2017 ANNUAL REPORT

Centers for Disease Control, Taiwan

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CENTERS FOR DISEASE CONTROL,

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Centers for Disease Control, Taiwan
Annual Report 2007



Message from the Director-General

Welcome to the 2007 annual report from the Centers for Disease Control (CDC), the leading public health agency in Taiwan that plays a key role in protecting the people from infectious diseases. In this report, you will see how CDC's outstanding around-the-clock teamwork across the island ensures a healthier environment for our people. I am proud to have fought and won some tough public health battles alongside this outstanding Taiwan CDC team, the most recent public health problem being the 2006 Dengue fever outbreak in southern Taiwan. Meanwhile, we are actively seeking to overcome many enduring and looming challenges, such as H5N1 avian influenza, HIV/AIDS, tuberculosis and other emerging diseases.

In 1999, the Taiwan CDC was established by merging the Bureau of Communicable Disease Control (BCDC), the National Institute of Preventive Medicine (NIPM) and the National Quarantine Service (NQS), under the Organization Law of the Centers for Disease Control of the Department of Health, Taiwan. During the past seven years, we have stayed true to our motto: "Disease prevention should be regarded as a battle. Unity, professionalism and swift action are the keys to success."

We are better prepared than ever to rapidly respond to an emergency, because we have built a multi-dimensional disease surveillance protocol that utilizes online technology to facilitate real-time information. Furthermore, we have established a national immunization information system to monitor vaccine coverage to better allocate the government's vaccine resources. These innovative systems have greatly aided disease control efforts in Taiwan and provided the CDC with a more comprehensive foundation for decision-making.

Since 2003, many countries in Asia have been affected by the Influenza virus subtype A (H5N1). Human H5N1 cases have subsequently been reported in many countries around the world. Fortunately, no trace of this highly pathogenic avian influenza (HPAI) has ever been found in Taiwan. Nevertheless, Taiwan CDC has stepped up its effort in detecting human-avian flu cases and clusters of influenza-like illnesses through a multi-pronged surveillance system. In 2006, we established the National Influenza Center (NIC) to integrate existing influenza surveillance systems, analyze the antigens and gens of influenza viruses, and regularly release influenza epidemic information to the public. We believe that this Center has provided Taiwan with an extra layer of protection against a possible bird flu invasion.

In Taiwan, the HIV infection rate among injecting drug users (IDUs) has risen acutely in recent years, and studies have shown that needle-sharing among IDUs has replaced risky sexual behavior as the primary HIV infection route. As the HIV epidemic among IDUs escalates, Taiwan CDC has been working closely with local health bureaus. Since 2005, the gradual implementation of a national harm reduction program, as a result of this collaboration, has

Message from the Director-General

led to significant results. Foremost of these being the first reversal in 20 years in the rising annual numbers of new HIV infections in 2006. In the next few years, AIDS control through harm reduction will continue to be one of the most important Taiwan CDC missions.

We realize that participation in international disease control 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 health care assistance to 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.

CDC's medical and research personnel are our frontline in the battle against epidemics, and they devote every effort to helping our people cope with infectious diseases. I would therefore like to dedicate this annual report, detailing our endeavors and achievements during the past year, to all CDC staffers as well as to our partners and supporters. I sincerely hope that you enjoy reading the report and continue to support us with your valued feedback and suggestions.

Steve Hsu-Sung Kuo, MD, MPH, PhD

Director-General

Centers for Disease Control

Taiwan

Overview

General Information On Communicable Disease

Background

Since ancient times, the threats of infectious diseases have been unending. Fortunately, there is a group of people who are fighting gallantly against the enemy. Thanks to their efforts, numerous indigenous communicable diseases such as plague, smallpox, rabies, malaria and polio were successfully eradicated from Taiwan during 1948-2000 (see Table 1).

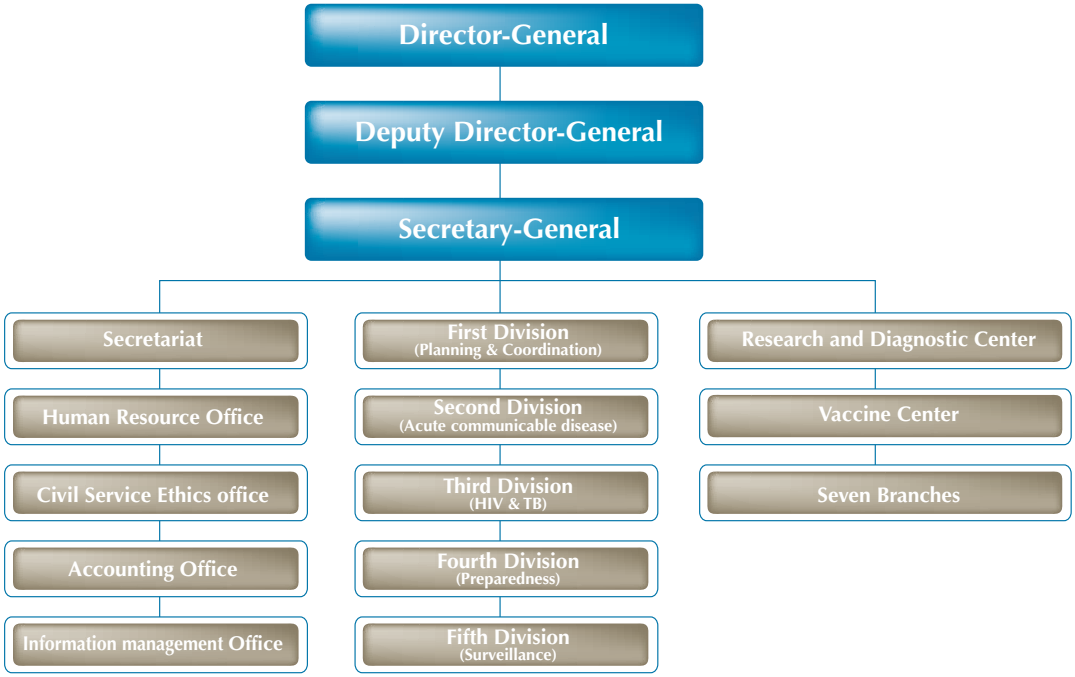
Table.1 Past-Year Major Disease Control Accomplishments in Taiwan

