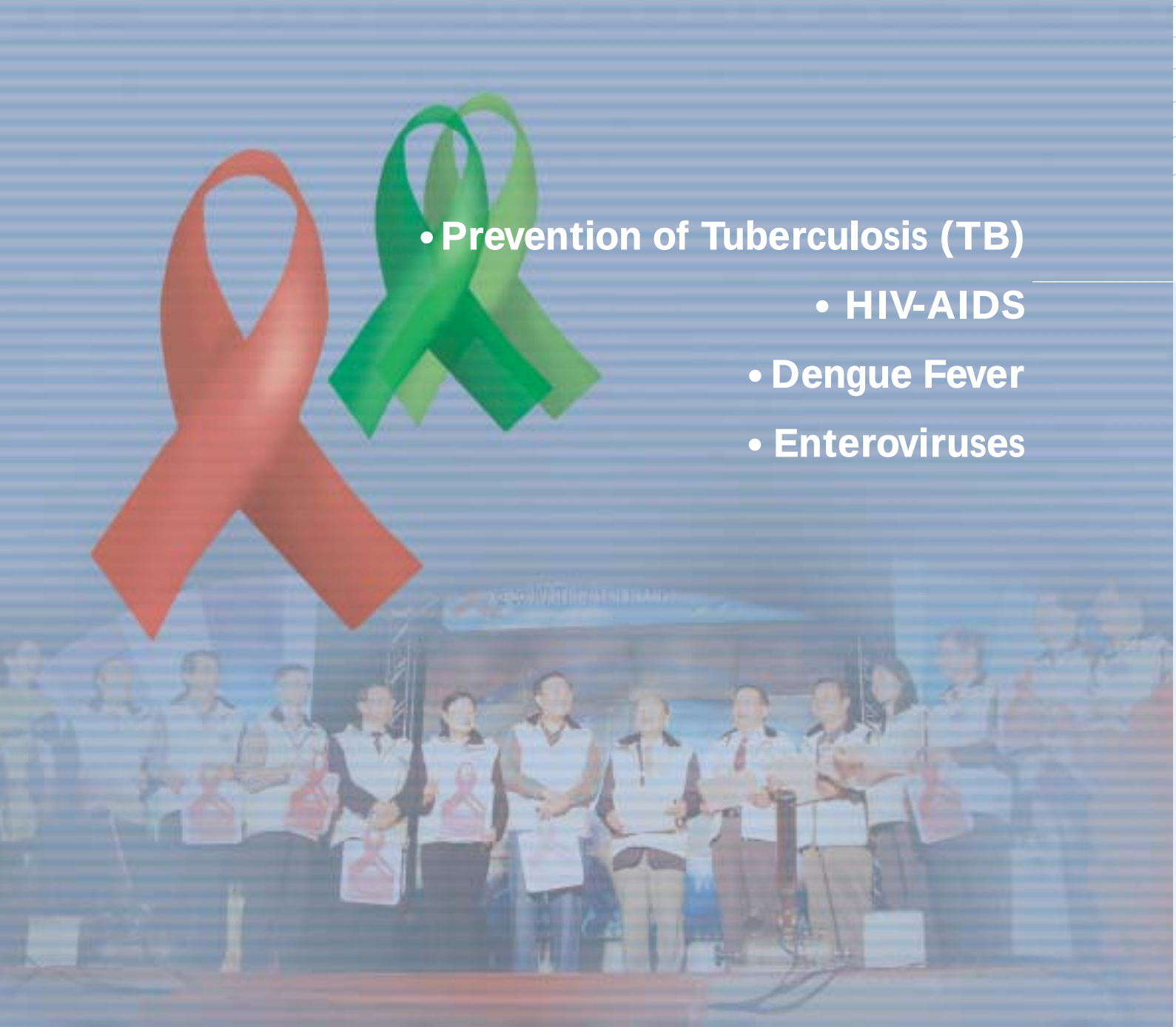
Investigation Taskforce for Disease of Unknown Causes

Background

To effectively control diseases, Taiwan CDC has constructed a surveillance system for unknown diseases and established the Field Epidemiology Training Program (FETP) through the joint efforts of the government's administrative system of health, disease-control (including Taiwan CDC of DOH, county and city health departments and health stations) and the academic research system (including the National Institute of Health, Council of Agriculture, medical colleges, public health colleges, and hospitals). It is hoped that this will reduce the spread of diseases of unknown causes through the field investigations made by health organizations and members of the epidemiology-training program and by taking advantage of collective wisdom of experts from many fields such as public health, epidemiology, toxicology, entomology, environmental health, community health, infection, and infantile infection control.

Upon receiving a case report either from a medical institution or the infectious disease surveillance system or the general public, the Investigation Taskforce for Disease of Unknown Causes (ITFDUC) will immediately mobilize the district's the epidemiologists, clinicians, health department or station, Taiwan CDC's related units, and FETP trainees to go to the site to handle the case on the spot. The task force will also coordinate the medical laboratories to pinpoint as soon as possible the factors of infection and the path of communication so that the infection can be contained and controlled as soon as possible and in the course Taiwan CDC's capability for disease control can be enhanced. In 2005, Taiwan CDC handled 14 suspected cases of unknown causes, revealed 3 cases of influenza virus, 1 septic shock case of Klebsiella pneumoniae, myocardial infarction, diffuse alveolar damage, hepatosis, and 3 cases remain unexplained.

This taskforce has worked steadfastly to integrate the flexible, homogenous, and maneuverable cross-platforms of investigative and analyzing systems for communicable diseases and also the various communities, medical, health, and infection investigation systems in order to provide prompt information for reference by the policy-making authorities, epidemic control and self-management of health. In this respect, it uses a digitalized platform of learning to spread the knowledge of disease control deep into the community, so that epidemics can be brought under control as soon as possible.



- Prevention of Tuberculosis (TB)
- HIV-AIDS
- Dengue Fever
- Enteroviruses

Communicable Diseases of Interest to the Public

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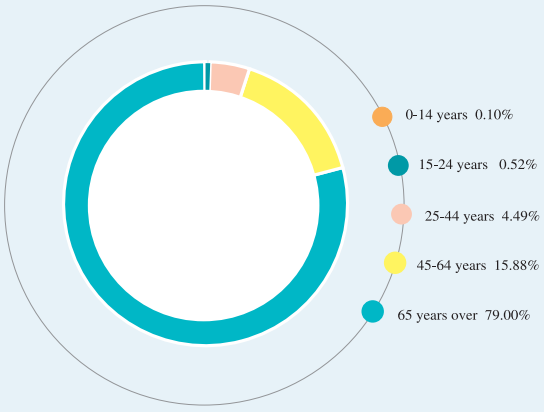
Prevention of Tuberculosis (TB)

The Situation of TB Epidemic in Taiwan

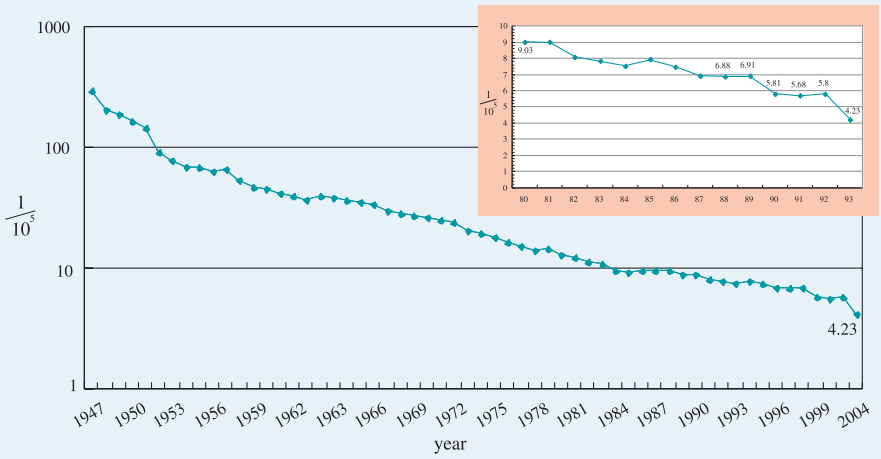
In 2004, the mortality rate of TB in Taiwan was 4.23 per 100,000 people. TB fatalities were 957, accounting for 0.72% of the total deaths and TB ranked 13th among the leading causes of deaths. Among the notifiable communicable diseases, TB has remained the number one killer for years. In 1947, the mortality rate of TB was 294.44 per 100,000 people and the proportion decreased to 4.23 in 2004. The decline is continuing at a slow pace (see Figure 1).

In 2003, 95.72% of TB patients died of pulmonary tuberculosis and the rest 4.28% died of tuberculosis on other organs. In terms of gender, male TB deaths in 2004 were approximately 3.39 times those of females while the mortality rate for male TB patients was approximately 3.27 times higher. TB mortality rate increases with age. Of the total 957 deaths caused by TB, 79%, or 756, were people over the age of 65, which was followed by people aged between 45 and 64（see Figure 2）. In comparison with the past, the age distribution of TB deaths is noticeably tipping towards the elderly population; and the mortality rate in the younger population has declined in recent years.



Note: Deaths of 65-year-olds and over accounted for 89%, followed by patients 45-64 years old.

Figure 2: Age distribution of TB deaths in Taiwan, 2004



TB deaths registered 957 in 2004,ranking 13th among causes of death,accounting for 0.72%

Figure 1: TB death trend in Taiwan, 1947–2004

Geographically, the mortality rates and incidences of TB tend to become stereotypical. They are higher in eastern Taiwan than in western Taiwan, higher in southern Taiwan than in northern Taiwan, and higher in the mountains than on the plains. In 2004, Hualien County had the highest TB mortality rate: 11.14 per 100,000 people. It was followed by Pingtung and Taitung County. In that year, the total mortality rate for mountain regions was 34.76 per 100,000 people, which was 5.99 times higher than the rate of 5.8 per 100,000 on the plains. Of the rate of total mortality for the mountain regions, 3.45% was attributable to TB.

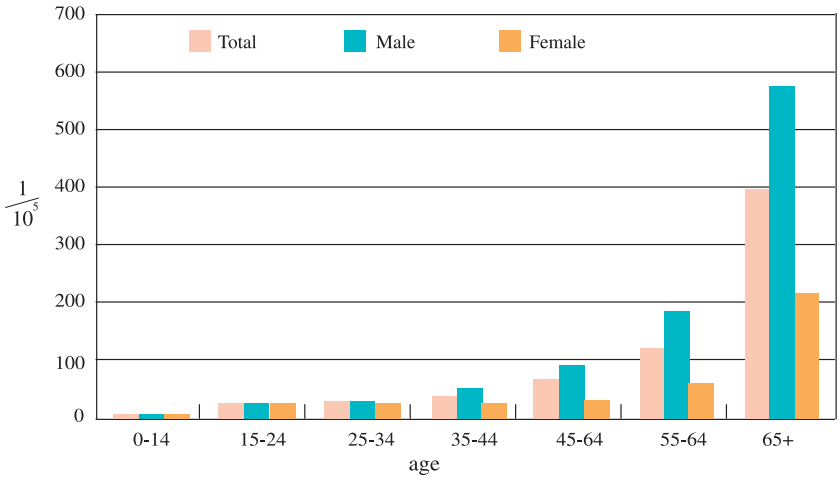
B. Prevalence

Starting from 1957, a survey on the prevalence of pulmonary tuberculosis was conducted every five years in order to understand the epidemic trend for reference by makers of TB control strategies of TB. However, the other kinds of TB weren't included. There were 8 such prevalence studies from 1957 to 1993.

The 1st TB prevalence survey was given in 1957, in which chest X-ray diagnoses for people over 20 years of age showed that 5.15% of the examinees had probable infections, of which 1.02% were proved by bacteriological exams. In the 8th survey conducted in1993, chest X-ray diagnoses showed that 0.65% of the examinees over age 20 were suspected of having contracted TB. Of these cases, 0.06% were proved by bacteriological exams. The rates were reduced to 87.4% and 94.1% respectively in decades. All the past surveys revealed that the older the age the higher the incidence rate was, and that pulmonary TB was more common among males than among females, with a ratio 2.2 to 3.3.

C. Incidence

A total of 24,161 TB cases were notified in 2004. Diagnoses showed 16,784 were new cases. The incidence rate was 74.1 per 100,000 people. For years, TB has remained to be the leading notifiable communicable disease. Of the 16,784 new cases in 2004, male patients were about 2.29 times more than female patients, and the incidence rate for males was 2.2 times the number for females. The number increased evidently with age (see Figure 3). Patients aged 65 and above accounted for 50.3% of



Note: Incidences increased with age, and there were more males and females

Figure 3:TB incidents by sex and age, 2004

the total. The incidence rate increased with age, and was higher among males than among females (see Figure 4). In 2003, the incidence rate in the mountain regions was 248.78 per 100,000 people, which was 3.73 times the rate of 66.67 per 100,000 on the plains.

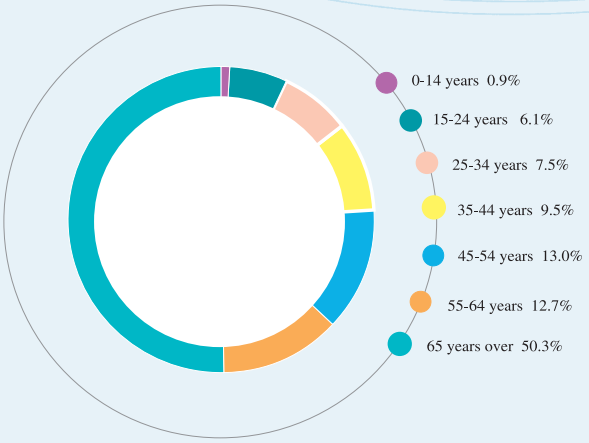


Figure 4: Age distribution of TB incidences, 2004

D. The Strategies for TB Prevention

1. Three networks: Public health network, examination network, medical treatment network.

2. Eight major policies:

a. Raising the quality of sputum examination

(1) Establishing a central reference laboratory for tuberculosis bacilli, installing a gene database, cultivating TB bacilli examination specialists, and setting up regional TB reference laboratories.

(2) Contracting qualified laboratories to provide the service of smear examination on a commission basis and organizing them into a nationwide laboratory network.

(3) Monitoring operations and evaluating the quality of contract laboratories.

(4) Strengthening the training of lab technicians.

b. Strengthening TB control for aborigines

(1) Subsidizing hospital stay by aborigines receiving TB treatment.

(2) Increasing the number of aborigines receiving X-ray screening.

(3) Strengthening health education in aborigine villages.

c. Organizing more referral hospitals to admit patients tested positive in sputum examination

(1) Encouraging patients tested positive in sputum check to stay in hospital for treatment in order to reduce the cases and the chance of infection.

(2) Solving the difficult cases and the hospital referral problem for drug-resisting patients by installing a TB treatment network, seeking help from the TB diagnosis and treatment consulting group, and establishing regional TB referral hospitals.

(3) Admitting infectious TB patients to negative-pressure wards.

d. Expanding TB control programs launched by county and city governments

(1) Due to different demographic compositions of each county and city, TB control programs with local characteristics have been tried in selected counties and cities. These programs will be expanded the whole nation.

(2) Suitable counties and cities will be selected to push such locally oriented programs.

e. Continuing to strengthen nosocomial TB control

(1) Strengthening nosocomial infection control in coordination with implementation of the nosocomial infection inspection system and the hospital appraisal system.

(2) Compiling pamphlets on nosocomial TB affection and offering on-the-job training to medical workers.

f. Advocating the positive concept of TB control

(1) At the onset, tuberculosis has no obvious symptoms, and therefore the golden period for a cure is often missed or delayed. If a patient can take medications for 6-9 months according to a physician's instruction, he can recover entirely.

(2) Taiwan CDC enlarges publicity on TB prevention and control. The publicity is intensified around the World TB Day each year in order to arouse the public to pay more attention to the tuberculosis problem.

(3) Taiwan CDC develops publicity channels and effective teaching aids for health education.

g. Strengthening the medical treatment network and personnel training

(1) TB diagnosis and treatment training is offered to physicians in hopes of raising their diagnosis standard for tuberculosis and to nurses working in different counties and cities to promote their understanding of the epidemic.

(2) Effort is made to attract physicians trained with public funds to join in TB diagnosis and control.

h. Continuing international exchange and cooperation

(1) Continuing the exchange and cooperation with international academic institutions to absorb new knowledge and success experiences of other nations for the improvement of Taiwan's knowledge and skills used in TB control and prevention.

(2) Analyzing the proposals and tendency of WHO and US CDC for fine-tuning the domestic strategies.

(3) Winning opportunities to participate in international conferences.

E. Major Challenges Ahead: Halve the Number of Patients in 10 Years

Tuberculosis control in Taiwan is still way behind the developed countries. The 2003 report of the US CDC shows that the incidence rate of tuberculosis in the US was 5.1 and the mortality rate of tuberculosis in 2002 was 0.3 per 100,000 people. In Japan, the incidence rate of 2003 was 24.8, and the mortality rate was 1.9 per 100,000. In Taiwan, the incidence rate of 2003 was 66.67, and the mortality rate was 5.8. In Taiwan there is still room for improvement. Taiwan CDC declared on the 2005 World Health Day that the number of tuberculosis patients would be halved in ten years through the DOTS implementation on smear positive cases; that is, from about 15,000 new cases each year to 7,500 (see Figure 5). Tuberculosis control is not the responsibility of the government alone, the successful policies formulated by the government need to be implemented thoroughly. This is a program that takes the efforts of all, the private sectors, the academia, the medical circles as well as the government. Only through joint efforts can tuberculosis be brought under effective control and the health of the people be securely protected.

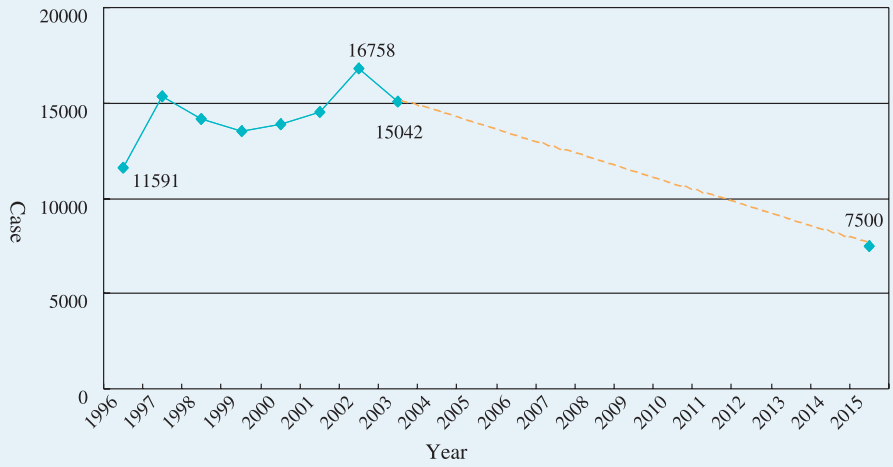


Figure 5: 2015(10 yrs later) anticipated target—halving the cases To cut the cases in half 15,000 ——→ 7,500

HIV-AIDS

Background

HIV destroys the noamal function of the human system, and it is transmitted from an infected person through blood, semen, or viginal fluid to another person with damaged skin or mucus membrane. Besides, an infected pregnant woman may pass the infection to the infant during the pregnancy, birth, or through breast feeding. People who loss of the immune function can lead to AIDS(Acquired Immunodeficiency Syndrome). AIDS is likely to become the catastrophe of human beings in the twenty-first century.

In Taiwan, the first HIV case was reported in 1984. By 2005, the number of HIV infections had accumulated to 10,719, of whom 10,170 were indigenous Taiwanese, and 1,359 had died. The number of HIV infections surged in 2005, reaching 3,404, marking a 123% increase (see Figure 1). In terms of age, the largest number of infections belonged to the 20-29 group, accounting for 1,394, or 41.0%. The second largest group was people aged 30-39, numbering 1,233, or 36.2% (see Figure2). An analysis of the risk factors showed that in 2005, similar to 2004, the major increase of HIV infections was among the injection drung users (IDUs), and these infections accounted for 71.7% of the increase. The second largest number of infections came from sexual relations, of which men who have sex with men (MSM) accounted for 14.0% and heterosex accounted for 9.0% (see Figure 3). Of the indigenous Taiwanese infected by HIV, 2,999, or 88.1%, were males and 405, or 11.9%, were females. The ratio between male and female infections was 7:1. The annual increase for female infections was 255%, higher than the 113% increase for male infections. The major cause was the sharp increase of women drug users. In 2005, 28 pregnant women were found infected by HIV, of whom 17 were IDUs. (Remarks: March 31, 2006, was used as the deadline for HIV/AIDS statistics.) Sharing needles and syringe among IDUs has become a new problem and challenge in the current fight against HIV/AIDS.

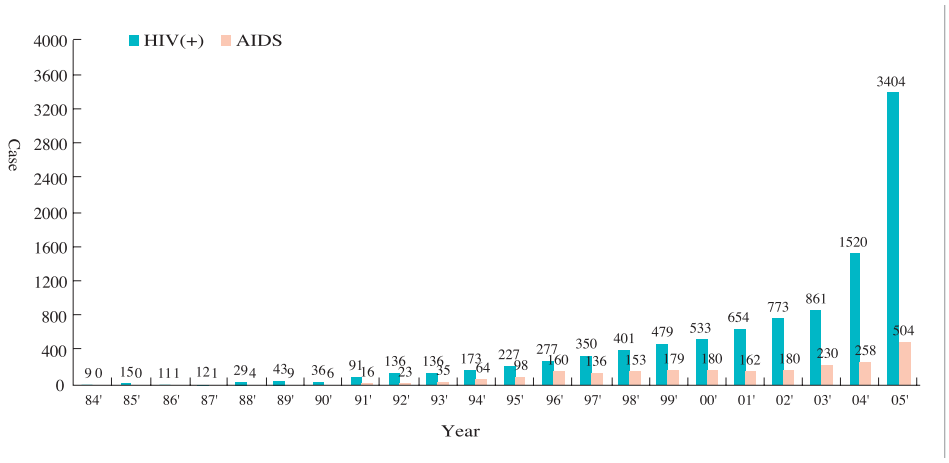


Figure 1: Report Cases of HIV/AIDS by Year of diagnosis in Taiwan 1984-2005(Taiwanese)

Age	2004		2005		1984-2005	
	Persons	Percentage	Persons	Percentage	Persons	Percentage
0-9	2	0.1%	3	0.1%	25	0.2%
10-19	62	4.1%	71	2.1%	364	3.6%
20-29	647	42.6%	1,394	41.0%	3,960	38.9%
30-39	524	34.5%	1,233	36.2%	3,533	34.7%
40-49	194	12.8%	525	15.4%	1,410	13.9%
50-59	57	3.8%	134	3.9%	542	5.3%
60-69	20	1.3%	32	0.9%	215	2.1%
70-79	14	0.9%	9	0.3%	94	0.9%
Over 80	0	0.0%	3	0.1%	12	0.1%
Unknown	0	0.0%	0	0.0%	15	0.1%
Total	1,520	100.0%	3,404	100.0%	10,170	100.0%

Figure 2: Age distribution of Taiwan's HIV infections (1984- 2005)2004/2005/1984-2005

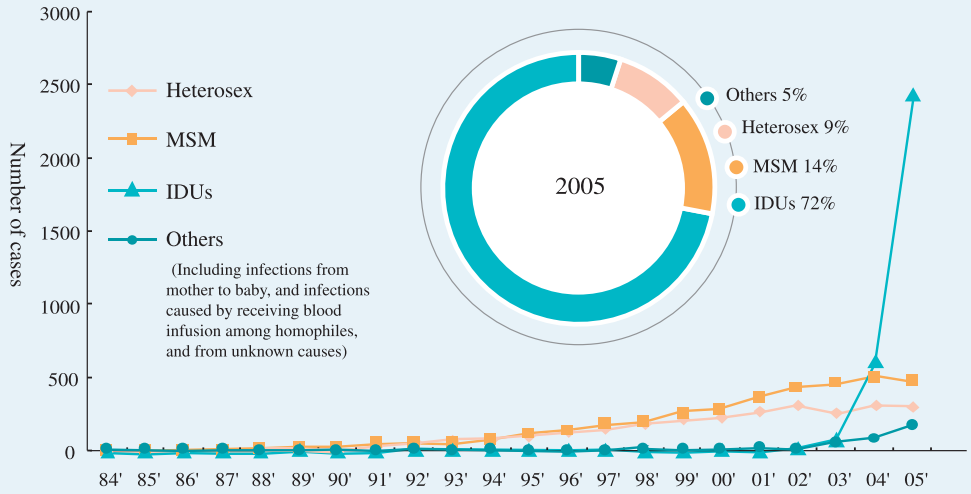


Figure 3:Statistics on risk factors of HIV infections in Taiwan in 1984- 2005

Objectives

1. To protect the uninfected population from HIV infection and effectively control the spread of HIV/AIDS.

2. To provide the infected cases with adequate medical care and raise the quality of their lives.

Strategies

1. Organizational mobilization and declaration of determination: To control AIDS, the Executive Yuan established an AIDS Control Promotion Committee in December 2001, which was composed of 13 ministers and prominent figures in society. Under it, there was a working group in charge of mapping out national plans for controlling the epidemic. In February 2005, when the Executive Yuan was restructured, the committee was changed to the Executive Yuan DOH AIDS Prevention and Control Committee which is chaired by the health minister (see its organization, Figure 4). The new committee seeks to enlist the support of the private sector in AIDS control. To carry out the task, the heads of county and city governments are requested to set up executive groups.

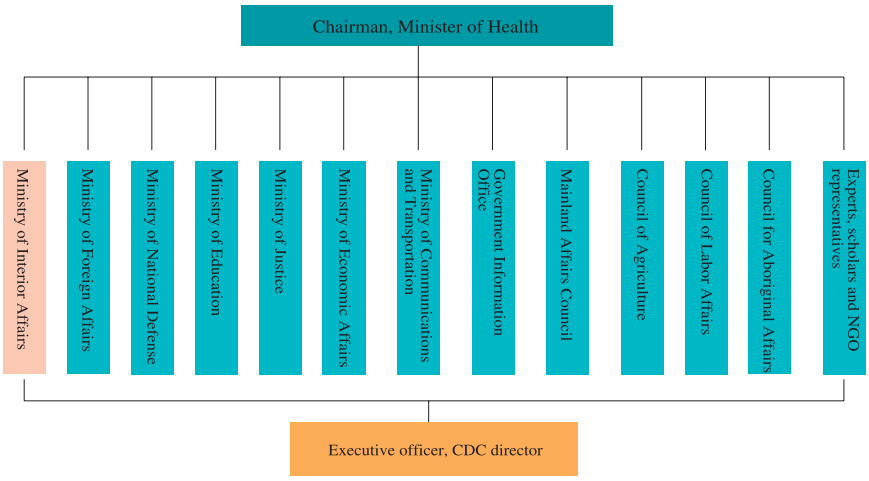
2. Increasing public awareness of AIDS: Multi-media channels are used for AIDS publicity, targeting on selected groups in community.

   a. Ascertaining the paths of infection: The main paths of HIV infection include unsafe sex, blood (blood infusion and sharing syringes), and mother-to-baby vertical infection. HIV does not spread in a handshake, an embrace, or a share of toilet.

   b. ABC to AIDS prevention: A. Resist sexual temptation. B. Be faithful to your sexual partner. C. Use a condom when making sex.

   c. Never share needles, syringes or thinners with others.

   d. Showing compassion with AIDS patients: In coordination with the world theme "Stop AIDS, Keep the Promise," Taiwan CDC has invited the concerned ministries to organize exhibitions across Taiwan and publicize the world's anti AIDS theme. It calls on everyone to show compassion to AIDS patients and contribute their part to the eradication of the disease.



Remarks: the ministries are represented by respective vice ministers

Figure 4:Executive Yuan DOH AIDS Prevention and Control Committee

3. Targeting on the groups with high risk behavior: Giving sustainable support to mobile demographic groups, including sex workers, MSM, drug users, sailors, and mapping out plans for controlling HIV/AIDS among them.

4. Promoting harm reduction pilot plants: To crub the epidemic situation of HIV infection among IDUs, a harm reduction plan was implemented in Taipei, Taoyuan, Tainan Counties and Taipei City on a trial basis. The plan includes needle and syringe exchange programs (NSEP), substitute treatment, health education and consultation for IDUs.

5. Giving HIV infections support and respect: Providing HIV/AIDS patients with appropriate medical treatment, respecting their rights, strengthening the care system, and rendering support to the patients and their families.

6. Fortifying the disease surveillance system: Increasing the knowledge and understanding of different population groups in order to formulate culturally appropriate policies and provide them with culturally friendly services.

7. Engaged in research and sci-tech development: Strengthening the studies and surveys in the fields of sociology, economics, culture and medicine for AIDS-related science and technology development.

Achievements

1. The Executive Yuan DOH AIDS Control and Prevention Committee held two cross ministerial meetings in 2005.

2. To tighten disease surveillance, Taiwan began to screen for blood donors in 1988, for draftees in 1989, for prison inmates in 1990, and for alien-laborers in 1991. Since 1977, ten hospitals have provided anonymous HIV blood-screening services, screening 5,350 people in 2005, of whom, 124 were found HIV positive, accounting for 2.5% of the total. Besides, to cope with the increase of female HIV infections and solve the problem of mother-to-baby vertical infection, a HIV screening plan for pregnant women was launched in 2005, detecting 28 positive cases, accounting for 1.2‰ of the screened women.

3. Taiwan government provides HIV/AIDS patients with free medical treatment and, in the end of April 2006, designated 34 hospitals to provide free treatment. All nations in the world encourage HIV infevtions to return to their homes and their communities. If a HIV infection can take medication according to prescribed schedule, his immunization system can be maintained to a certain state allowing him to avoid leading to AIDS and to lead a normal life, same as a healthy person. For those HIV infections who are rejected by their families for the time, the government subsidizes private institutions to take care of them. These institutions include the Garden of Mercy Foundation, the Harmony Home Association, and the Catholic Lourdes Home. With these institutions, HIV infections can get more care and compassion in society.

4. In sci-tech research and development, Taiwan CDC conducted nine projects in 2005, and commissioned National Taiwan University Hospital to establish an AIDS treatment center to train physicians in the hope that an outstanding medical corps can be built up to participate in HIV/AIDS control.

Future Prospects

According to statistics of the National Health Insurance Bureau (NHIB), each HIV patient consumes NT$220,000 of medical resource in a year. Judging the 2005 tendency of increase, the medical expenses for HIV patines in 2006 will top NT$1.54 billion. In addition to this huge amount of medical spending, the AIDS-related economic costs (such as popular education and screening) and all other medical costs (clinical examinations and psychological consultations) will also go up tremendously. The loss of labor and technology, the stall of foreign investment, the reduction of export, and the decline of revenues are inestimable.

At the onset of world AIDS epidemic, the Department of Health under the Executive Yuan brought medical and health experts and private institutions into the effort of prevention and control. After years of hard work, they have achieved remarkable results but still cannot bring immediate result in the control of new cases. We hope that in the future the cross-ministerial AIDS Prevention Control Committee will make “prevention of infection” as the backbone of its effort and stop the spread of HIV/AIDS.

Dengue Fever

Background

During the first half of the 20th century, there were three island-wide dengue outbreaks in Taiwan, in 1915, 1931 and 1942 respectively. After forty years of dormancy, a DEN-2 broke out in Luchiu Township of Pingtung County in 1981. Thereafter, more dengue outbreaks took place in Kaohsiung (1987-1988), Chungho of Taipei County (1995), Taichung (1995), Taipei City (1996) and several others in the greater Kaohsiung area, Tainnan City and Pingtung County. In the year 2002, another outbreak of dengue fever occurred in the southern part of Taiwan, which was similar to the outbreak in 1988 that started in 1987. The number of dengue fever cases increased tremendously since mid-June. The epidemic originated at the border between Chienchen of Kaohsiung City and Fengshang of Kaohsiung County. The disease gradually spread to other places such as Pingtung County, Tainan City and Penghu County. The total number of confirmed cases was 5,336, including 242 cases of dengue hemorrhagic fever (DHF), causing 21 deaths. There were only 86 confirmed indigenous cases in 2003, of which 51 were reported in Kaohsiung and Pingtung before March 8, which were considered residual cases of the 2002 outbreak. In 2004, there were 336 indigenous cases, of which five were the hemorrhagic variety but it caused no death. The distribution was mainly in the south, including Pingtung County, Kaohsiung City, Kaohsiung County and Tainan City (Figure 1).

In 2005, there were 202 indigenous cases of dengue fever, of which three were the hemorrhagic variety but it led to no death. The distribution was mainly in the south, including Kaohsiung City, Kaohsiung County, Tainan City and Pingtung County (Figure 2).

Objectives

Control dengue fever in Taiwan by thoroughly cleaning vector breeding grounds and effectively lowering vector (mosquito) density.

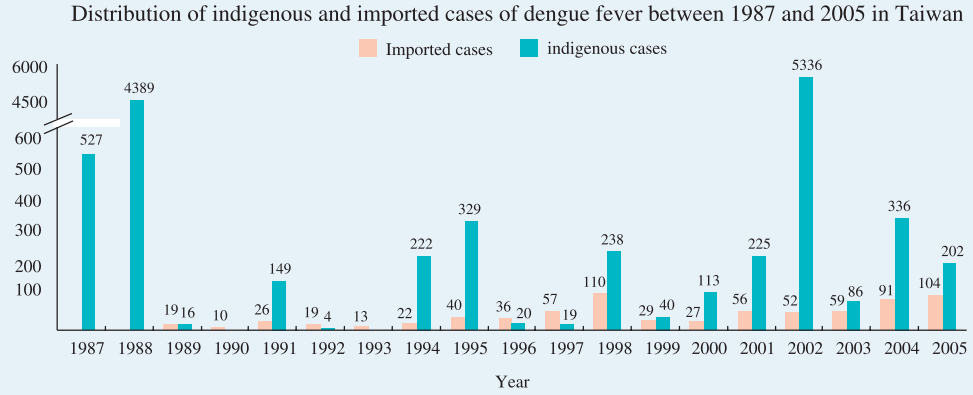


Figure 1: Number of confirmed dengue cases reported from 1987 to 2005

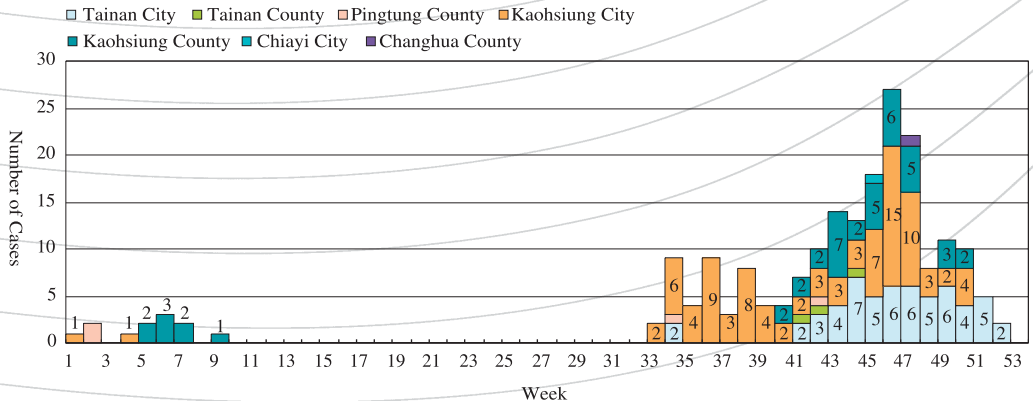


Figure 2: Number of indigenous dengue cases reported in 2005

Strategies

Taiwan CDC has devised a three-stage prevention strategy in an attempt to control the dengue fever epidemic. Primary prevention measures include source reduction and control of vector population. Secondary prevention measures cover disease surveillance and an emergency/contingency mechanism. Tertiary prevention involves controlling the number of deaths from the critical illness.