1948	Plague was eradicated.
1948	Diphtheria toxins vaccination program was implemented.
1955	DPT vaccination program was implemented.
1955	Smallpox was eradicated.
1956	BCG vaccination program was implemented.
1959	Rabies was eradicated.
1965	Malaria was eradicated.
1966	OPV vaccination program was implemented.
1968	Japanese encephalitis vaccination program was implemented.
1978	Measles vaccination program was implemented.
1984	Hepatitis B vaccination program was implemented, reducing the children-carrying rate by 84%.
1986	Rubella vaccination program was implemented.
1992	MMR vaccination program was implemented.
1995	Hepatitis A vaccination program was implemented, successfully eliminated the outbreak in the mountainous areas.
1998	Influenza vaccination program for elderly was implemented, lowered the hospitalization by 54%.
2000	Polio was eradicated.
2003	SARS outbreak was successfully controlled.

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

To meet the challenges of disease control in the 21st century, the reinvented CDC has made "prevention and control" its central thrust and directed its efforts 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. The Taiwan CDC is composed of five divisions distributed throughout two Centers, and seven Branches (see Table 2).

Table.2 Organization of Centers for Disease Control, Taiwan



Currently, the Taiwan CDC has 804 employees, with an average age of 43.3 years. Statistically, the staff is comprised of 75% of employees are younger than 49 years old, 49% of the staff have been college and university educated and 30% have advanced degrees (see Figure 1 and Figure 2). With a team that combines credibility, vitality, and innovation, the Taiwan CDC is working hard to foster a communicable disease-free environment for the people of Taiwan. To attain this goal, the Taiwan CDC utilizes professional disease control measures, timely disease surveillance systems, state-of-art research, and innovative health publicity and education.

Figure 1: Age Statistics of Taiwan CDC Employees

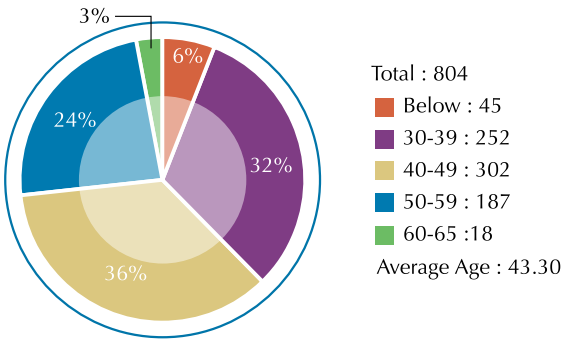
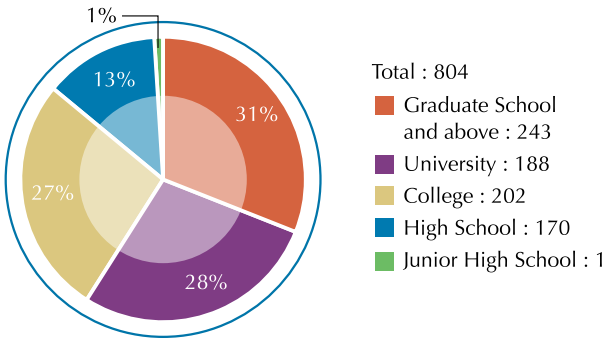


Figure 2: Education Levels of Taiwan CDC employees



Infectious Disease Prevention

In recent years, the Taiwan CDC has focused its energy for communicable disease control on enterovirus, dengue fever, HIV/AIDS, tuberculosis and preparedness against pandemic influenza.

In 1998, a large scale outbreak of enteroviruses caused great panic in Taiwan. The Department of Health (DOH) immediately established a surveillance system and a medical consultation committee to deal with this problem. Subsequently, Taiwan CDC launched a movement to teach the public correct hand washing procedures, enabling people to prevent the epidemic in their daily lives.

The Taiwan CDC has controlled Dengue fever by improving the doctors' reporting system and informing the general public, while at the same time, conducting a vector distribution survey to effectively control disease-carrying mosquitoes. The Taiwan CDC has also obtained body temperatures of all inbound airport passengers from Southeast Asia and tracked their state of health to reduce the possible threat posed by imported Dengue fever. Furthermore, a community level initiative to clean up local breeding sites has also been launched.

Regarding AIDS control, HIV/AIDS has presented a continuous challenge to all governments and health professionals around the world. The Taiwan CDC has dedicated great efforts and resources to AIDS control and prevention after witnessing an alarming HIV caseload increase that began in 2003. In addition to reinforcing measures that are already in place, including a nationwide surveillance system, regular HIV/AIDS awareness activities, HIV counseling services, as well as free testing and treatment to HIV/AIDS patients, Taiwan CDC has launched many new initiatives in 2005 and 2006, including free HIV screening of pregnant women and a nationwide harm reduction program. As a result of these initiatives, at the end of 2006 we witnessed the first decrease in the annual HIV caseload since 1984.

Tuberculosis (TB) is the most notorious notifiable communicable disease in terms of both the number of incidences and the number of lives lost. Since 2002, the Taiwan CDC has tightened its case-tracking management by specifically assigning each TB case to a public health nurse. In 2004, TB treatment was included in the National Health Insurance Program, mapping out a plan for providing better care to tuberculosis patients. On World Tuberculosis Day 2005, Taiwan CDC declared that the number of tuberculosis patients would be halved in ten years. In 2006, the CDC launched the DOTS (Directly Observed Treatment Short-Course) project to ensure TB patients take medicine regularly and complete the treatment process.

Influenza Control

Aware of the possibility that avian flu transmission around the world could trigger a flu pandemic, Taiwan CDC has built multiple surveillance systems to detect human avian flu cases and any unusual cluster of influenza-like illness. On 29 December 2004, "Novel Influenza virus infection" has been

announced as a notifiable communicable disease. Three response plans to an influenza pandemic have been completed, including National Influenza Pandemic Preparedness Plan, Strategy Plan for Execution of Influenza Pandemic Response, and Mobilization and Preparedness Plan for Influenza Pandemic Prevention (Battle Plan). So far, no H5N1 case has been detected in Taiwan.

Immunization

During the 20th century, Taiwan actively promoted preventive immunization, the effectiveness is clear to see as they successfully reduced or eradicated a number of infectious diseases, including diphtheria, tetanus, whooping cough, polio, Japanese encephalitis, measles, the mumps, German measles, and hepatitis B.

Taiwan was the first country in the world to promote a hepatitis B immunization program. After years of hard work, the rate of child carriers has declined from 10.5% prior to the commencement of vaccination (1989) to approximately 0.84% in 2005. The efficacy of the hepatitis B vaccination has become a model for other countries of the world.

Surveillance System

For early detection of communicable diseases and control measures, Taiwan CDC has established a multi-prong surveillance system to monitor the health status of people and to rapidly detect outbreaks. The multi-surveillance system includes the “Notifiable Disease Surveillance System”, “Syndromic Surveillance System”, “Sentinel Surveillance System”, “School-based Surveillance System”, “Symptom Surveillance System”, “Surveillance System for Populous Institutions”, “Information Collection System for Infectious Diseases”, and “Disease Reporting and Consulting Center for General Public”.

Network for Infectious Disease Control and Treatment

Taiwan CDC has established Infectious Disease Command Centers in each district of Taipei City, Northern, Central, Southern, Eastern Taiwan and Kaokaoping area. Each command center is made up of representatives of the local health bureaus, hospital superintendents and medical centers to be responsible for infectious disease control in their respective areas.

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 reserve enough hospital beds designated for treating infectious diseases according to the gravity of the situation. This system can also be used to refer patients to designated hospitals for treatment.

Nosocomial Infection Control

Because of the Severe Acute Respiratory Syndrome (SARS) outbreak experience in 2003, the Taiwan CDC focused on three key areas to prevent nosocomial infections: planning and implementing nosocomial infection control guidelines; conducting inspection for nosocomial infection control measures; and improving the quality of nosocomial infection control by collaborating with the national health insurance program. At the end of 2006, the nosocomial infection control in Taiwan had improved significantly.

Laboratory Research

There are 13 communicable disease research laboratories within the Taiwan CDC. They has actively participated in activities with the WHO Laboratory in America, Australia and Japan, and cooperated with international public health research institutes, such as US CDC and Japan NIID on infectious disease long-term research. In order to assure quality laboratory testing, it has regularly participated in proficiency tests (such as CAP tests). In 2006, the Taiwan CDC set up the National Influenza Center for influenza virus surveillance and research. Furthermore, CDC implemented PulseNet Taiwan, a national molecular subtyping network for surveillance of bacterial infectious diseases. In addition, Taiwan CDC established a pathogen microarray system and a viral microarray chip, which contains 44,995 sixty-mer oligonucleotide probes for 5,700 viruses. It also developed and produced anti-sera for enterovirus cosackievirus A2, A4, A5 and A10 for routine diagnostic use in IFA tests. The sensitivity and specificity of these anti-sera are above 95%. From this work, 28 SCI-level scientific journal papers and 11 conference abstracts were published.

Health Publicity and Education

To enhance public awareness of infectious diseases and the ways to prevent and control them, the Taiwan CDC conducted timely disease prevention and risk communication campaigns through mass media channels and cooperating partners in the non-profit and business sectors. The CDC also utilized cyberspace as an additional communication channel by developing educational online games and organizing competitions.

In the future, the Taiwan CDC will continue to design diverse, interactive and dynamic materials to facilitate health education and risk awareness to the public.

Disease-control diplomacy

Although it has been isolated from the World Health Organization (WHO) since 1972, Taiwan has never ceased to offer medical assistance to its allies by dispatching medical teams, providing medical materials, supplying financial aid, training personnel, and technical support. Furthermore, it has followed the APEC model of cooperation with international partners on communicable diseases surveillance and other health activities.

2006 Focus

Harm Reduction Program in Taiwan

Background

The first case of AIDS in Taiwan came from a foreigner in transit and was reported in 1984. By the end of 2006, there had accumulated 13,702 reported cases of HIV infections, of which 13,103 were Taiwanese nationals and 599 were foreign nationals. Further analysis revealed that since 1984, the instance of HIV/AIDS cases in Taiwan has steadily increased each year, increasing by an average of 17% between 2001-2003, but sharply rising by 77% in 2004.

For a long time, sexual behavior was the main infection route for HIV/AIDS in Taiwan. Beginning in 2003, with the rapid increase in the number of injecting drug users (IDUs), the number of HIV/AIDS cases began to mushroom. HIV cases among IDUs first entered double figures with 18 cases in 2002, and then entered triple figures with 624 cases in 2004, an increase of seven-fold over this two-year period. IDUs accounted for 40.5% of all reported HIV/AIDS cases in 2004.

We have witnessed a rapid growth in the number of HIVAIDS cases among IDUs in recent years, primarily because IDUs often share needles and heroin diluents. This is a much more rapid transmission route than one-to-one sexual behavior. Faced with the most serious situation of the HIV/AIDS epidemic it had ever seen, Taiwan conducted harm reduction strategies proposed by the UNAIDS, WHO, and other developed countries to curb the HIV/AIDS epidemic among IDUs.

Objectives

Reduce the HIV/AIDS epidemic among IDUs.

Strategies

The strategy for Taiwan's harm reduction program consists of three main parts: (1) Information, education and communication (IEC), (2) Needle-Syringe Programming (NSP), and (3) Drug Substitution Treatment.

A. Information, education and communication

Expand HIV screening and monitoring of drug users to enhance our ability to detect new cases as

early as possible and provide timely health education information and communication to correct dangerous behavior.