1. Primary Prevention

a. To implement health education through various channels of communications in an attempt to promote dengue awareness.

b. To involve the community in improving environmental and household hygiene as well as reducing vector sources through training of volunteers.

c. To put into place the mechanism of regular inspection and cleaning of vector breeding sources by cleaning empty houses, places and other potential vector breeding sources and by keeping a record of these places for future inspection.

d. To strengthen educational training for the disease prevention workers and volunteers.

e. To set up a vector surveillance mechanism to check places with a high mosquito density in an attempt to promptly wipe out vector sources.

2. Secondary Prevention

a. To construct a disease surveillance mechanism for a prompt control of suspected cases and strengthen disease surveillance and disease trend evaluation through the use of official epidemic reporting systems, emerging disease surveillance, and the public reporting and symptom declaration forms.

b. To set up an emergency/contingency mechanism for a prompt investigation of a suspected source of transmission and spray insecticide to eliminate the source; to carry out health education on the importance of eliminating vector-breeding sites to prevent any likely infection.

3. Tertiary Prevention

To establish a set of guidelines for dengue hemorrhagic fever (DHF) diagnosis and treatment and organize continued education for medical personnel in order to raise healthcare quality and lower mortality rates.

Achievements

In the south 202 people were infected with dengue fever in 2005. As a result of the joint effort between the central and local governments and the organized mobilization of the community, dengue control was remarkably successful in Taiwan compared with Southeast Asian nations. Below is a list of the major achievements:

A.Primary Prevention

1. Continuation of body-temperature monitoring at international airports. In 2005, 46 cases of imported dengue fever were detected this way, accounting for 44.23% of the total number of 104 imported cases (Table 1). This measure effectively limited the inroad of the disease.
2. Publication of health education and publicity materials including leaflets, posters, buntings, Combat Manual for Dengue (second edition) and VCD's.
3. Production of publicity materials for the mass media, including publicity recordings, epidemic control programming, newspaper ads, TV commercials and short films for screening in TV slots reserved for the Government Information Office to make public-service announcements. All these materials call on people to eradicate the breeding grounds of vector mosquitoes of dengue fever.

	Serotype					
Country of infection	1	2	3	4	Undetermined	Total
Indonesia	9	5	7	2	14	37
Vietnam	1	11	3		7	22
Philippines	1	2	1	3	3	10
Thailand				8	1	9
Burma			5		2	7
Cambodia				1	5	6
Malaysia	1				4	5
Singapore	1		1		3	5
India					1	1
Belize					1	1
Bangladesh						1
Total	13	19	17	14	41	104

Table 1: Serotypes and origins of imported dengue fever cases, 2005

4. Invitation for scholars, experts, CDC branch offices, and heath bureaus of county and city government in southern Taiwan to a meeting on the revision of the dengue control manual. They centered their discussions on the chapters dealing with “emergency spraying of insecticides” \ and “survey of vector mosquito density.” On the basis of the discussions, the fourth edition of the Combat Manual for Dengue Fever was published as guidelines for the various health organizations in their fight against the epidemic.

5. Formulation of the “Community Mobilization Plan for Cleaning the Breeding Grounds of Vector Mosquitoes. Taiwan CDC encouraged community organizations in southern counties and cities to advance their plans for CDC subsidies and for organizing mosquito-killing volunteers’ teams. The achievements were evaluated during the second half of September 2005 and an award ceremony was held in November, where demonstrations were given. On the occasion, outstanding volunteers reported on their experience for exchange with others. A total of 64 villages and boroughs participated in the plan, recruiting 1,000 volunteers.

6. Commissioning of scholars and experts to engage in vector-mosquito drug-resistance and drug-effectiveness studies. The results of the studies were used for reference in the procurement of insecticides. Taiwan CDC procured 230 bottles of Lambda-cyhalothrin, an insecticide for killing mosquitoes and an additional 10,000 bottles of the smoke variety. These chemicals were sent to the health bureaus in the south for use.

7. Conduction, in conjunction with the Environmental Protection Administration, of vector mosquitoes control workshops. Two of them were held in northern and southern Taiwan respectively and 95 of the trainees passed the examination.

8. Conduction of training courses on vector mosquito survey. Altogether, 12 courses were held in northern, central, southern and eastern Taiwan, with 1,030 people participating.

9. Promotion of vector mosquito surveys and the dengue control plan. Implementation of the plan was entrusted in the hands of the health bureaus of high risk counties and cities in the south (the district infested with *Aedes aegypti*. Under the plan, 111 people were hired for the surveys. In 2005, surveys were conducted in more than 60,000 villages and boroughs, on average once for every 1-3 months.

B. Secondary Prevention

1. A reward system was established to encourage physicians and the public to report cases in order to facilitate early detection of disease transmission. An amount of NT$2,500-NT$5,000 was awarded to the physician or other medical worker who reported the first indigenous case of dengue fever of the year and to those who discovered an imported case of dengue fever. If an individual volunteered for dengue fever testing and the case was subsequently determined to be an imported case or the first indigenous case in his or her village or township of residence, the individual would be awarded NT$2,500.

2. The frequency of vector density survey and investigation was increased to one time per month for every village in and around the areas in southern Taiwan where dengue fever was prevalent. In 2005, a total of 60,387 vector-density investigations were conducted in villages in Taiwan.

3. A total of 78,890 of the caught vector mosquitoes (consisting of 39,570 *Aedes aegypti* and 39,320 *Aedes albopictus*) were examined for virus, and "two pools" of them tested positive. These virus-carrying mosquitoes were caught at Zhouzhou Borough in Koahsiung City (Type 3) and at Shengan Borough of Tainan City (Type-2) respectively.

4. To grasp the change in drug resistance of vector mosquitoes after indigenous dengue fever broke out in southern Taiwan in 2005, Taiwan CDC sent vector experts to areas where emergency spraying was made to evaluate drug resistance of mosquitoes. They also offered timely advice on the use of insecticide and equipment to make the control effort more effective.

C. Tertiary Prevention

1. In April and May, five training sessions on clinic diagnosis and treatment of dengue hemorrhagic dengue fever were held in northern, central, southern, and eastern Taiwan. There were 440 participants. The courses covered symptoms, diagnosis and treatment of hemorrhagic dengue fever aimed at raising the quality of medical care.
2. The third edition of "Manual for Diagnosing and Treating Hemorrhagic Dengue Fever" was published for distribution to healthcare institutions through the health departments of county and city governments.
3. In December 2005, an APEC symposium was held in Taipei to discuss dengue fever surveillance, testing, molecular epidemics and to exchange experience in dengue fever prevention and treatment.
4. As a result of intensive training offered by Taiwan CDC and the hard work of medical workers in various hospitals, no death from dengue hemorrhagic fever was registered in 2005.

Future Prospects

Taiwan CDC will formulate a "reinforced plan for dengue control - a four-year program for eradicating vector-breeding sources and eliminating indigenous dengue fever" to strengthen dengue control. Taiwan CDC, Environmental Protection Administration (EPA), local governments and NGOs will implement the plan together. Efforts will be made to popularize health education and encourage the general public to get involved in maintaining environmental and household hygiene. Taiwan CDC and EPA will construct a real-time disease surveillance and response mechanism in an attempt to wipe out vector sources and consequently stop the occurrence of indigenous dengue fever once and for all.

Enteroviruses

Background

Enterovirus belongs to a group of small RNA viruses, including polioviruses, Coxsackie A viruses, Coxsackie B viruses, echoviruses and other enteroviruses (EV68~). The EV71 has a significantly higher pathogenicity among the known enteroviruses, especially in the respect of causing neurological complications. Enterovirus is found in gastrointestinal tract (stool of an infected person, mouth, water, food) and respiratory tract (aerosols such as saliva, sputum, or nasal mucus, coughing, sneezing). People can be infected by direct contact with the secretions of an infected person or a contaminated surface or objects.

According to the surveillance data over five consecutive years provided by the Center for Disease Control, Department of Health, the number of outpatients infected with enterovirus increases in late March every year and the number reaches its peak around mid-June and decreases after mid-June. In addition, there is usually another smaller outbreak of enterovirus infection when the schools reopen in September. Many types of enteroviruses disseminate around the world and they have been living in the human kinds. Apparently, human being is the only known host and source of transmission. There are currently no preventative vaccine for non-polio enteroviruses and no known highly efficacious medicine that could kill the infection virus that lives inside the human body. Therefore, enterovirus will continue to exist and pose threat to human's well being in the predictable future. The peak season for enterovirus infection in the temperate region is summer. On the other hand, there is no foreseeable enterovirus prevalence in the tropical and the subtropical regions, so there might be infection all year round in these places.

According to various surveillance data, the enterovirus infection trend in 2005 suggest that children under the age of 5 are prone to critical complication and death resulted from enterovirus infection and the associated mortality rate is 10.6%. The major symptom of enterovirus infection is herpangina and hand-foot-and-mouth disease (HFMD). Enterovirus 71 is the most commonly seen type of enteroviral pathogen in Taiwan. Another surveillance data collected by the local health departments and the physicians' reporting surveillance system points out that the number of suspected enterovirus cases increases from early April 2005 and reaches the peak around early June. In 2005, 142 enterovirus complicated cases were confirmed, causing 15 deaths.

Objectives

1. To control the trend of enterovirus infection in Taiwan and to set up a database of the variety of active enteroviruses in Taiwan.
2. To lower the mortality rate resulted from enterovirus complications.

3. To organize a “Clinical Critical Care Consultation Committee” to set guidelines for acute enterovirus complication treatment.

4. To schedule enteroviruses conference on a regular basis in order to ameliorate the academic standard in the field of enterovirus studies.

5. To develop enterovirus 71-prototype vaccine.

Strategies

1. To reinforce case surveillance and disease evaluation abilities

The CDC will continue to collect and analyze enterovirus infection information both abroad and at home (especially in Taiwan) to construct an enterovirus infection database in an attempt to understand the outbreak of the disease and to make responsive policies.

2. To augment health education

Knowledge removes fear. Taiwan CDC consolidates governmental and public resources to educate the general public, medical personnel, educational conservatives and the media with the basics of the enterovirus through various means of media. The following information is conveyed to the public to ensure significant results in the disease prevention. General cleanliness and frequent hand washing can boost one’s immune system. Proper hand-washing facilities are encouraged to be installed both at home and in public places. The public are urged to seek immediate medical treatment when they develop symptoms of enterovirus infection. Health care workers are taught with the up-to-date treatment. Disease prevention can only be effectively accomplished when everyone takes their initiatives to practice personal hygiene, hence eliminating the infection and stopping the spread of the disease.

3. To strengthen emergency disease control mechanism

Many problems arise from enterovirus infection. The problems involve prevention work, the entire medical system, education, media, economics and so on and so forth. It is crucial that the central and the local governments readily set up an enterovirus prevention decision-making center in preparation for the malfunction of the disease surveillance system. In addition, an appropriate coordination mechanism is organized between the central and the local government bodies for efficacy in disease control. A complete disease prevention network provides a timely and adequate medical treatment, research, cases inspection and consoling service in an attempt to slow or stop the spread of the disease, to decrease the number of deaths and pacify people’s fear towards the disease.

4. To conduct prudent research and related personnel training

Epidemiological research and vaccine developments are some of the plans that are underway. Human resource training is reinforced to improve the prevention methods, diagnoses and cures of enterrovirus infections. Thereafter, enterovirus can no long pose any threat to people’s wellbeing and social security.

Achievements

1. Accomplishment in the construction of surveillance and database

Figure 1 shows the trend of enterovirus infection in Taiwan. The annual number of enterovirus outpatients begins to increase mid March and reaches its peak around early-May. The number generally decreases afterward. Enterovirus has become a seasonal epidemic in Taiwan.

Table 1 shows the annual critical enterovirus complication fatality rate in Taiwan is around 10.0% to 25.7%.

Figure 2 shows that EV71 is the most pathogenic virus in acute enterovirus complication in Taiwan.

2. Health Education

a. Red banners about enterovirus education are hung in school and on garbage trucks. A variety of talks on child enterovirus preventative measures and related health issues are organized.

b. The local organizations work with the community to promote enterovirus education and prevention.

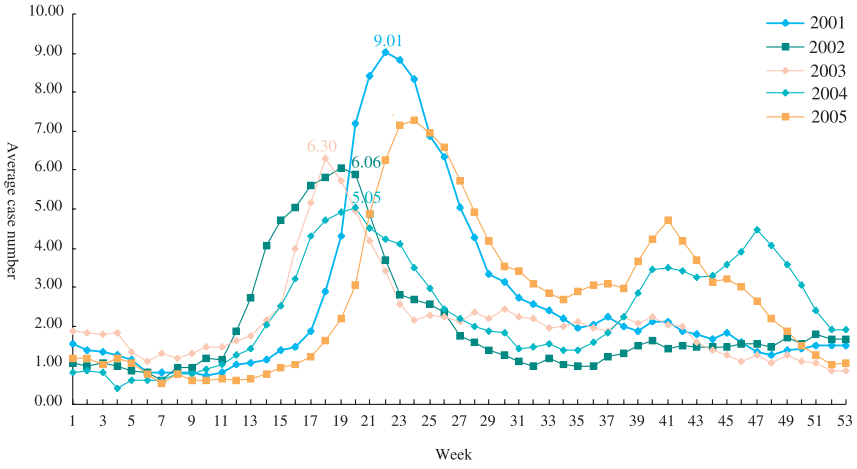


Figure 1: The average Number of enterovirus cases reported by sentinel physicians in Taiwan

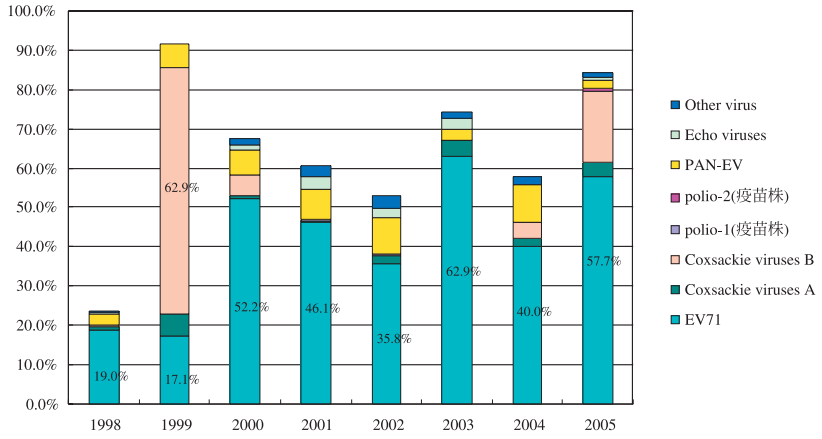


Figure 2: Distribution of number of confirmed critical enterovirus complication cases resulted from different types of enteroviruses, 1998-2005

Table 1: Acute Enterovirus Complication Fatality Rate During 1998-2005

Year	Confirmed Cases	Death	Fatality Rate
1998	405	78	19.3%
1999	35	9	25.7%
2000	291	41	14.1%
2001	393	58	14.8%
2002	162	30	18.5%
2003	70	8	11.4%
2004	50	5	10.0%
2005	142	15	10.6%

c. Restaurants, schools, hospitals, clinics, and other public gathering places are required to conduct regular inspection for environmental hygiene and hand-washing facilities.

3. A "Clinical Critical Care Consultation Committee" is organized by recruiting all the clinical professional island-wide in an attempt to provide clinical healthcare consultation and to construct guidelines to treating enterovirus complication. Providing the complicated patients with primary care can effectively lower the mortality rate.

4. "Enterovirus Control Plan," "Enterovirus-prone Group Control Booklet" and "Enterovirus Control Handbook for Child Care Workers" are compiled to list all the necessary precautions and published in large quantity for distribution to all the health departments in Taiwan.

5. Workshops on clinical treatment of critical enterovirus complication are held to strengthen doctors' abilities, raise the quality of the treatment, and reduce the mortality rate and the sequelae.

6. Because there is no efficacious medication for curing enterovirus infection, beginning in 2000 effort is made to develop enterovirus-71 vaccine to boost population immunity.

Future Prospects

1. Reinforcement of enterovirus prevention
   a. Strengthening the Household Hand-Washing Activity Campaign, calling on the adults coming back from outside to wash hands before contact children.
   b. Highlighting the concept of "no school and no work when get sick."

2. Assessment of the present prevention policy
   a. Assessing the consequence of no school policy.
   b. Conducting a research on the integrity of medical facilities across the area to assess the treatment criterion of severe enterovirus cases.

3. Continuation of the related research
   a. Carrying on research of enterovirus 71 vaccine (EV-71 Vaccine).
   b. Starting seroepidemiologic surveillance for EV71.
   c. Investigating and studying the risk factors of enterovirus complicated severe cases.
   d. Studying biological characteristics of enterovirus.

- International Ports Quarantine Activities
- Foreign Labor Health Management, 2005

Quarantine Services

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International Ports Quarantine Activities

Background

Taiwan, situated in the subtropical zone, is suitable for the spread of many tropical diseases. This is especially true when international tourism and trade have become increasingly frequent. To tighten the quarantine, the government has set up quarantine offices at the Chiang Kai-shek Airport of Taipei and the Xiaogang Airport in Kaohsiung, and in the seaports of Keelung, Kaohsiung, Taichung, Hualien, Suao, Mailiao, and Heping to prevent the import of diseases and protect people's health. At present, quarantine work at these airports and seaports is in the charge of the branch offices of Taiwan CDC, which plans and supervises the operations through its Second Division.

To meet the requirements of the International Health Regulations (IHR) and prevent the import of diseases by aircraft and ships, Taiwan CDC has revised the Regulations Governing Quarantine at Ports, authorizing the quarantine units to take necessary quarantine measures against inbound ships, aircraft, their crews, passengers, and cargos for the sake of national security and the protection of people's health.

Objectives

1. Strengthening information management: This involves strengthening the functions of the "one-window stop system of quarantine operations" to make the quarantine process and the information management more efficient.
2. Streamlining the process of operations: This calls for timely revision of the operational process in keeping with the trend of the times and by benefiting from collective wisdom.
3. Following through the quarantine procedures: All inbound aircraft and ships as well as their passengers and cargos must be subjected to quarantine so as to prevent the import of diseases.

Strategies

1. One-stop service:

   This includes the establishment of a one-stop service for aircraft, ship quarantine, de-ratting certificates, vaccination, collection of fees, online check and statistics for quarantine operations.

2. Quarantine for aircraft and ships:

   a. Quarantine by review: Aircraft or ships destined for a Taiwan port are obliged to report to the quarantine unit on the state of its sanitation and the health state of persons it is carrying via telegraph, telex, fax, mobile phone, or e-mail. It may be allowed to enter the port after the quarantine unit has reviewed the report and is convinced that there is no danger of the import of disease. The procedure is intended to shorten the time of quarantine.

b. On-board quarantine: If an inbound ship or aircraft has not applied for quarantine, or if it has but is found as having failed to meet the quarantine requirements, or if it has reported of carrying a patient suspected of suffering from a communicable disease, or if there is abnormal death of rats, or, in the case of an aircraft, if there is a suspected patient or death, quarantine officers will go aboard the ship or aircraft to quarantine the whole aircraft or ship. The following table shows the state of quarantine in 2005:

Statistics on quarantine work at international ports in 2005

Quarantine unit	Ships	Passengers	Aircraft	Passengers	Cargo planes	Tonnage of cargo
1st Branch Office (Keelung)	7,167	53,761				
1st Branch Office (Suao)	651	0				
1st Branch Office (Kinmen)	2,553	242,073				
1st Branch Office (Matsu)	1,545	36,628				
2nd Branch Office (CKS)			61,225	8,674,133	15,069	4,548,402
3rd Branch Office (Taichung)	5,771	3,747	46	3,103		
3rd Branch Office (Mailiao)	2,556	9				
5th Branch Office (Kaohsiung)	17,313	134,977				
5th Branch Office (Xiaogang)			14,161	1,336,099	626	219,296
6th Branch Office (Hualien)	3,760	1,009	33	1,649		
Total	41,316	472,204	75,465	10,014,984	15,695	4,767,698

3. Quarantine for crews and passengers

For the early detection and prevention of communicable diseases, all arriving passengers should have their body temperature scanned with an infrared thermal apparatus. Only arriving passengers who show symptoms are required to fill out the “Communicable Disease Survey Form.” Individuals reporting possible symptoms would either be required to have a specimen taken on site, depending on the gravity of the symptoms and their travel history, or will be followed up by local health authorities about their symptoms to prevent and contain imported communicable diseases.

In 2005, a total of 10,487,188 passengers arrived in Taiwan. Of these passengers, 11,790 indicated as having symptoms and, therefore, were put on the tracking list of the local quarantine units. Arriving passengers who become ill after entry are encouraged to seek medical advice, and inform their doctors of their recent travel history. Taiwan CDC installed a nationwide toll-free hotline, 1922, for consulting purposes. In 2005, 10 cases of shigellosis, 46 cases of dengue fever, and 1 case of malaria were detected from the filled forms or through the taking of body temperature.

In an attempt to block avian flu away from Taiwan, beginning on October 10, 2005, travelers from bird flu affected areas, such as Vietnam, Thailand, Indonesia and Cambodia, are asked to follow health self-management for ten days after arrival. And beginning on October 26, travelers from China are also requested to follow the procedure.

4. Control of vectors in ports: The purpose is to control the density of vectors at the ports and the spread of communicable diseases. The various quarantine units have taken the following measures to stop the breeding of vectors for the protection of people's health.

   a. Control of rats in port areas:

      (1) Anticoagulant bait is placed around the year in the port areas where rats are most active. The bait is replenished every 10 to 15 days to ensure its effectiveness.

      (2) A plan for monitoring the parasites and infectious serum of rats in port areas (including Kinmen and Matsu, the two termini of the "mini sea link" with the mainland) was drawn up and carried out. The rats caught in such areas are examined for exterior parasites and blood analysis to understand the variety and quantity of the parasites. The blood serum is examined for evidence of plague and Hanta virus to prevent the import of such diseases.

   b. Control of vector mosquitoes in the port areas: Mosquitoes are vectors of several communicable diseases including yellow fever and dengue fever. Their density is closely related to the spread and development of an epidemic. Therefore, it is necessary to grasp the variety of mosquitoes and the rise and down of their quantity and to kill them in time for the prevention of an epidemic. The following methods have been adopted:

      (1) Checking the density of dengue fever vectors breeding in containers: Empty bottles, jars, and tires, which are prone to retain water in the port areas, are checked once every month to grasp the breeding of vector mosquitoes. The wigglers are killed.

      (2) Setting up contrivances to induce mosquitoes to lay eggs in them: Such contrivances are placed in many places in the port/airport areas for mosquitoes to lay eggs. They are pieces of coarse cloth wetted with Temephos. After the eggs have hatched, the baby mosquitoes are killed by the insecticide, so they cannot grow up. The fabrics are replaced every month, and the eggs laid on them are used for calculating the mosquito index in the port areas.

(3) Surveying mosquito: Lamps are hung in a few selected places to trap mosquitoes for analysis in order to grasp their types and activities.

(4) Establishing "joint supervisory groups for epidemic control at international ports": They are organized by Taiwan CDC's branch offices among representatives of the port authority, the port police, the customs, the cargo transportation station, and other related organizations. These representatives meet every four to six months, depending on the circumstances, to guide the improvement of pest control on the basis of the density of mosquitoes and the elimination of their breeding grounds. If necessary the related organizations are asked to spray insecticides.

c. Control of rats on ships: To prevent the spread of diseases by rats on ships plying on international routes, Taiwan CDC imposes control on such ships in accordance to Article 53 of the WHO's the International Health Regulations and Article 27 of the Regulations Governing Quarantine at Ports.

(1) De-ratting for ships (or de-ratting exemption): The de-ratting certificate (or de-ratting exemption certificate) held by a ship is valid for six months. A new one should be applied if the old one expires. If the sign of rats is discovered, the ship must eradicate the rats immediately before getting another certificate. If no sign is found, a de-ratting exemption certificate will be issued.

(2) To prevent rats running to the shore along the mooring cable, a rat guard must be hung on the cable. If a ship is found as having failed to do accordingly, it will be corrected and put on record for quarantine reference when it called on the port next time.

d. In coordination with the start of mini links with the mainland from Kinmen and Matsu, Taiwan CDC has set quarantine units on the two offshore islands.

e. The quarantine work for illegal mainland immigrants caught at various fishing ports is entrusted to the health authority of each place.

f. The CDC's quarantine units have invited the various related organizations to establish a "joint supervisory group for epidemic control at international ports."

Future Prospects

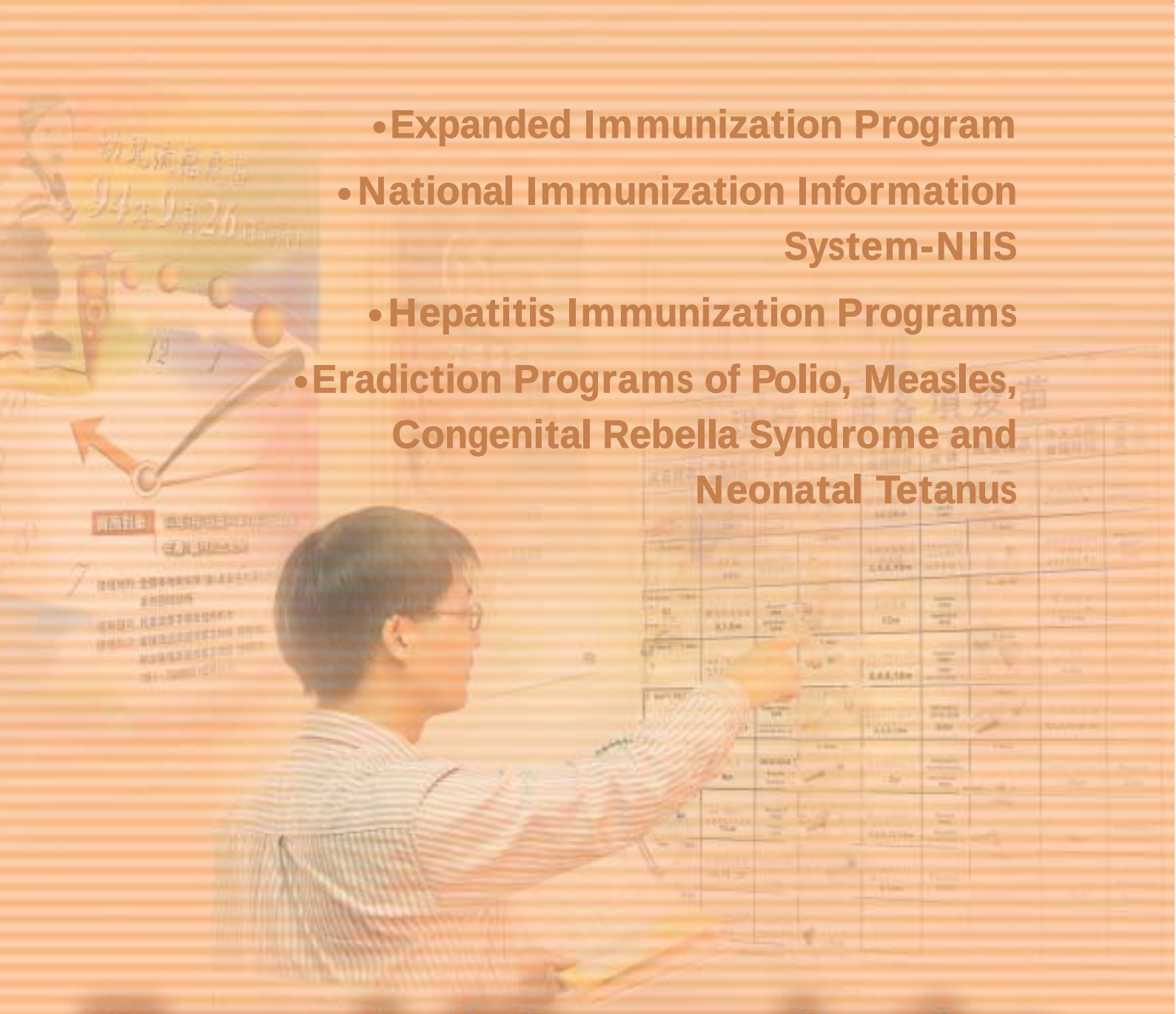
1. Increase the manpower and equipment, strengthen the functions of quarantine, and perform the quarantine conscientiously in order to stop the import of diseases into the countr.
2. Strive to cultivate quarantine personnel, encourage the development of new quarantine techniques, and raise the quality of quarantine officers and their work.
3. Strengthen the eradication of rats on ships and the survey of rat density in port areas to avoid the spread of communicable diseases.

Foreign Labor Health Management, 2005

The government began to import foreign labor in October 1989 in response to the need of large numbers of laborers for the economic development. At present, there are about 320 thousands foreign laborers in Taiwan. They are mainly imported from countries such as Indonesia, Malaysia, Philippines, Thailand and Vietnam. All legally imported foreign laborers are required to have a health examination before applying for an entry visa in order to prevent importation of diseases that might threaten the health of the people in Taiwan. Moreover, all admitted foreign laborers are required to attend a routine health check-up within the first three days of arrival. On the other hand, they have to receive physical examination on the 6th, 18th and 30th month after their arrival during their stay in Taiwan. Currently, the mandatory check-up items include chest X-ray examination, HIV antibody screening, syphilis serum screening, hepatitis B surface antigen screening, intestinal parasite screening, pregnancy check in addition to general health check which covers psychological health state and leprosy screening. If a

foreign labor is found to carry intestinal parasite (excluding Entamoeba histolytica), he or she is required to receive treatment within the thirty days of the detection. On the other hand, if a foreign labor is tested positive for any of the aforementioned items or is found having any of the five notifiable communicable diseases, he or she will immediately repatriated in order to ensure the safety of the people in Taiwan. The total number of health check-up for the employed foreign workers in 2005 was 402,807, of this total, 10,573 failed to pass, representing a failure rate of 2.62%. Moreover, 10,144 of the failed workers were tested positive for intestinal parasites, registering in the highest failure rate of 2.52% among all the tested items. It was followed by failures in chest X-ray examination, in which 293 people were found as having tuberculosis, representing a failure rate of 0.07%. On top of that, 14 people were tested positive for HIV antibody.

- Expanded Immunization Program
- National Immunization Information System-NIIS
- Hepatitis Immunization Programs
- Eradiction Programs of Polio, Measles, Congenital Rebella Syndrome and Neonatal Tetanus



Expanded Immunization Program (EPI)

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Expanded Immunization Program

Background

Vaccination is one of the most cost-effective strategies adopted by health authorities to fight against vaccine-preventable diseases. Since 1948 when diphtheria toxoid was firstly introduced to Taiwan, a strategic plan-the Expended Program on Immunization (EPI)-has been implemented to protect children from diseases infectious diseases. Nowadays, DTP, BCG, OPV, and vaccines against Japanese encephalitis, measles, hepatitis B, mumps and rubella (MMR) are recommended to infants and children.

Thanks to the intensified efforts of the central and local governments as well as local health organizations, many once-common but vaccine-preventable diseases have been brought under control. Smallpox was eradicated in 1955, and poliomyelitis was also eradicated in the Western Pacific Region where Taiwan is located in 2000. Furthermore, measles and rubella have been effectively controlled.

Strategies

1. To continue the routine immunization services, and follow the global disease control strategy to strengthen the immunization system and promote a supplementary plan.
2. To increase the coverage and raise the quality of immunization service.
3. To develop a high-quality vaccine supply and management program.
4. To provide an appropriate evaluation system in the routine promotion of EPI program.
5. To review and modify the EPI strategic plans for the satisfaction of the current need in national and international control of infectious diseases as well as the need for strengthening the current immunization capabilities.

Objectives

1. To manage and maintain the purchase, distribution, and cold chain system for vaccines recommended under the EPI program.
2. To increase the vaccination coverage by strengthening the immunization services and to promote the supplementary plan.
3. To hold training seminars on cold storage system, storage management and immunization practice, in order to ensure the quality of vaccines and increase the professional knowledge of medical personnel.
4. Plug the possible loophole in the network of disease control. Taiwan CDC has urged parents to take with them the health passports and IC cards of their babies when they are take to contractual hospitals or health stations for vaccination.

Future Prospects

1. To build a system of plentiful and safe supply of vaccines and to increase the immunization coverage for all kinds of vaccination in order to reach the goal of eradicating all vaccine-preventable diseases.
2. To consider including new vaccines to the EPI-recommended vaccine list by reviewing the current situation of communicable disease control; assessing their impacts on the public health, social economics and medical costs; updating information on the vaccine R&D, production and supply; allocating the health fiscal budget for vaccines purchase.
3. To develop and promote an appropriate immunization program for the elderly, in order to reduce the mortality and morbidity that caused by severe complications of the vaccine-preventable diseases.

National Immunization Information System-NIIS

Background

The rapid change in society and the easy accessibility to medical resources have resulted in the withering of medical services rendered by health stations, but in another respect the immunization services of health stations have been valued increasingly. Therefore, they should move toward the use of computers to increase their efficiency. When computer came into being, everyone hoped that it would replace human labor to make work and management more effective. The DOH began to push computerization for the health departments in 1993 and have established DOS PHIS to help health departments and stations to establish three major systems-outpatient service, immunization for health protection, and administrative management. However, the list of new operational needs continue to grow and the information and network technology have since developed by leaps and bounds dominating the mode and direction of the development of application systems. As a result, the DOS PHIS has gradually become inadequate.

As the people have the freedoms of movement and the choice for their service environment, they can get to the vantage point to get immunization. Under the current system, when a man goes to a medical institution (including health stations) to receive vaccination, he must establish a basic personal file and, after evaluation, the doctor will enter the vaccination and other information into a referral slip and into the medical history. If the man goes to the health station of his locality to get vaccination, he can immediately be entered into the DOS PHIS system. On the contrary, if he goes to get vaccination in a health station or another medical institution not located at his domicile, he needs to complete a yellow card and mail it to the health station of his domicile, which will use manual labor to key in the information for filing and then the health station has to use PHIS to put the data of vaccination administered in other places into a notice for transmission together with the referral slip to the health

department, which will in turn transmit it to the health department of a county or city (the so-called consolidation system), consuming much time and manpower. The basic personal data in the computer, however, come from the Department of Civil Affairs of the Ministry of the Interior, whereas extraction of the information must go through the DOH Information Center, which, in doing so, has to ask the Ministry of the Interior to transmit the information of changes to the regional information center (RC) every two weeks for distribution to health stations. The health stations use this way to connect with the domicile registration system to enable health workers on the base level to know the number of individual cases and the information (birth date, moving out of or moving into the domicile district) for use as the basic materials for administrative analysis. Because there is no official specifically in charge of this business and also because the problem arising from line connection with the RC, the domicile department cannot transmit the data of domicile changes within the required two weeks. Therefore, there is often delay in sending the referral slips, sometimes for as long as one or two months. The mode of PHIS operation is show in Figure 1.