1. Hospital drug rehabilitation

Expand the HIV screening, health education and counseling for IDUs during detoxification to help them understand HIV/AIDS and the danger of sharing needles and syringes.

2. IDUs apprehended by law enforcement officials

Implement screening among IDUs, concentrating on (1) individuals that use drugs in groups of three or more, (2) people who use drugs in entertainment venues (e.g., pubs, KTV, and discotheques), and (3) drug dealers.

3. Efforts in correction agencies

(1) Implement policies requiring apprehended persons undergo mandatory screening before being admitted into correction agencies, require annual HIV screening of everybody in custody, and carry out AIDS prevention education.

(2) Under the Program for AIDS Consultation and Health Education Services in Correctional Facilities, experienced organizations from the private sector provide counseling as well as health and education services to inmates infected with HIV.

4. Community screening and outreach services

Provide HIV information and screening for communities or locations with high IDUs concentrations or traffic. Also prepare to provide outreach services in areas where IDUs tend to congregate by establishing long-term fixed blood screening stations in areas within counties and cities with serious epidemics.

B. Needle-Syringe Programming

The County and municipal health bureaus in conjunction with neighborhood pharmacies and residents decide on locations to operate clean needle programs. This interface provides IDUs with clean syringe paraphernalia, dilution buffer, educational materials, guidance, and counseling, as well as accurate information and referral treatment channels. This is all done in the hope of reducing drug use, expanding the drug rehabilitation network, and providing HIV screening to IDUs and their families. The ultimate goal is to change the attitudes and behaviors of IDUs through repeated education and counseling. Taiwan started a trial NSP in Taipei County and City, Taoyuan County, and Tainan County in November 2005. Because of its success, it was expanded island-wide in July 2006.

C. Drug Substitution Treatment

The major thrust of drug substitution treatment is the providing of long-term oral methadone treatments to IDUs as a substitute to the comparatively risky intravenous drug use. The program also provides follow-up counseling, education, and drug rehabilitation referrals. In addition to modifying drug injecting among drug addicts, it is hoped that this interface provides drug users with continuous education and counseling as well as the physical, psychological, and sociological support systems that they need. They receive these comprehensive and continuous specialized services to allow them to continue to live and work normally, with the ultimate goal of eventually helping them break their drug habit and start new lives. Taiwan's substitution treatment program was initially only offered in six hospitals in four counties and cities around the island. After a six-month trial period, it was expanded in July 2006. As of February 2006, 22 hospitals and clinics around the island now offer substitution treatment services.

Achievements

1. The implementation of Taiwan's harm reduction program has not only been the fastest of any similar program anywhere in the world, but it has served to quickly bring the epidemic under control. In 2006, Taiwan saw an increase of 2,942 new HIV cases, 547 fewer than the 3,399 cases in 2005. This was the first time in 20 years that Taiwan saw a decrease in the number of new HIV infections. Furthermore, the percentage of reported new infections among IDUs dropped from 72% in 2005 to 60% in 2006.

2. The establishment of a sound interagency cooperation model to change the thinking behind drug control policies. In addition to setting up drug prevention and control centers in various counties and municipalities, judicial and law enforcement agencies are actively participating in the promotion and implementation of harm reduction policies.



3. High scores from the international community: In the World Economic Forum's Global Competitive Ranking for 2006, Taiwan ranked No. 1 with 24 other countries in terms of low HIV prevalence between the ages of 15 and 49.

4. Reduction in crime, improved public order: Studies show that substitution treatment can increase the employability and average monthly wages of IDUs, while decreasing the amount of heroin they use, enhancing public safety, and reducing crime rates.

Key factors for the program's success

1. Changes in attitudes: It is now clear that the main pathway of HIV transmission shifted from unsafe sexual behavior to IDU needle sharing. This focused the spotlight on drug users and the problem of drug use. Because of the inter-departmental cooperation at the central and local levels, a paradigm shift has occurred in drug control thinking among judicial and police units and health agencies, from viewing drug users as "criminals" to regarding them as "patients". A key to this success was the cooperation of the judicial and police authorities, who together came to agree with this philosophy within a very short time.