Taking into consideration of the unrestricted movement of people, the convenience for keeping health data, and the fact that immunization is a nationwide demand, Taiwan CDC hopes to use the current information technology to develop and set up a "National Immunization Information System" based on the existent network for health departments and medical institutions. This system can be used to integrate the current administrative health organizations, the hospitals contracted for administering vaccination and the database of domicile department so that they can take advantage of the system's function of automatic referral and consolidation to keep the immunization data in whole and reduce the workload of the staff of the health station Figure2, Operational mode of NIIS.

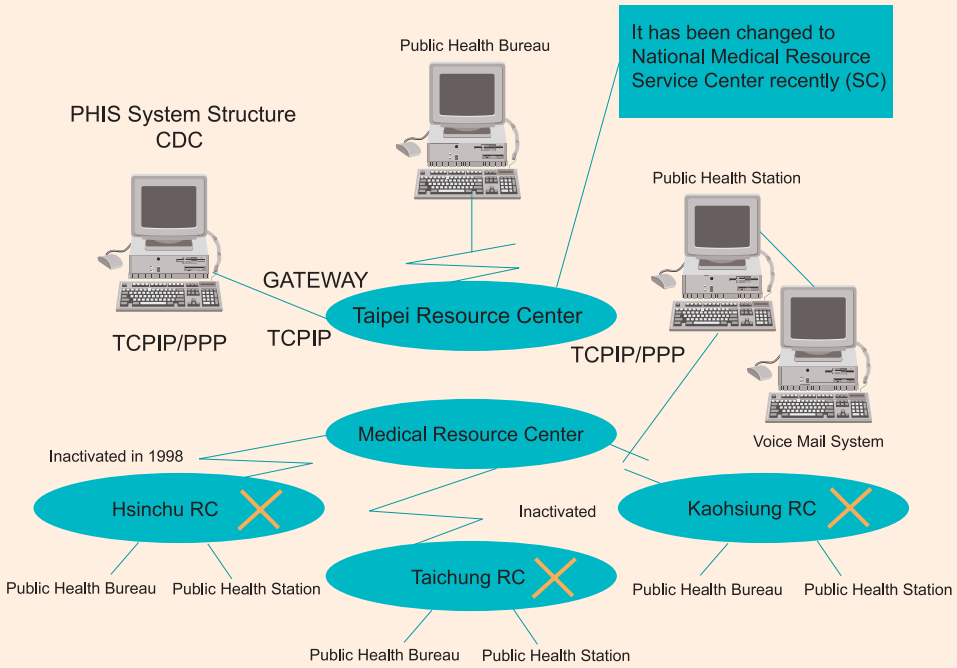

Figure 1: PHIS structure

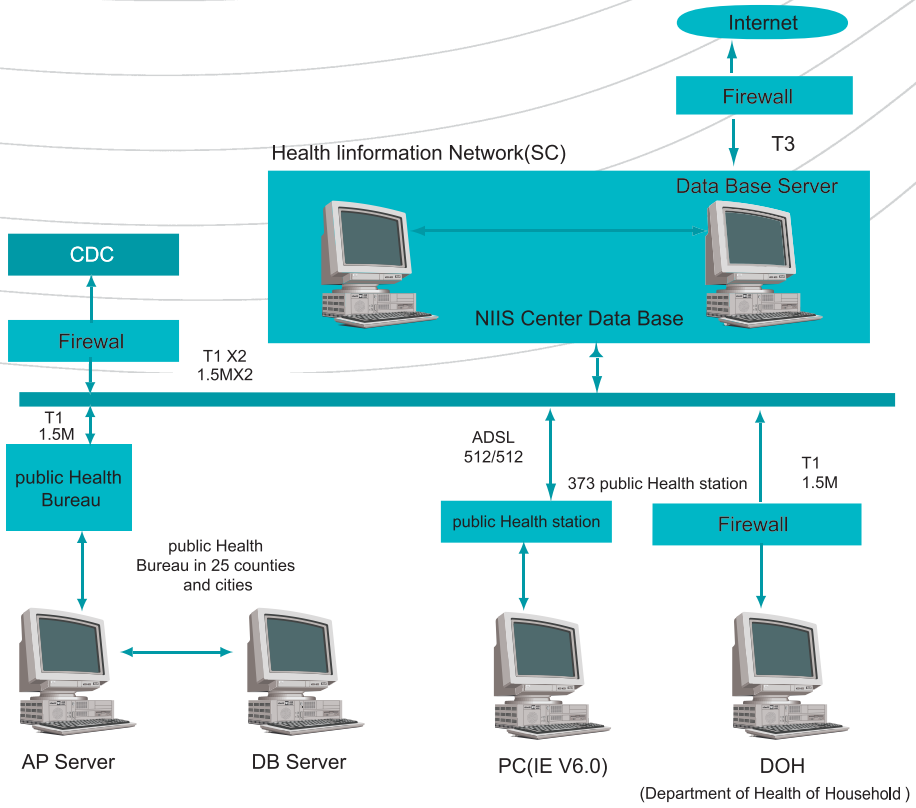

Figure 2: Operational mode of NIIS

Objectives and Strategies

1. Health departments of county and city government may continue to use NIIS to put online their contracts signed with hospitals. The usage rate has topped 98%, which may be used as part of the basis of performance review and evaluation.

2. Domicile data may be obtained from the Department of Civil Affairs of the Ministry of the Interior. The information on daily changes can be collected from the data by using a computer program for transmission to the databank of the National Immunization Information System, which can be connected with the NIIS domicile databank. Then, the data (including moving in, moving out, birth, and death information) can be passed down to health stations for use in referral consolidation. Thanks to this referral-consolidation mechanism, the immunization data scattered in the various health stations can be integrated to reduce the use of human labor for registration, to eliminate the need for keeping the data, to cut down on the expense for referral consolidation, and to attain the goal of cost-effective operation.

Achievements

1. Local Database System of the National Immunization Information System

   a. By the end 2005, all contract clinics and hospitals in the jurisdiction of county and city health departments were put online, digitalizing the immunization reports.

   b. The use of magnetic disks for reporting immunization data to the health stations and for entering the contractual medical institutions into the computer by taking advantage of the NIIS function of referral consolidation has eliminated the need for people to fill out the referral form, a practice when PHIS was in use, and therefore health stations no longer need to screen the data for mailing, saving manpower and mailing cost as well.

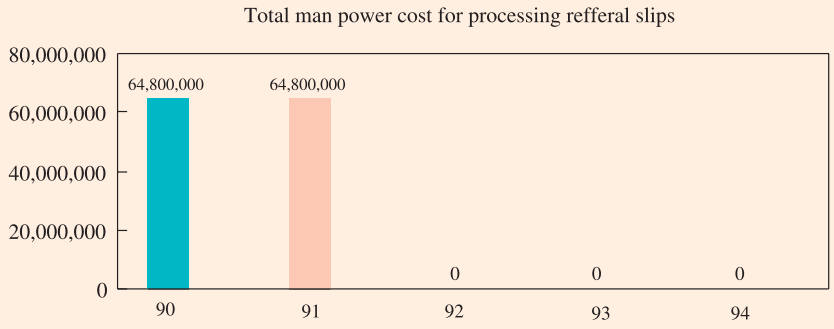

Figure 3: Total manpower cost for processing referral slips

2. Figure 3: Total manpower cost for using Central Database Subsidiary System of the National Immunization Information System to process referral slips.

The system has the following features and can help the competent departments at central level in many ways in supervising local immunization affairs and in making policies:

   a. Using the data stored in the databank of the Ministry of the Interior to establish a national bank of basic data of all the people and the complete immunization data of the nation.

   b. Automatically updating the NIIS databank, the basic data of the national databank, and the immunization data of individual cases.

   c. Knowing in time the stockpile of vaccines in the nation through the use of the national vaccine stockpile system.

   d. Reading on the Communicable Disease Notification System for data about people who have chronic diseases, the elders who have received flu immunization and people who have chronic diseases, including the respective percentages.

e. Auditing the various NIIS reports filed by local organizations and providing the information to the appropriate departments and policy-makers.

f. Establishing a website for staff members of health departments and stations to inquire about the educational and publicity materials on immunization and to discuss immunization problems, which will be open to the public in the future.

3. Immunization Research System

The system is established for staff members of health departments and stations to check the immunization data of people not living in their locality.

Future Prospects

Since the completion of the National Immunization Information System, the domicile registration departments, health agencies, and medical institutions have comprehensive online connections for rapid transmission of data. The digitalization of operations for referral consolidation has spared the chore of filling out the referral slips (the so-called yellow card), reducing the workload of health personnel on base level and providing convenience for the people. The function of urging people to receive immunization can help the work of disease control.

In the long run, the Central Database Subsidiary System can be used for supporting policy making, for evaluating the efficacy of vaccines, for supervising the control of disease through immunization, and for getting instant information required in disease control. In the future, Taiwan health and medical operations will move toward the goal of internationalization. Information web is the center of the 21st century for integrating health and medical information as required in the promotion of various health policies.

Hepatitis Disease Control Programs

Hepatitis Control Program

From 1982 to 2002, four five-year plans had been completed under the Hepatitis Control Program. The fifth five-year-plan started in 2003 and will last until the end of 2007. The priorities are to strengthen the surveillance system for acute cases, sever the paths of hepatitis A infection, tighten the health education on liver disease control, improve the management on blood transfusion, and raise the quality of hepatitis examination. Taiwan CDC will move in the following directions: developing the vaccine-manufacturing technology, screening for the early detection of hepatocellular carcinoma, and seeking effective treatment for hepatitis.

Objectives and Strategies

The main objectives and strategies are to raise the coverage rate of hepatitis B immunization to 95% and above, to increase the rate of free hepatitis B screening for pregnant women to above 90%, to promote the inclusion of the two-year-olds in the hepatitis A immunization in the aboriginal regions and to reduce the acute Hepatitis A incidence rate in the aboriginal regions to 5 per 100,000 people, to strengthen quality control for hepatitis diagnosis and to make the accuracy rate of hepatitis diagnosis to up to at least 90%.

Accomplishments:

1. Immunization:

a. Hepatitis A

The confirmed cases of acute viral hepatitis A in aboriginal regions were reduced from 183 in 1995 to nil in 2005 and the incidence rate was lowered from 90.74 out of 100,000 people in 1995 to zero in 2005.（Figure 1）

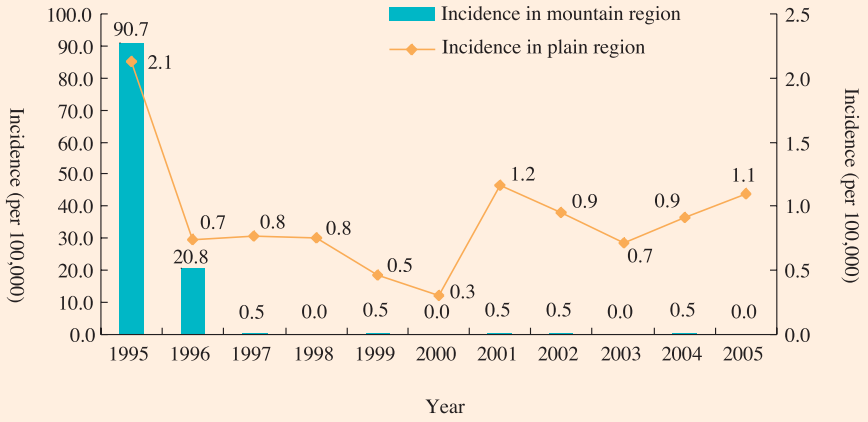

Figure 1: Incidence rates of Hepatitis A in Taiwan's Aboriginal and Other Regions, 1995- 2005

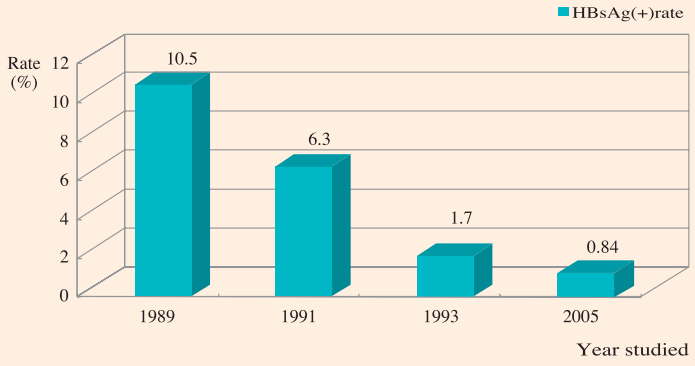

Figure 2: Hepatitis B Carrier Rates (HBsAg) at Age of six in Taiwan

b. Hepatitis B

(1) This study shows that the carrier rates of each year have declined significantly from 10.5% in 1989 to 0.84 % in 2005 respectively. (Figure 2)

(2) To complete Hepatitis B vaccination for babies born in 2004, the second and third doses are given and the immunization rates for these two doses are 97.3% and 95.1% respectively.

(3) A review of the vaccination records of new students in elementary schools shows that hepatitis B vaccination rates among them are 99.6% for the second dose and 99.3% for the third dose.

2. Health education:

In 2005, health education for the public was conducted through the distribution of publications and broadcasts via electronic media. For hepatitis A, the publicity was targeted mainly on people below 30 years of age. Using a kit titled “The Heavenly King Battles with Hepatitis A” as the theme, Taiwan CDC collaborated with "Leecy's Research Foundation for Pediatric Infections Disease and Vaccine" to make an islandwide publicity tour, in which hepatitis A was presented in the form of comic dialog. Also included in the tour, show girls gave a dance called “Hit the Hepatitis.” Other promotional activities were conducted in popular places in Taipei city, Taipei county, Taichung city, Kaohsiung city, Hualien county.

3. Quality control of hepatitis diagnosis:

Taiwan CDC supervised and monitored the quality control of hepatitis diagnosis. The HBsAg specificity rate reached 100% in 2005.

4. Hepatitis study and research:

The research program was aimed at prevention of all types of hepatitis. It began with an effort to understand the related problems associated with the situation of incidence, residual defects on the infected, mechanisms, and treatments. The results of the studies were used as references for hepatitis prevention policy.

5. Promotion of Hepatitis B and C Trial Treatment Program:

There are approximately 2.5 million hepatitis B carriers and 300,000 hepatitis C infected cases in Taiwan. In order to give them appropriate treatment to the infected population and reduce the incidence rate of liver cirrhosis and liver cancer, the Bureau of National Health Insurance lunched a Promotion of Enforcing Hepatitis B and C Trial Treatment program. From October 2003 to December 2005, the program had treated 14,818 and 8,807 B and C patients respectively.

Future Efforts:

To promote public awareness about hepatitis risk factors, increase the immunization coverage rate, and strengthen diagnosis and treatment studies for hepatitis to further reduce the incidence rate and mortality rate of all kinds of hepatitis and liver cirrhosis and hepatoma.

Eradiction Programs of Polio, Measles, Congenital Rebella Syndrome and Neonatal Tetanus

Background

Taiwan launched the program on the eradication of polio, measles, congenital rubella syndrome and neonatal tetanus in 1991. The goal for polio eradication was attained on October 29, 2000. However, the eight nations in Central and West Africa that had been declared polio free were infected again by polio rampant in neighboring Nigeria and Niger in 2003 and 2004, registering 63 imported cases. In Taiwan, more than 95% of babies receive three doses of polio immunization but there are still 5% of them failing to do so in time, constituting a loophole in the network of polio control. Before the virus is eradicated in the world, it is still possible for it to invade Taiwan. Although Taiwan has eradicated polio, it still has to strive to keep the fruit of the eradication effort.

Measles can be eliminated through vaccination. It is the primary target of endeavor after the eradication of polio. In recent years, a single-digit rate of measles incidence has been registered except in 2002 when 24 cases were reported. As for neonatal tetanus, no cases have been reported since 1995 except in 2001 when a case was reported. It was established as an isolated case involving a child borne by a foreign mother. Since 1994, three cases of congenital rubella syndrome have been confirmed, all in 2001, of which the mothers of two patients were foreigners. This indicates that the latent danger of prevalence of communicable diseases cannot be overlooked in view of the brisk business exchange, booming tourism, introduction of alien labor, and increasing number of marriages with foreigners and Chinese mainlanders. So, it is necessary to continue the eradication program for polio, measles, congenital rubella syndrome and neonatal tetanus.

Objectives and Strategies

1. Maintaining the high rates of immunizations for all diseases

This involves the maintenance of coordination with contractual immunization hospitals and clinics and enhancement of the quality of their service, conduction of surveys on the completion rates of immunization, so that appropriate remedial measures can be taken to ensure that all women of child-bearing age (foreigners in particular) are protected from rubella. The cold chain system should be maintained and the immunization information system be improved.

2. Strengthening the surveillance on diseases

This involves constant surveillance on AFP, measles, rubella, and congenital rubella syndrome and instant analysis of the data; strengthening of the reporting and tracking system for babies not born in a hospital so as to grasp neonatal tetanus cases for newborns; continuation of the "zero-case reporting system and telephone interviews"; regular evaluation of the surveillance operations of the counties and cities. If shortcomings are found in the evaluation, the local health authorities will be asked to propose a plan for improvement. Besides, a plan should be mapped out to award reporting.