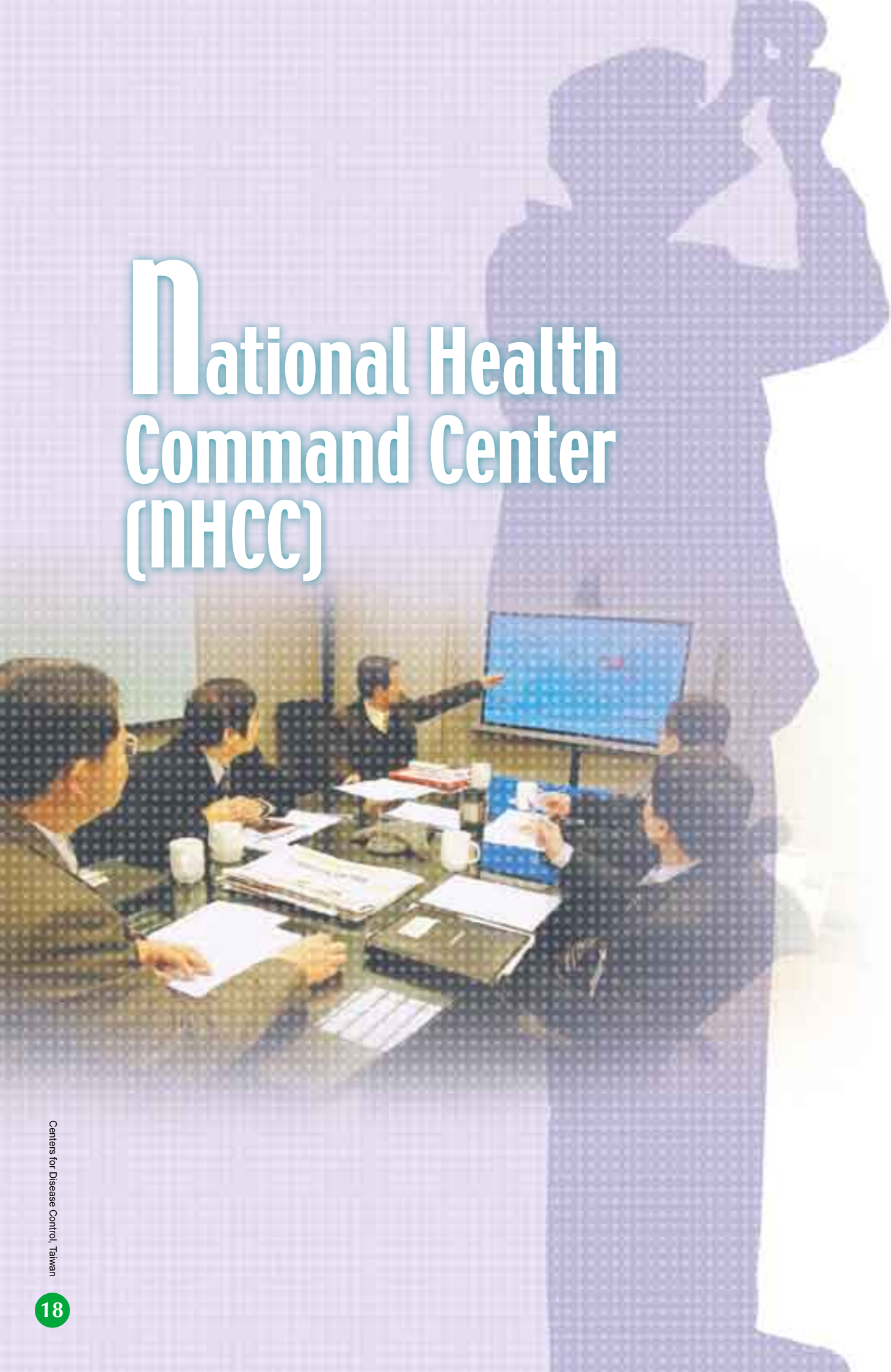
2. New channels for contact, education and counseling: Since the implementation of the harm reduction program, the government has actively provided health education and counseling to persons on probation and drug-addicted inmates of correction facilities. Furthermore, the needle exchange program and replacement therapy provide an interface and platform for IDU contact, allowing the government to provide health education and counseling, as well as encouraging IDUs to leave their hiding places and enroll at addiction treatment organizations.

3. Expansion into a nationwide program: According to an analysis conducted by Australia's expert in harm reduction policy (a driving force behind Australia's highly-successful program), the government's decision to expand the harm reduction program in July 2006 was the key to its success and the reason for the clear results seen today.

Prospects

Countries around the world are positive about the harm reduction programs. On the practical side, however, a number of common difficulties await resolution, including law and regulation restrictions, national policy support, society biases and public opinion against harm reduction concepts, as well as drug addicts' and HIV carriers' suspicions dealing with health and medical personnel. In the year since Taiwan implemented its harm reduction program, it has experienced a similar process which included unceasing communication and coordination aimed at consensus building. In the future, Taiwan will strive to increase the accessibility of its clean needle program and the return rate on used syringe paraphernalia. At the same time Taiwan will enhance the accessibility and safety of substitution treatment, and increase contact with drug addicts through the clean needle program and substitution treatment hospitals as these platforms have the potential to be used to provide screening, counseling, and drug rehabilitation referrals aimed at continuing to curb the spread of the HIV/AIDS epidemic.

National Health Command Center (NHCC)



Origin (Strategy for Long-term Success)

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

The NHCC, based in the Centers for Disease Control (CDC), is a component 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 major epidemics.

Framework (Victory through Perfect Teamwork)

The success of NHCC hinges upon state of the art technology and urgent medical information integration, as well as a complete command system blueprint. To work toward this goal, the NHCC planning team established standard operation procedures (SOP) that incorporate elements of the US Incident Command System and the SARS Command System SOP.

In terms of operational framework, the NHCC coordinates district, regional and central government officials. When the scale of a disaster warrants action, the 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 government involvement level, 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 houses the following units: Coordination Center, Situation Room, Commander's Office, Administrator Office, Conference Room, Media Watch Room, Operation Room, Data Room, Utility Room, Records Room, Lounge and remaining office space. This organizational design stimulates effective coordination and operations.

Facility Designs (Technology on the Frontlines)

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

- Videoconferencing: Conducts Internet videoconferences on large screen TVs to communicate with domestic authorities and governments worldwide.
- Media reception and satellite communication: Provides a constant flow of first hand information.
- Communication system framework: Integrates NHCC phone networks and maintains accessible hotlines to each command center.
- Environment control and AV equipment: Multiple high-tech visual media sources provide decision makers with up-to-date information.
- Hardware control integration platform: Allows managers to effectively control visual media displays, videoconference settings and network configuration.
- Alternate site support: Activated in the event that forces beyond control result in the loss of operational capabilities.

Information Integration (Command by Grasping the Whole Picture)

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

- Inter-departmental information platform:

  Initially utilizes an information framework consisting of current CDC platforms: the Real-time Data Warehouse for Infectious Diseases, the Geographic Information System (GIS), the Real-time Outbreak and Disease Surveillance (RODS), and the SARS Hospitalized Cases Report and Management System. From this framework, the NHCC commander receives integrated data regarding all notifiable infectious diseases, counter bio-terrorism intelligence, as well as medical resources and logistics for prompt decision-making. Future plans call for the incremental development of epidemic prevention/management software.

- Decision support analysis software:

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

- Meetings and Follow-up Evaluation Management System:

  Provides medical crisis meetings with automated reporting and follow-up management.

Events

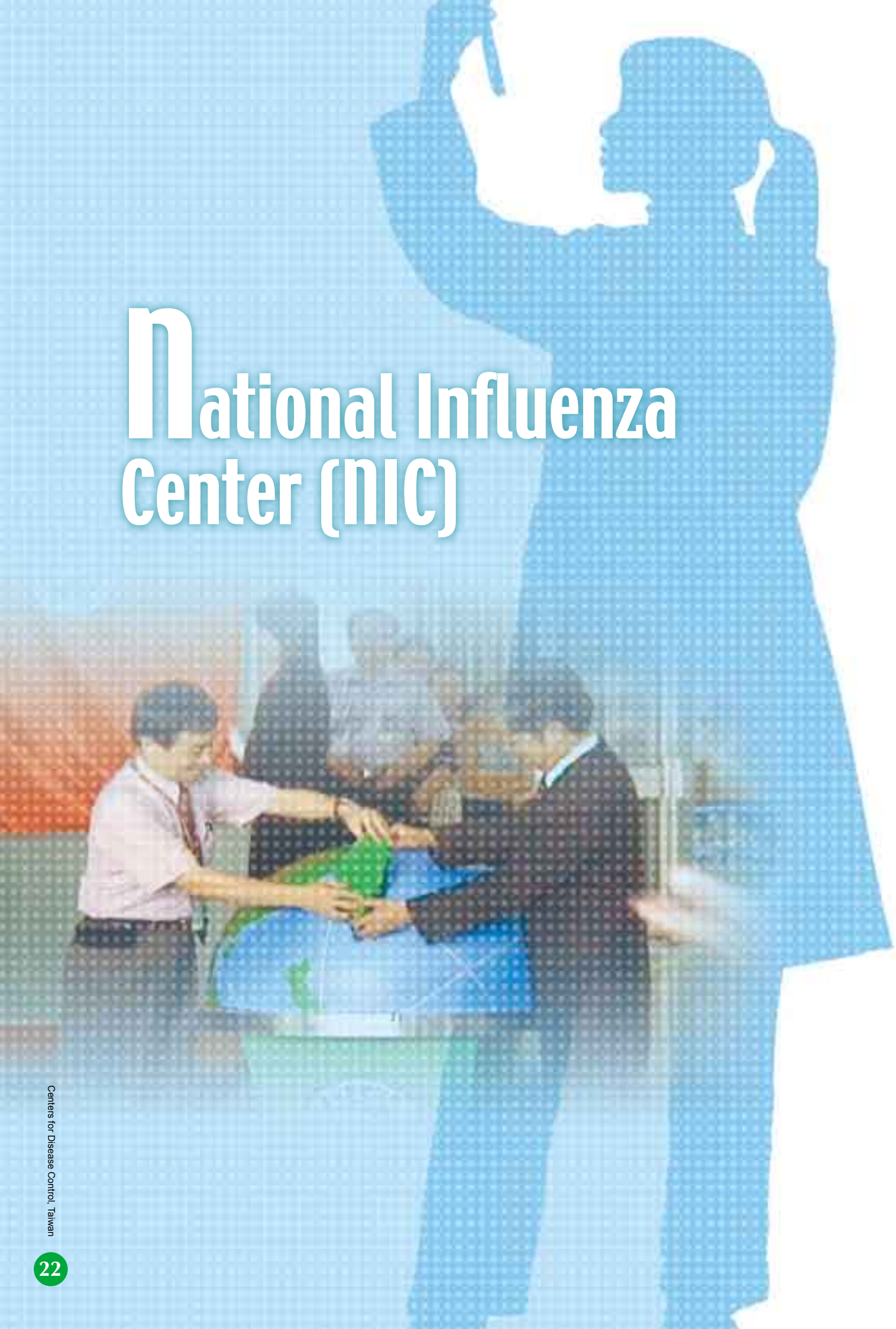
Since its establishment in 2005, the NHCC has faced a number of major public health events in Taiwan which has served to enhance Taiwan's ability to deal with epidemics.

2005	2006
■ South Asian earthquake aid (01.05-01.28) ■ Cerebrospinal meningitis outbreak in China (02.02-02.10) ■ Enterovirus outbreak (06.02-09.25) ■ "Strange disease" outbreak in Sichuan (07.23-08.21) ■ Melioidosis outbreak (07.30-08.17)	■ Individual traveling to Australia suspected of being infected with avian influenza while in transit through Taiwan (01.04-01.05) ■ Boy suspected of being infected with avian influenza on his return to Jinmen Island. (03.01-03.02) ■ Dengue fever outbreak in Kaoshiung. (10.02-12.22)

Vision (The Power of Uniting as One)

In this post-SARS era, the NHCC employs modern technology, smooth data exchange systems, and complete information platforms to achieve the 3 "I"s: Initiation, Integration and Innovation. This enables 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 public's epidemic prevention awareness level and create a better tomorrow for the whole nation.

National Influenza Center (NIC)



National Influenza Center (NIC)

July 5, 2006 marks the third anniversary of Taiwan's removal from the WHO list of SARS-affected areas. The Taiwan CDC has chosen this auspicious date to hold the opening ceremony at its Kunyang facility for its new affiliate – the Taiwan National Influenza Center (Taiwan NIC). The Taiwan NIC has five major goals:

1. Integrate all current influenza surveillance, notification and laboratory analysis systems throughout Taiwan to enhance our epidemic data collection process.