3. Augmenting the capability of lab examination

Besides the use of serum method for the determination of clinical cases, Taiwan should establish the technology of molecular biology for diagnosis by cultivating the virus in keeping with the WHO strategy for this stage of measles eradication. To examine the antigen and separate the virus in the samples, the types of samples needed to be collected in a reported case and the number and timing of samplings all should be regulated.

4. Enhancing the rates of completeness and correctness of case survey

Besides correctness in sampling, the essentials for a case survey include history of immunization, history of travel, and information whether the contacted persons also have suspected symptoms. All of these should be included in the standard operational procedure in order to strengthen the training for local health workers.

5. Conducting health education and publicity

This should be done through different channels to remind people, especially the spouses from the Chinese mainland, of the need to take their babies for immunization.

6. Engaging in research and survey

This involves enlarged study of virus separation and assessment technology for measles and rubella, molecular biological study of the genomic sequence, evaluation of serum epidemiology, cost-effect study of the immunization information system, and the increase of the completion rate of immunization.

Achievements

1. In 2005, 79 AFP cases were reported and investigation was made for all of them. The investigation was completed within 48 hours for 91% of them. Clinical data showed none of them were polio cases.
2. In 2005, a ACIP meeting was held because of the polio outbreak in Indonesia.
3. In 2005, 39 measles cases were reported. The investigation rate was 97.4%, and the sampling rate was 100%. Seven of the cases were confirmed.
4. Three cases of congenial rubella syndrome were reported in 2005. Investigation and complete sampling were made, but either of them was proved in lab test.
5. There was no report on neonatal tetanus in 2005. None of the cases involving a baby not born in hospital were tracked down.
6. Since 2002, female spouses from foreign countries and the Chinese mainland have been required to have a rubella certificate or an immunization certificate.

Future Prospects

1. The fruit of polio eradication will be maintained by preventing import of the disease.
2. Strategic planning will be completed in the tail stages of the world's polio eradication program.
3. Efforts will be made to monitor measles and to discover cases of measles infection on the basis of the samples collected from the Taiwan CDC's contractual laboratories.
4. Certification for measles eradication will be completed in accordance with the WHO's schedule for the eradication of the disease.
5. The effort will be continued to maintain zero cases for congenital rubella syndrome and neonatal tetanus.

- Manufacturing of Serum and Vaccines
- Center for Research and Diagnostic Center
- Laboratory Biosafety

Research and Development

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Manufacturing of Serum and Vaccines

A. Manufacturing, inspection, and development of biological products

1. Manufactured 11,90,700 doses of freeze-dried BCG, 53,755 doses of cholera vaccine, 39,690 doses of absorbed tetanus and diphtheria toxoid (Td, for adult use), 39,690 doses of alum precipitated tetanus toxoid (TX), 1,807 doses of lyophilized biv-alent antivenin of Tr. Mucrosquamatus and Tr. Stejnegeri, and 3,558 doses of lyophilized antivenin of D. acutus.

2. Inspected 22 lots of biological products, 86 lots of agents, 151 lots of ingredients, and 43 lots of materials.

3. Completed and passed the third-phase cGMP.

4. Completed the clinical test for eight cases of D. russellii antivenin, with a 100% cure rate, and making effort to register the product for inspection and to apply for a license.

5. Introducing ferrets to help produce antigen for first strain of endemic A flu.

B. Conducted training in cooperation with National Health Research Institute (NHRI) for bio-agent technique transfer.

The NHRI dispatched four technicians to receive training in BCG, Ta, Da manufacturing and the filling rooms. It sent four other technicians to learn BCG, antivenin, and microbe inspections.

C. Promoted authorization and cooperation for biological technology

1. In coordination with the government policy of supporting private industries, on November 5, 2002, Taiwan CDC signed with Adimmune Corp. a technology authorization contract for the manufacturing of human-use biological products. By November 4, 2005, technique transfers for DT and Td were completed.

2. On November 1, 2005, Taiwan CDC signed, also with Adimmune Corp., a cooperation agreement on the development of technology platform for cell cultivation and manufacturing of Japanese encephalitis vaccine.

D. Cooperation of NHRI for the development of vaccine for H5N1

The virus titer of cultivated H5N1 NIBRG-14 virus exceeds 128 for HA. Ultra-centrifugation is used for purifying the vaccine. Application to animals has proved its preliminary effectiveness.

E. Development of biological products:

1. Completion of the manufacturing-process improvement and the immunization analysis for enterovirus-71 vaccine:

   a. Built 230 vials master virus seed for enterovirus-71 vaccine strains in a cGMP-level place.

   b. Produced 20 lots. In the process of production, stability and homogeneity were achieved in terms of average protein density, antigen content of unit protein, and antigen recycling rate.

   c. When the antigen protein was applied to mice above 2ug / ml, the nertralization titer could reach 1:40.

2. Production of anti-cobra and anti-Krait IgY using duck eggs:

   a. The average validation value of 20mg/ml anti-cobra IgY was 170U and the egg could be withdrawn beginning in the fifth week until the 32nd week. The validation value of 20mg/ml bivalent antivenin of Krait could be maintained at above 600U beginning from the sixth week to the 32nd week.

   b. If duck eggs are used for the production of bivalent antivenin, the cost could be reduced, estimably 15% for anti-cobra IgY and 75% for Krait IgY.

3. The use of real-time PCR for BCG efficacy analysis:

   a. A standard curve for monitoring BCG 16S rRNA QPCR was established. The effective scope was from 4×10^{5} cells to 4×10^{1} cells.

   b. It is found that if the BCG 16S rRNA QPCR is used for monitoring the growth of BCG bacteria and if the number of living BCG bacteria remain at above 1×10^{7}, the growth differences of BCG bacteria can be detected after more than two days' cultivation.

Research and Diagnostic Center

Foreword

The primary objectives of the Center are to conduct researches for the development of more efficient and comprehensive diagnostic methods, to perform laboratory-based epidemiological study, and to study the pathogenesis of communicable diseases. Another role of the Center is to establish national reference laboratories and carry out diagnostic services and provide technical support to the control of notifiable communicable diseases and to aid national and international health agencies in the consolidation of control strategies and policies. In 2005, the Center had 186 employees. The diagnostic amount was 145,178 specimens. Facing the challenge of the continuously emerging and re-emerging of communicable diseases, the Center put great premium on international collaboration placing special emphasis on information exchange and the introduction of new and advanced laboratory technology. In addition, laboratories of the Center regularly participated in proficiency tests such as CAP tests to assure the quality and consistency of the diagnostics. The Center is divided into seven laboratories and two administrative sections, namely Virology I, Virology II (Vector-Borne Viral and Rickettsial Diseases), Bacteriology, Mycobacteriology, Vector Entomology, Parasitology, Mycology, Biological Resources Section and Quality Assurance & Biosafety Section. The focuses and accomplishments of the Center in 2005 are listed as following:

2005 Focuses and achievements

Virology Laboratory I

1. Executed the acute flaccid paralysis surveillance system in compliance with WHO goal of polio eradication.
2. Conducted a serological study of severe cases caused by enterovirus infections and developed anti-Coxsackievirus antiserum.
3. Enforced the quality control program for the detection of HIV-1 and hepatitis B and C virus infections among teaching hospitals, local hospitals and clinics, including health examination hospitals for foreigner laborers.
4. Performed the viral diarrhea disease surveillance system and its epidemiological study.
5. Established HIV-1, enterovirus 71 and rotavirus genomic sequences databank.
6. Explored and developed multiplex detection system for emerging viral diseases.
7. Cooperated with teaching hospitals, the academia, life science research institutes and other international relevant public health research institutes such as the CDC in USA and NIID in Japan.

8. Carried out routine diagnoses of respiratory viruses, by using ELISA and PCR technologies.
9. Designed real-time PCR primers and probes from highly conserved regions of influenza viruses to improve the specificity and sensitivity of lab tests on influenza viruses.
10. Established real-time PCR methodology for other novel influenza viruses such as H5, H7 and H9.
11. Continuing on the surveillance of evolution of influenza viruses in Taiwan, including antigenic and genetic changes.
12. Developed the ferret antisera to influenza viruses for surveillance and detection purposes.
13. Contacted the WHO Collaborating Influenza Centers and delivered the circulating influenza viruses of Taiwan to WHO collaborating Influenza centers for global surveillance, epidemiology and control of Influenza.

Virology Laboratory II (Vector-Borne Viral and Rickettsial Diseases)

1. Established a flavivirus reference laboratory to provide laboratory reference and diagnostic services to national and international health agencies.
2. Established a Rickettsia reference laboratory to provide laboratory reference and diagnostic services to national and international health agencies.
3. Carried out routine diagnoses of dengue, Japanese encephalitis, yellow fever, Hantavirus, scrub typhus, typhus fever, and Q fever using serological methods (ELISA and/or immunofluorescence assay), molecular method (real-time PCR), and isolation method (cell culture).
4. Conducted seroepidemiologic and molecular epidemiologic studies of the diseases mentioned above.
5. Built genomic databases of dengue virus, Japanese encephalitis virus and *Orientia tsutsugamushi.*
6. Applied the rapid diagnostic system to the fever screening program at airports for early identification of imported dengue cases and other arboviruses.
7. Held the 2005 APEC workshop and offered a course on “virological surveillance, diagnosis and molecular epidemiology of dengue” in Taipei.

Bacteriology Laboratory

1. Diagnosed and identified bacterial pathogens by the established conventional and molecular methods.
2. Investigated the outbreaks of *Burkholderia pseudomallei* and *Salmonella typhi*.
3. Established the following detection methods:
   - Quantitative PCR for detection of various types of *Staphylococcus aureus* exotoxin.
   - Thin-section electron microscopy for infectious pathogens.
   - Diagnostic methods for rat bite fever caused by *Streptobacillus moniliformis.*

4. Genotyped molecularly *Legionella* spp., *Bordetella pertussis*, and group A streptococcus that caused scarlet fever in northern Taiwan.

5. Made molecular study of the topoisomerase and efflux pump-mediated resistance to fluoroquinolones in *Shigella* spp.

6. Established genomic database for *Legionella* spp., *Bordetella pertussis*, and group A streptococcus that caused scarlet fever.

7. Made a serology study of the effects of serum IgG and IgM antibody titers on decision making in diagnosis of Legionellosis.

8. Established a reference laboratory for Leptospirosis and Cat Scratch Disease.

Mycobacteriology Laboratory:

Provided

1. diagnosis and identification services:
   - Standardized conventional and molecular diagnosis methods.
   - Developed new molecular diagnosis and genotyping methods.
   - Provided species identification and confirmation services.

Conducted

2. outbreak and pseudo-outbreak investigations:
   - Conducted laboratory investigations of cases from schools, hospitals, long-term care facilities, etc.

Carried out

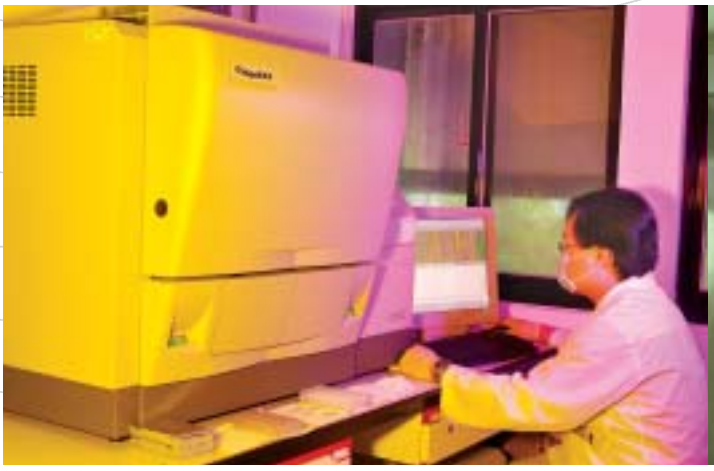
3. molecular epidemiological studies:
   - Surveyed Beijing family *Mycobacterium tuberculosis* strains, 2002-2005.
   - Investigated transmission dynamics of *Mycobacterium tuberculosis* in high-risk groups.
   - Conducted surveillance of multiple-drug resistant *Mycobacterium tuberculosis* strains.

4. Established genetic database:
   - Carried out molecular genotyping of *Mycobacterium tuberculosis* using RFLP, Spoligotyping and VNTR-MIRU.
   - performed sequence analysis of nontuberculous mycobacteria.
   - performed sequence analysis of drug resistance and virulence genes of *Mycobacterium tuberculosis*.

5. Established a mycobacteria strain banking system.

6. Implemented the laboratory external quality assessment program.

7. Conducted technical training and education.



Parasitology Laboratory:

1. Applied the molecular diagnostic system to routine enteric amebiasis examination of the reported patients and alien workers.
2. Continued the molecular epidemiology project of amebic infection for the high-risk group, such as institutional psychiatric patients.
3. Used the molecular surveillance system for malaria to assist microscope examination.
4. Organized two amebiasis and two malaria laboratory short training courses for lab workers from local health departments and hospitals allowed to conduct health examinations for patients and alien workers.
5. Attended the CAP tests, parasitology survey and blood parasite survey for the professional evaluation.

Mycology Laboratory:

1. Provided routine fungal diagnostic services such as *Cryptococcus neoformans and Candida spp.*
2. Compared and standardized various molecular typing methods such as PFGE, MLST, rep-PCR, and AFLP for typing of *Candida spp.*
3. Carried out molecular surveillance of *Candida spp*. in Taiwan by PFGE genotyping and MLST.
4. Conducted molecular epidemiology study of *Candida albicans* infection for high-risk groups, such as AIDS patients.
5. Built PFGE fingerprint as well as MLST database of *Candida spp*. in Taiwan.
6. Developed a real-time diagnostic system and applied it to the diagnosis of *Candida spp*. and *Cryptococcus neoformans.*

7. Conducted routine diagnosis of *Chlamydia pneumoniae* and *Mycoplasma pneumoniae* using MIF, ELISA and real-time PCR technologies.

8. Performed epidemiological studies of *Chlamydia pneumoniae* and *Mycoplasma pneumoniae* in Taiwan.

9. Developed quantitative PCR and multiplex PCR for *Chlamydia pneumoniae* and *Mycoplasma pneumoniae.*

10. Genotyped *Chlamydia trachomatis* from clinical samples by nested-PCR and sequencing.

Vector Biology Laboratory:

1. Monitored the density of vectors of rodent-related diseases (tick, mite, flea and louse).

2. Identified vector species.

3. Detected pathogens in vectors of rodent-related diseases.

4. Mosquito surveillance on dengue and malaria vectors.

5. Detected dengue virus *Aedes* mosquitoes caught in fields in dengue high-risk areas, using real-time RT-PCR method.

6. Researched the resting sites of malaria vector, *Anopheles minimus* and its blood sources.

Major Achievements in 2005:

1. Molecular epidemiologic studies of dengue

Molecular epidemiologic study was applied to the laboratory based dengue surveillance in Taiwan 2005. The results showed that multiple dengue epidemics were caused by four different imported dengue virus strains, which co-transmitted in southern Taiwan between August and December 2005. The results demonstrated that the application of real time molecular epidemiological investigation on virological surveillance could help monitoring the transmission dynamics of present and newly introduced dengue virus strains.

2. Studies on the vectors and pathogens of murine typhus in Taiwan area

Murine typhus is a rickettsiosis, which is mainly transmitted by fleas. The pathogen of murine typhus is *Rickettsia typhi*, and the vectors are mainly *Xenopsylla cheopis*. Since 1995, about 10 to 20 murine typhus cases have been confirmed by indirect immnofluoresecnt assay (IFA) in Taiwan, however, the surveillance of the vectors and pathogens of murine typhus in Taiwan had never been done. From November 2004 to December 2005, 810 rodent serum samples were collected from main airports and seaports in Taiwan area to detect rickettsial antibodies by IFA. The result showed the seropositive number of *R. typhi*, *R. rickettsii*, *R. conorii* and *Coxiella burnetii* were 14 (1.73%), 407 (50.3%), 217 (26.8%) and 0 (0%) respectively. *R.* typhi seropositive rodents were found in Mailiao port, Kaohsiung port, and Kaohsiung airport, whose seropositive rates were 6.31%, 5.26% and 1.43%

respectively. A comparison of the rickettsial seropositive rates among airports and seaports showed that *R. rickettsii* seropositive rates were high in Kaohsiung port (79.8%) and Hualien port (64.7%), with Matsu port (22.7%) as the lowest. Taichung port (8.2%) had the lowest *R. conorii* seropositive rate, while Badouzih (46.7%) and Kaohsiung (40.4%) were the two ports that had the highest rate. Two hundred and eighty-two *X. cheopis* were collected from airports' and seaports' rodents, which were detected by PCR based on 17 kDa antigen (htrA) and citrate synthase (gltA) rickettsial gene. It was found that 19.4% (55/282) *X. cheopis* carried *Rickettsia*, and the distributions were 50% (3/6), 30.1% (43/143), 14.3% (8/56) and 3.68% (1/28) respectively in Dongang port, Kaohsiung port, Kaohsiung airport and Mailiao port. Through sequence BLAST in gene bank, two rickettsial strains were found, one was *R. felis*, and another one was *R. typhi*, with *R. felis* accounting for 78.2% (43/55). From January 2005 to November 2005, vector surveys were done on eleven confirmed murine typhus cases, 5 in Pingtung County, 4 in Kaoshsiung County, 1 each in Kaoshing City and in Tainan County. Totally, 82 rodents were captured, of which *R. typhi*, *R. rickettsii* and *R. conorii* seropositive rates were 8.5% (7/82), 36.3% and 30.3% respectively. The data of PCR detections on fleas showed 11 out of 160 fleas had rickettsial infection, and the percentage was 7.0%. The rickettsial strains were *R. typhi* and *R. felis with R. typhi* as the dominant one (63.6%). In addition, a new rickettsial strain was found on cat flies (*Ctenocephalides felis*). This study showed *X.* cheopis might be the main vector of murine typhus in Taiwan.