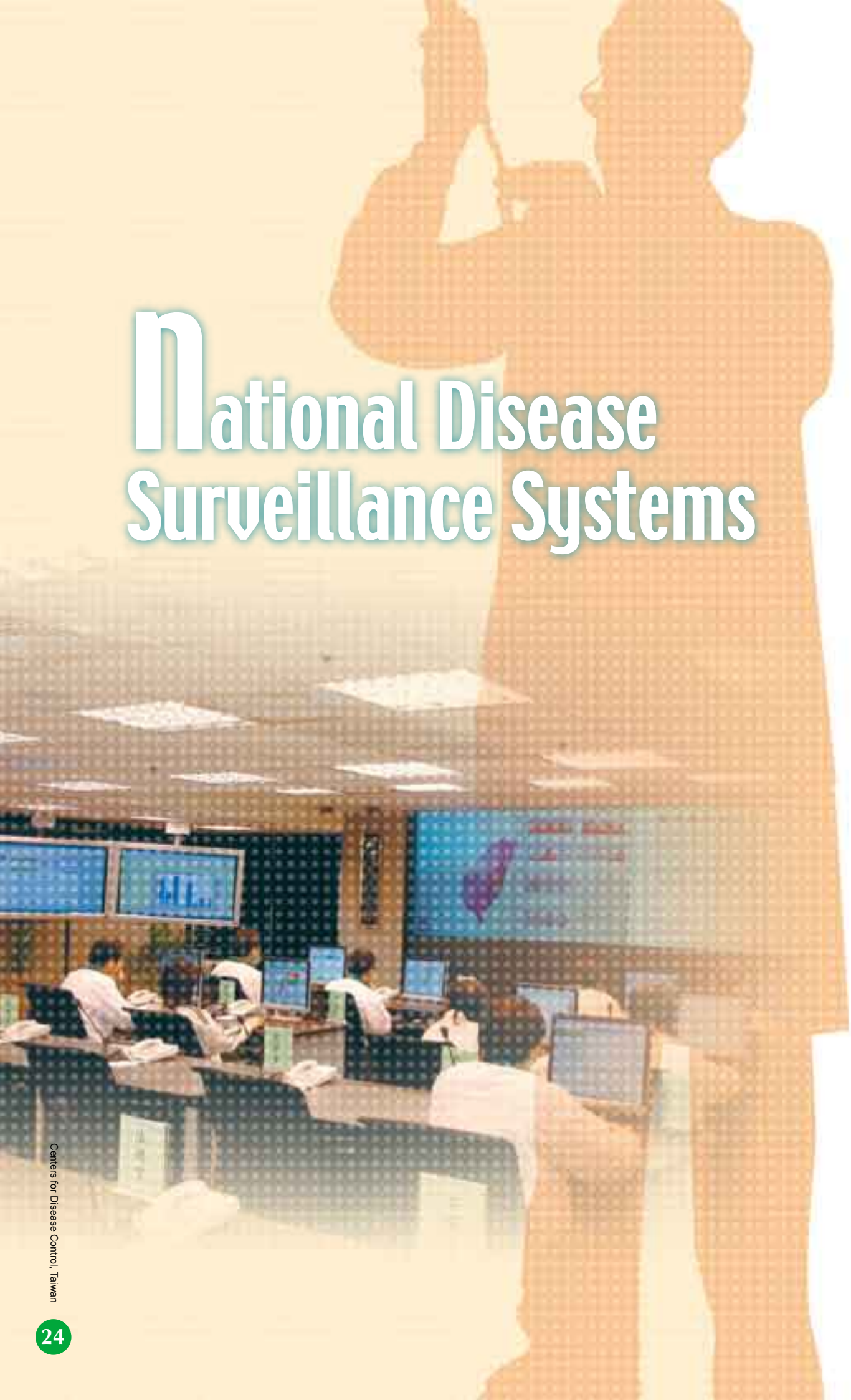
2. Carefully monitor new types of flu virus and the viral antigen variation trends; providing references to vaccine strain selection.

3. Prepare antibodies against local flu virus strains to facilitate virus diagnoses and typing.

4. Every flu season, publish a periodical in both Chinese and English for the general public entitled "Influenza Express".

5. Provide a platform to exchange information with other NICs across the world.

National Disease Surveillance Systems



Centers for Disease Control, Taiwan

National Disease Surveillance Systems

Vision

The vision of the National Disease Surveillance Systems (NDSS) is to monitor the national health status and 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 of global and indigenous infectious diseases regularly.

Background

After the Taiwan CDC was reorganized in July 1999, the NDSS has taken responsibility for surveillance of infectious diseases in Taiwan. They began with surveillance of notifiable diseases and sentinel surveillance to detect epidemics. Later on, several systems were built to 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 was accomplished in September 2006. It will effectively integrate the Symptom Surveillance System, Syndromic Surveillance System, and Notifiable Disease Surveillance System

2. Syndromic Surveillance System: Initiated as a pilot study during July 2000 to December 2001, it was implemented as a part of the Taiwan CDC surveillance network in 2002. Initially, only medical centers and selected hospitals were included in the pilot study. In August 2002, all regional hospitals were required to join the syndromic surveillance system and district-level hospitals were allowed to participate on a voluntary basis. The system is designed to improve the Taiwan CDC' s capacity to rapidly detect emerging and reemerging infectious diseases and to complement the traditional disease-specific reporting system by reporting suspected severe infectious cases with unknown causes.

3. Sentinel Surveillance System: Initiated as a pilot study between July 2000 to December 2001, it was implemented as a part of the Taiwan CDC surveillance network in 2002. In the beginning, only medical centers and selected hospitals were included in the pilot study. In August 2002, all regional hospitals were required to join the syndromic surveillance system and district-level hospitals were allowed to participate on a voluntary basis. The system is designed to improve the Taiwan CDC's

capacity to rapidly detect emerging and reemerging infectious diseases and to complement the traditional disease-specific reporting system by reporting suspected severe infectious cases with unknown causes.

4. School-based Surveillance System: Since frequent interactions among the students could lead to the rapid spread of infectious diseases, the Taiwan CDC established this system in 2001. Teachers and nurses participating in this project file weekly reports on the number of sick students, especially upon the discovery of flu-like symptoms, chickenpox, mumps, hand-and-foot-and-mouth disease, herpangina, diarrhea, fever, and any 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. Two diseases have to be reported: (1) pneumonia with unknown causes and (2) illnesses with flu-like symptoms. Physicians are to report the number of clinic cases displaying these symptoms, especially if samples were deemed necessary. In addition, they need to note the contact history, travel history, and patient's occupation.