3. Investigation of the distribution of Beijing family genotypes of *Mycobacterium. tuberculosis* in Taiwan

A total of 421 *M. tuberculosis* complex clinical isolates were collected at random from four geographic regions of Taiwan and analyzed by spacer oligonucleotide typing (spoligotyping) in 2003. 113 resolved spoligotypes were found, out of which 28 (24.8%) clusters were identified. One hundred eighty-seven (44.4%) isolates could be classified as Beijing family genotypes: 172 (40.9%) characteristic Beijing genotypes and 15 (3.6%) Beijing-like ones. A substantially larger proportion of tuberculosis patients were found to be infected with Beijing family genotypes in northern (51.6%) and eastern (46.2%) Taiwan, while 31.6% and 28.0% of the tuberculosis patients were infected with these genotypes in the central and southern regions. The proportion of Beijing genotype isolates was the highest in patients below the age of 24 (61.5%), the second highest number was found in patients over 65 (46.8%), and the lowest in patients aged between the 45 and 54 (34%). It was found in multivariate analysis that Beijing family genotypes were associated with geographic location and age. Antituberculosis drug resistance was more often found in Beijing family strains (46.4%) than in non-Beijing strains (34.3%), with more Beijing strains being resistant to ethambutol and isoniazid. These findings suggest that *M. tuberculosis* Beijing family genotypes have been dominant for several decades and that they are the cause of a significant proportion of the recent transmissions of tuberculosis in Taiwan.

4. Genotyping of multidrug-resistant *Mycobacterium tuberculosis* isolates

Of 162 multidrug-resistant *Mycobacterium tuberculosis* isolates from Taiwan, 60.5% belonged to the Beijing family according spoligotyping. IS6110 restriction fragment length polymorphism fingerprinting showed genetic diversity among the multidrug-resistant isolates. Furthermore, 90.1% of the multidrug-resistant isolates had mutations in the *rpoB* gene, and 11 novel alleles were recognized.

5. Identification of laboratory cross-contamination of *Mycobacterium tuberculosis*

A retrospective study including 515 *Mycobacterium tuberculosis* isolated from 215 patients was conducted to investigate possible laboratory contamination with *M. tuberculosis* over 1-year period in a university hospital. All cultures underwent variable-number tandem repeat-mycobacterial interspersed repeat (VNTR) typing. Cultures suspected of being contaminated in the VNTR analysis and possible source of contamination underwent Mycobacterial Interspersed Repetitive Unit (MIRU) typing further. Overall, 8 (3.7%) cases of 215 patients were considered possible false-positives. Five (2.3%) cultures might be contaminated during initial batching processing, and 1 (0.5%) and 4 (1.9%) cultures might be contaminated by cultures that had been processed in species identification procedures in the same laminar-flow hood. The 2-step strategy using VNTR and MIRU analyses in combination in this study appears to be a valuable means for the study of false-positive cultures.

6. Development of a modified genotyping method for *Mycobacterium tuberculosis*

A total of 502 isolates of *Mycobacterium tuberculosis* collected in Taiwan were genotyped using a modified and high-throughput typing system involving mycobacterial interspersed repetitive units. The Hunter-Gaston discriminatory index improved significantly to 0.972 with the modified 15-locus scheme, including ETR-A, B and C, compared with 0.951 for the previously reported 12-locus design.

7. Antigenic Divergence of *Bordetella pertassis* Isolates in Taiwan

Eighty *Bordetella pertussis* isolates were collected in Taiwan from 1998 to 2004 and analyzed using a combination of pulsed-field gel electrophoresis (PFGE) and sequencing of the *ptxS1* and prn genes. The incidence of pertussis increases every 3 years, and most of the isolates prevalent since 1998 have expressed nonvaccine *ptxS1A* and *prn2* alleles. Through PFGE analysis, the isolates could be classified into four major groups, and the incidence of these groups exhibited a correlation with the *prn* allele expressed by the isolates. It was found that PFGE is more discriminative than gene sequencing, since it could divide the isolates expressing the *prn2* allele into two groups: one group circulating from 1998 to 2001 and another group circulating from 2001 to 2004. The transition between the two groups in 2000 coincided with an outbreak of 326 cases. This research indicates that the antigenic divergence of *B. pertussis* circulating isolates has evolved over time in Taiwan. This information will have implications for vaccine policy in Taiwan.

Future Prospects

1. To develop multiplex detection system.
2. To develop rapid detection method for identification of vaccine derived poliovirus or OPV in the era of polio eradication.
3. To set up an internationally recognized flavivirus research center. The final goal is to establish a dengue network with laboratory-based surveillance systems among all APEC member economies. A standardized information exchange system will be implemented to facilitate the communication of member economies in dengue surveillance, clinical and laboratory diagnoses, prevention, clinical treatment and control.
4. To develop advanced high-throughput and multiplexing diagnostic techniques such as beads array or microarray system to improve diagnostic as well as genotyping efficiency.
5. To establish genotype databank of *Candida spp*. and to participate in global surveillance.

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Laboratory Biosafety

Biosafety

In September 2003, a stunning laboratory-acquired SARS case broke out in Singapore. Only a couple months later in December, a similar situation also took place in Taiwan. Fortunately, thanks to a swift inspection and proper emergency management by Taiwan CDC, the single individual-involved laboratory-acquired SARS case did not spread. Taiwan CDC is the competent authority for prevention and control of communicable diseases in Taiwan, with full responsibility for management against various severe biological hazards. Since this incident, Taiwan CDC has taken the opportunity to initiate an on-going revision of the Communicable Disease Control Act and to set up various regulations governing construction standards, occupational safety, fire security and environmental protection in Taiwan, in order to improve the standard requirements and mechanisms of supervising biological safety in laboratories. As a result, the level of biological safety of laboratories in Taiwan has been effectively enhanced through various management measures of the government.

Through a strict inspection routine on laboratory safety by Taiwan CDC, along with educational campaigns and practical training, all laboratories in Taiwan handling micro-organisms have made great progress in terms of safety inspection results of facilities and equipment, as well as awareness of safety and personal protection by the operational personnel. Aspects relating to the inspection quality and research accomplishments, the physical safety of the research personnel present, and the environmental security have all been addressed to, and together they constitute a very meaningful and prominent indicator in the course of establishing Taiwan's own management system concerning laboratory biological safety.

A National Biological Safety Committee has been formed by relevant government institutions in collaboration with several private organizations of biological safety for the purpose of policy integration, planning, promotion, and implementation. Meanwhile, with complementary measures such as building up a nationwide information management system for all laboratory microorganisms, establishing an accreditation system for laboratory safety, and enhancing efforts in R&D in technology concerning domestic safety equipment. It is expected that the management system of laboratory biological safety will become adequately comprehensive that enables Taiwan to become a rather meaningfully active and contributing member towards global biological safety accomplishments.

Education and Training.

For Taiwan, 2005 was definitely a decisive year for improving the management of epidemic preventing materials, in policy and strategy alike. There was obvious good progress in the following four major aspects, i.e. establishing a safe stock of epidemic preventing materials, formulating and setting up a MIS, swift delivery, and medium-term and long-range planning.

1. About the safe stock, Taiwan CDC channeled those large quantities of the surplus materials handed over by Department of Health into a three-level stockpiling system, i.e. the central, local, and individual hospital levels. In this way, not only does it render the responsibility evenly to every concerned user but also asks each user to maintain enough quantity for at least one month's supply. Currently, some domestic total figures of key items, for instance, are 3,850,000 pieces of N95 gauze mask, 4,880,000 pieces of medical protecting clothing, and 22,130,000 pieces of surgical gauze mask, which are all considered beyond safe levels.
2. The newly established MIS website posts regularly updated information of their epidemic preventing materials at 566 hospitals, 399 health bureaus, and 24 Taiwan CDC offices. According to a recent survey, there is an average of 465 persons visiting the MIS website every day, which means a total of 170 thousand person-times per year. The latest version of it is having the content divided into four categories or subgroups including the conventional epidemic preventing materials, anti-snake venom plasmas, anti-virus drugs, and anti-disease vector drugs. It has proven to be a more effective way of integrating the current information.
3. All these epidemic-preventing materials are kept in the air-conditioned storehouse, and transferred effectively with modern and professional storage logistics. Materials are delivered to users located anywhere in Taiwan and Penghu within 24 hours after the order is received, and to Kinmen and Lianjiang within three days.
4. On the draft board of Taiwan CDC there is a four-year medium-range plan, starting from some time in 2005 to 2008. The purposed of this very plan is to gradually establish a high level biosafety capacity to meet the needs for confidently responding to newly emerging infectious diseases and equip medical workers with the preparedness for possible bio-terrorism incidents in the future.

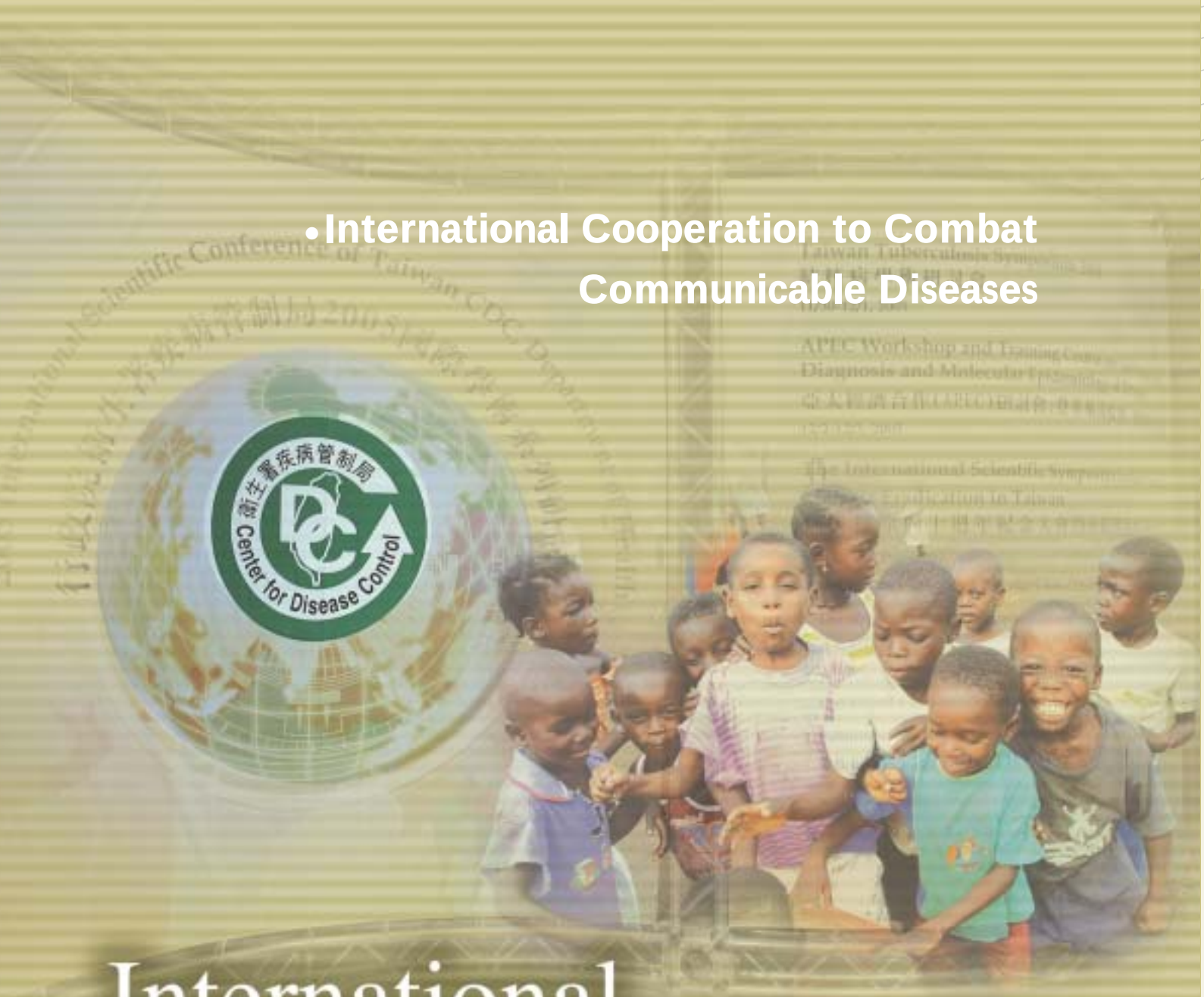
Establishment and Application of a Pathogen Molecule Sequence Database

The original plan for this project included was to gradually establish a number of individual genomic database units each for a specific pathogenic microorganism category in the years of this study, and keeping track on the long-term variation situations of various pathogenic genomes of local importance. Coupling with other relevant genetic information, it will allow Taiwan CDC to estimate the genetic evolving rates of those key pathogens in their normal static environment. Such rate information may be very helpful in inferring possible contamination sources, monitoring the approximate epidemiological situations about imported or newly emerged pathogens, and timely providing necessary molecular epidemiology information that can be used as an important reference for setting off communicable disease alarm in advance and formulating control policies.

What Taiwan CDC has accomplished so far are as follows: in 2003 the genomic database units were set up for enterovirus, influenza virus, dengue virus, and Mycobacterium tuberculosis; in 2004 the list of established genomic databases was extended to include Japanese encephalitis virus, HIV, adenovirus, rotavirus, and rickettsia; and in 2005, hepatitis viruses, Legionell pneumophila, Salmonella, Shigella, Bordetella pertussis, Group A beta-hemolytic Streptococcus, and pathogenic fungi such as Candidas were added. The principal content of those database units embraces specific segments of genomic sequence of various pathogens, epidemiology information of related field cases, and data analysis models.

As to the application, let's take influenza virus genetic database unit for example. In view of very frequent outbreaks of human avian influenza cases in many Asian regions in the last two years (2004-5), Taiwan CDC was not only actively planning and implementing neusray preventive measures against the epidemic possibilities, but also earnestly pushing a domestic "R&D project of influenza vaccines," which will adequately take advantages of Taiwan's existing genomic database, and presumably aiming at those vaccinal low reactors and cluster infection isolates to conduct various analyses regarding antigenic amino acid loci and antigenic advantages, as a good reference to help out in the selection of suitable isolates for vaccine candidate.

So collectively Taiwan CDC is establishing a Taiwan pathogenic microorganism genomic database (TPMGD) for the purpose of accessing genomic sequences of various pathogenic microorganisms, along with their serological or other experimental results, and the corresponding epidemiological information of real cases, which were all collected by Taiwan CDC. The current database contains more than 16,000 sequences of just seven pathogens: influenza virus, enterovirus, dengue virus, adenovirus, HIV, rotavirus and riskettsia, determined from 2002 up to now in Taiwan. Similar data of eight kinds of bacteria will be added to the database this year. In addition, browsing and searching functions are available to access these sequences by different query methods and criteria. Basic sequence analysis tools including multiple sequence alignments and phylogenetics tree building are also integrated by web interface. Individual users can set up their own personal database and they may compare their sequences with the original sequences from TPMGD side by side. Taiwan CDC also provides a reporting interface for users to prepare summary, table, or chart graphics. Finally, this database will soon be integrated with the GIS system and other surveillance systems of Taiwan CDC to provide more dynamic description of genomic evolution and more powerful analytical programs for specific pathogens will be available too.



International Cooperation to Combat Communicable Diseases

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Background

Communicable diseases know no national boundary. In today's world, globalization facilitates the spread and transmission of communicable diseases. To build a responsive worldwide disease surveillance and prevention network is a critical need for protecting the health of Taiwan people. As Taiwan is a member of the global village, Taiwan CDC is responsible for cooperation with international partners as well as providing adequate disease-control resources to needy countries to promote the quality of human life.

In recent years, Taiwan has made a lot of efforts to strengthen international exchange on health affairs. These include increasing disease prevention cooperation with advanced nations, assisting allies to raise the quality of medical care, fulfilling the responsibilities as a member of international community, vigorously participating in international conferences, learning and introducing advanced medical technology from other countries and winning worldwide understanding and support. As a result, many impressive achievements on disease control have been accomplished. And Taiwan is able to contribute its unique experiences to the world to attain the ideal of Health for All.

Objectives

Taiwan CDC has actively sought to participate in the activities of international organizations such as the WHO and APEC for the advance of bilateral and multilateral relations and the development of plans aimed at joint prevention and control of communicable diseases. By attending international symposiums and sending its staff to study abroad, Taiwan CDC seeks to cultivate more cosmopolitan health workers and promote international exchange.

Achievements

A. Participation in international activities and exchange visits: In 2005, 193 foreign guests from 32 nations visited Taiwan. Taiwan CDC signed two contracts and one cooperation plan with foreign nations. we sent 46 staff members for training abroad, participated in 33 international conferences and published 43 papers.

B. Hosting of international symposiums: From November 30 to December 4, 2005, Taiwan CDC held three international symposiums at the International Convention Center in Taipei. These were the tuberculosis symposium participated by 45 specialists from 34 nations and 237 related domestic personnel; the APEC symposium and training course on the surveillance, lab examination, and molecular epidemiology of dengue fever, attracting 199 participants from home and 12 nations; and a symposium celebrating the 40th anniversary of malaria eradication. The success of these symposiums has been well recognized.

C. Promotion of the Model 414

Taiwan CDC began to promote 414 Model in 2005, The first 4 of the model means to borrow a lesson from the strategies of four targets: the U.S., Japan, Canada, and the E.U. The digit “1” refers to the WHO (including WPRO). The second 4 means participation in disease control in four nations abroad: malaria control in Sao Tome Principe; AIDS control in Vietnam; construction, in collaboration of the U.S., of a national laboratory for disease control in Haiti; and AIDS control in Malawi, using foreign aid as the strategy.

D. Promotion of bilateral relations

1. Invited Dr. Michael Malison of US CDC to serve as Taiwan CDC’s advisor.
2. Established for the first time a video link with US CDC, opening the milestone of cooperation with the U.S. on communicable disease control.
3. Held in conjunction with Japan’s NIID the Second Taiwan-Japan Bilateral Symposium in Tokyo themed on human-animal mutually communicable diseases, including vector-borne, rat-borne, and zoonotic diseases, which was participated by 14 specialists from Taiwan, including Taiwan CDC staff.
4. Joined in the epidemic control activity in the aftermath of Southeast Asian tsunami by sending a team to the stricken area.
5. Participated in Sao Tome’s malaria control program and its cholera control corps.
6. Planned personnel training in cooperation with the U.S. in Haiti with the completion of the Haitian laboratory.
7. Donated 600,000 doses of anti-flu drug to carry out the strategy of “battling communicable diseases beyond the national border.”

E. Interaction with WHO (WPRO)

1. Reviewed and revised, in keeping with the WHO's International Health Regulations (IHR), domestic regulations and served as the designated liaison focal point in Taiwan.

2. Invited for the first time to attend a WHO avian flu conference, in which Taiwan CDC director was present as an observer.

3. Participated in the capacity of a WHO specialist in a Biological Safety conference in China.

Future Prospects

In view of the increasing international intercourse and transportation, the issue of global cooperation has become more important than ever. Taiwan CDC will do our best to strengthen cooperation with other countries as well as international healthcare institutes. Encouraged by the accomplishments of training and educational programs, Taiwan CDC will cooperate in setting up a global surveillance network for the prevention and control of infectious diseases with world nations. In addition, training personnel specializing in international public health and emerging infectious disease prevention, and seeking full involvement in international communicable disease prevention project will also be the next targets of Taiwan CDC. The future efforts are detailed as follow:

1. Participating in the WHO's technical conferences and activities.

2. Promoting cooperation in communicable disease control with other countries.

3. Serving as the IHR Focal Point in Taiwan and continuing the collection of information from the focal points of other nations for use in the development of international exchange and cooperation.

Major Challenges Ahead

Major Challenges Ahead Major

Major Challenges Ahead

1 Establishment of a Disease-control Lab Network

1. To augment the capacity of lab test and establish an international-level lab-testing network for the early detection of a bio-terrorist attack or the re-emergency of SARS and other novel diseases.
2. To construct a perfect management system for infectious biological materials according to the regulations governing safety management of laboratories and transportation for the safety of lab workers and the general public.

2 Development of Vaccines

This calls for integrating the limited resources of the nation, organizing a national team for vaccine development, promoting vaccine-manufacturing infrastructure, and augmenting the nation's vaccine capability of coping with a major prevalence in the world and the outbreak of an endemic epidemic. Using this as a model, a robust development of Taiwan's vaccine industry should be induced with the establishment of bank of disease strains, development of vaccine-making technology, and collection of the results of clinical tests and vaccine regulations of Taiwan and other Asian nations.

3 Rising Probability of Epidemic Outbreaks

1. In recent years, large numbers of foreign laborers have been imported to meet the requirement of economic development. The number of foreign spouses has also been on the increase, year upon year. These, together, have increased the probability of disease import.
2. Disease-borne animals and vectors move in from areas infected with diseases communicable between animals and humans (also known as zoonoses), much increasing the probability of the prevalence of these diseases in Taiwan.

4 Fortification of the Border Quarantine Network

This calls for an increase of quarantine facilities at the ports to fortify the border defense against the import of diseases, the enhancement of the capability of handling emergency cases so as to effectively screen suspected diseases and stop their spread. Also required is the revision of the Regulations Governing Quarantine at Port according to the International Health Regulations (IHR).

5 Epidemic Probability Increasing with Growth of Collective Caring Institations

1. With the change of social pattern, double-earner families are increasing in large numbers, giving rise to the problem of caring for babies and children. People must count on the assistance of postnatal care institutions, day-care centers, kindergartens, after-school classes. If these organizations fail in their health management, they will become centers of disease spread.
2. In recent years, the number of old people is on rapid increase. This is aggravated by the changing of diseases into the chronic type, calling for long-term care. Because long-term care providers are organizations of high population density, if problems happen in health management, breakouts of communicable diseases are unavoidable.

6 Integration of surveillance networks

Taiwan's major challenge for future is to integrate the surveillance networks for taking prompt preventive measures, including development of a real-time disease surveillance and alert network, construction of early detection models, establishment of real-time communications and information exchange command centers, improvement of nosocomial infection and tuberculosis surveillance and control.

An ideal comprehensive surveillance network has six elements. The first is the use of systematic disease detection method for establishing epidemic intelligence. The second is real time verification and alert. Once an infectious disease is detected, a coordinated rapid response must be made, including dispatching field epidemiologists to the scene to handle the outbreak. A good model of information management and dissemination is most important for early mobilization. Outbreak response logistics and continuous training for field epidemiologists are also vital.

In the near future, Taiwan CDC plans to make up the gaps represented by these challenges with the following measures: (1) to establish an autopsy-related surveillance system for the detection of suspect emerging and re-emerging infectious diseases and the outbreak of biological cases; (2) to integrate school-based surveillance, autopsy-related surveillance, syndrome surveillance, and nosocomial infection surveillance into a comprehensive surveillance network for prompt preventive action; (3) to strictly monitor the indexes of the "Global Plan to Stop TB, 2006-2015," hospitalization status, TB smear positive cases, the magnitude of DOTS observers' workable measures of adaptation, and onset alert of TB contacts, and (4) to improve the capability of hospitals' nosocomial infection control, including revision of nosocomial infection control policies and related regulations, enhancement of the Nosocomial Infection Prevention System and implementation of an award program for hospitals having improved the quality of their infection control.

7

Reduction the Number of Patients to a Half in 10 Years

Tuberculosis control in Taiwan is still way behind developed nations. The 2003 report of the US CDC says that the incidence of tuberculosis in the US was 5.1 per 100,000 people; and the mortality rate of tuberculosis in 2002 was 0.3 per 100,000 people. In Japan, the 2003 ratio of incidence was 24.8, and the mortality ratio was 1.9 per 100,000 people. In Taiwan, they were 66.67 and 5.8 respectively, indicating there is still room for improvement in both ends. Taiwan CDC declared on the 2005 World Health Day that the number of tuberculosis patients would be halved in ten years; that is, to cut the number of new cases from about 15,000 a year to 500 a year (see P50 Figure 5). Tuberculosis control is not the responsibility of the government alone. A thorough implementation of the successful government policy calls for the concerted efforts of every sector: the government, the private sector, the academia, medical circles and others. This is the only way to attain the ultimate goal of tuberculosis control for the health of the people.

8

Installation of an Prevention and Treatment Network for Infectious Diseases

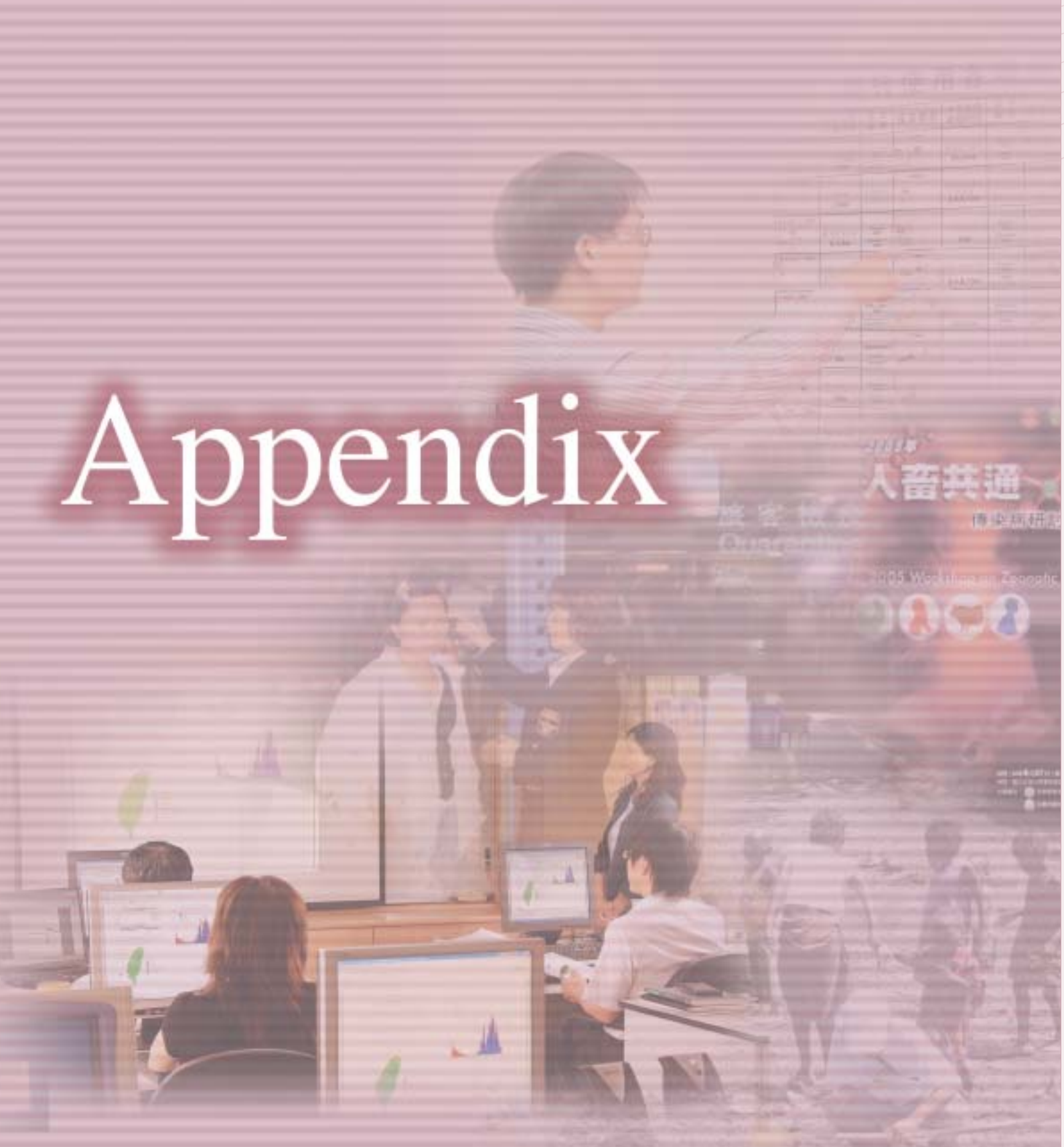
1. Increasing the response capability of the infectious disease treatment institutes of the country.
2. Establishing the concept of specific medical treatment for infectious diseases in the country in order to effectively diagnose and control the epidemic and at the same time maintain the normal operations of the medical system.
3. Fulfilling the functions of the Infectious Disease Treatment System for quick response by connecting the medical treatment system with the public health system and substantiating their manpower and material power.
4. Combining the strengths of medical circles and administrative organizations for the establishment of an all-people epidemic control network to effectively prevent and control the spread of infectious diseases for the wellbeing of the people as a whole.

9

Strengthen the network of international exchange

To establish a platform for international exchange, vigorously cultivate international health and disease-control talent, and set up a regional joint defense system for effectively use of international resources and for augmentation of the totality of the nation's disease-control capability.

Appendix



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Major CDC Timeline 2005

	January
1	Implements a prenatal HIV screening for all pregnant women in Taiwan.
4	Sends the first echelon of specialists to Phuket Island, Thailand, to control post-tsunami outbreak of epidemics.
5	Ships 20,000 masks, 20,000 N-95 masks, 100,000 pairs of gloves, 10,000 pieces of quarantine clothing, and 22,500 chlorine tables to Phuket, Thailand, for the control of post-tsunami outbreak of epidemics.
11	Sends the second echelon of epidemic fighters to Phuket Island, Thailand, to control post-tsunami outbreak of epidemics.
12	Sends 20,000 doses of tetanus toxoid and 20,000 syringes to Indonesia to help the tsunami victims there.
14	The Legislative Yuan passes the revisions of the AIDS Prevention and Control Act.
18	1. The National Health Command Center is inaugurated. 2. The third echelon of epidemic fighters leave for Phuket Island, Thailand, to control post-tsunami outbreak of epidemics.
28	Five sets of new-type emergency health kits are sent to Indonesia to relieve tsunami victims.
	February
4	A Global Control System is announced for care providers participating in the National Health Insurance Program designed for strengthening the control of infections.
5	The revised articles of the AIDS Prevention and Control Act are promulgated.
16	The Situation Room of the National Health Command Center is inaugurated by Director Kuo Hsu-sung of Taiwan CDC.
	March
7	The Department of Health's AIDS Prevention and Control Committee advances a plan for the control of the epidemic.
20	Outstanding workers are awarded at a ceremony marking the 2005 World TB Control Day.
20-24	Participates in the 16th International Harm Reduction Workshop.
	April
1	The measure of health self-management for passengers from China, Hong Kong, Macau (including those going to Kinmen and Matsu) comes to end.
7	The Executive Yuan Disaster Prevention and Control Committee approves at its 21st meeting a plan for preventing and controlling biological disasters.

12	Two sets of new-type emergency kits are sent to Indonesia as tsunami relief in coordination of the efforts of the Ministry of Foreign Affairs.
14	Participates in the cross-ministerial exercise on the control of biological terrorist attacks.
15	Establish a contact network for the infectious disease control and medical treatment networks in five regions.

May

1	SARS control is upgraded from zero level to the preparatory level with the revision of related measures.
13	A discussion is held on the plan for supporting the cooperative hospitals participating in the medical treatment network for infectious diseases.
24	A workshop on coping with bio-terrorist attacks is held for infectious disease treatment networks.
31	The second senior officials' meeting of APEC approves Taiwan's proposal on the development and manufacture of flu vaccine.

June

13	The definition of probable case of novel flu is announced.
28	Holds an infectious disease control exercise with Taitung County Government, including an excise on referral a Green Island patient infected with pneumonia of unknown cause.
29	Director Kuo Hsu-sung flies to Japan to attend an international publication conference marking the fifth anniversary of the inauguration of a global foundation, where he reported on Taiwan's policy of AIDS control and its achievement.

July

1	Participates in the Seventh Asia-Pacific AIDS Control Workshop held in Kobe, Japan.
5	Conducts in conjunction with the Animal Health Experimental State of the Council of Agriculture the 2005 bio-safety training for chiefs of related departments.
15	Implements the "Plan for TB Class-teaching Demonstration" and the "Plan for Accommodating More TB Patients by the Medical Treatment Network for Infectious Diseases."
29	The Mechanism for Handling Infectious Disease Emergency is started and necessary measures are taken after the outbreak of a cluster case of pseudo-melioidosis among people living in the valley of Erlun River.

August

1	Launches a trial plan for the control of AIDS among drug addicts in Taipei City, Taipei County, Taoyuan County, and Tainan County.
17	Holds an explanatory meeting before the start of the 2005 Flu Vaccination Program.
19	The president presides over a high-level national security meeting on countermeasures for the possible invasion of avian flu.
26	Holds a workshop on disease prognosis and the use of GIS.

27	Holds in conjunction with the ROC Society of Comparative Pathology the 2005 workshop on the control of diseases inter-communicable between animals and humans.

September

7	Holds a bilateral symposium with NIID, Japan.
8	Begins to require inbound passengers to fill out an “infection disease survey form.”
24	Attends the Fareast regional congress of the 23 Global TB Control Alliance.
26	Announces the regulations governing the management of infectious bio-materials and sample-taking from infectious patients.

October

	A consensus is reached with the DOH medication division to exempt pharmacies from the application for a license before selling condoms as in the case of selling syringes.
10	Requests passengers from Indonesia, Thailand, Vietnam and Cambodia to enforce health self-management for the prevention of avian flu invasion.
26	Requests passengers from China to enforce health self-management for the prevention of avian flu.
27	Premier Frank Hsieh inspects the National Health Command Center.

November

1	Returns SARS control to the domain of Category A of the Infectious Disease Control Act.
2	Director Kuo Hsu-sung attends a WHO conference on avian control and pays a visit to E.U. CDC and Thai Ministry of Health.
8	Participates in an APEC conference.
14	Offers free application of flu vaccine to babies under three.
17	Invited to attend a bio-safety workshop held by the WHO in conjunction with the Ministry of Health of China.
23	Announces ameba dysentery, tuberculosis, leprosy, and AIDS as diseases for the withdrawal of employment permits issued to the employers that hire foreign laborers.
30	Holds 2005 International Scientific Conference of Taiwan CDC.

December

	Marks the World AIDS Day with a series of activities including an exhibition and a concert.
4	Sends officials to inspect avian flu epidemic in Peijing, Anhui and Hunan in China.
6	Holds, in conjunction of the medical administration bureau of the Ministry of National Defense, the 2005 International Workshop Against Bio-terrorist Attack at the Chiang Kai-shek Memorial Hall.
21	Holds for the first time a three-way online discussion with US DHHS and CDC on cooperation in the control of avian flu and other subjects.
27	Completes B-level and C-level tabletop exercises on the control of novel flu.

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