6. Surveillance System for Populous Institutions: The system is aimed at early cluster detection of infectious diseases in organizations among their inhabitants or workers. It applies to elderly hospices, long-term care facilities, elderly apartments, institutions for disability, protectories for children and juveniles, veterans' homes, correctional facilities, nursing homes, and day-care centers for mental health. If an individual or cluster respiratory disease case is found among the inhabitants or workers, the concerned facility must file weekly online reports, confirming the data reported, and report the number of people accommodated.

7. International Epidemic Intelligence Collection System: Established to filter the latest daily international epidemic information and to relay pertinent information to those charged with applying suitable control measures. The filtered information is simultaneously posted on a website accessible to the public. The major information source is the Internet and is gathered from the World Health Organization website, various national health department websites, official online publications, public health and epidemiological journals, and news websites. Other sources include diplomatic organization's documents and the media. Taking advantage of the rapid publicity of this media and the accuracy of official reports, any potential crisis can be promptly evaluated to determine any necessary actions.

8. Disease Reporting and Consulting Center for the General Public: The 2003 SARS outbreak experience showed that during an epidemic, the disease control staff tends to so frequently interrupted by media interviews and phone inquiries from the general public that they could be too distracted to tackle the epidemic itself, so this center was established to provide the public with timely and complete consultation services.

Objectives and Strategies

Enhancing the effectiveness of various surveillance systems

1. Establishing supporting systems for management and analysis:

A. The Geographical Information System (GIS) was used in conjunction with the Notifiable Diseases Surveillance System, Syndromic Surveillance System, and the Sentinel Surveillance System to analyze epidemic data and as a disease prediction model, which models the predicted disease distribution.

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. Enhanced functions enable users to view the information corresponding to the epidemic in almost real time.

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 required.

D. Surveillance systems were installed for data acquisition and analysis.

E. On February 24, 2004, the Taiwan CDC outsourced the establishment of the "Disease Reporting and Consulting Center" to the telecom industry. The general public can dial 1922 or 0800-024582 for communicable disease reporting, consultation, education, and announcements of epidemic prevention policy. The Taiwan CDC assigned full-time personnel to answer calls and take caller messages. The center has become a communication platform between the Taiwan CDC and the general public. The manpower and service equipment can be adjusted based on the gravity of the epidemic.

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

3. Systems Integration: To integrate the information and analysis for more presentation and application, the Taiwan CDC enhanced the integration functions of its surveillance systems, including the Symptom Surveillance System, the Syndrome Surveillance System, and the Notifiable Disease Surveillance System. This task was completed in September 2006.

4. Information Exchange:

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

B. To understand the surveillance material effectiveness, the Taiwan CDC, in collaboration with academics, conducts research projects every year.

C. Due to the close relationship between pathogens, geographical factors, and the distribution and spread of infectious disease cases, the Geographic Information System (GIS) was frequently used to analyze the spatial and epidemiological data as a guide for further applications and research

worldwide. Although GIS has many disease distribution and map display applications, it needs more advanced research in correlation of disease and spatial data in Taiwan. Since the disease surveillance system works closely with disease prediction and GIS, the Taiwan CDC organizes "Disease Prediction Model and GIS" symposiums regularly for professionals and CDC staff to exchange views. This exchange program provides a better understanding of the GIS program and possible GIS applications.

5. Broadening Information Use:

   A. Both English and Chinese versions of the GIS epidemic inquiry system were completed in December 2004. Thus, the epidemic information is more accessible to foreigners and has expanded the targeted audience of this system to the international level.

   B. A daily updated information bulletin of the domestic and international epidemic is generated and broadcast through the following systems: (1)?the LED systems of the Taiwan CDC's offices and branches, (2)?the DOH media center system, and (3) the integrated system of the Taiwan CDC's website. Furthermore, the Taiwan CDC forwards daily information via e-mail to the Strait Exchange Foundation (SEF), the Council of Agriculture, the National Security Bureau, the Taiwan Tourism Association, all class-A tourist agencies, all international airline companies, and all of the city and county health departments.

6. Training and Education Offerings: Every year, the Taiwan CDC offers training to system users so that they can remain current on new information about epidemic surveillance.

Accomplishments

1. Notifiable Disease Surveillance System: In 2006, there were 3,611 notifiable disease cases that required reporting within 24 hours. 3,568 were reported on time, accounting for 98.8%. This is higher than the 2005 rate of 98.6%. In the same year, the average rate of completeness nationwide was 91.5%. This is also higher than the 2005 rate of 89.5%. The following table shows the reported/confirmed case numbers of notifiable diseases in Taiwan in 2006.

2. Syndromic Surveillance System: Currently, the system is comprised of 201 regional hospitals. In 2005, there were 966 reported syndromic 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 diarrheal syndrome cases. Except for the acute hemorrhagic fever syndrome cases, which were mostly reported in eastern Taiwan, all other syndromes were mostly reported in northern Taiwan. Most patients were over 60 years of age, with the exception of the diarrheal syndrome cases. 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 rate of increase varied. The monthly incidences are shown in Figure 1.

Figure 1: Monthly Distribution of Syndrome Cases Reported in 2005

Disease	2006	
	Reported	Confirmed
Intestinal Disease	982	585
*Cholera	1	1
EHEC(Enterohemorrhagic E. coli infection)	6	0
Typhoid fever	75	dr
Paratyphoid fever	56	10
Shigello sis	164	139
Amoebiasis	364	125
Acute Flaccid paralysis	74	66
EHEC(Enterohemorrhagic E. coli infection)	48	11
Acute Viral Hepatitis A	194	190
Vector-Borne Diseases	5111	1531
Dengue fever	2465	1074
*DHF/DSS(Dengue hemorrhagic fever/ Dengue shock syndrom)	19	19
*Malaria	26	26
Japanese encephalitis	250	29
Scrub typhus	2351	383
Respiratory Diseases	34557	17065
Meningoco ccal meningitis	25	13
Measles	24	4
Pertusis	135	14
Scarlet fever	1634	1128
Legionellosis	607	55
Rubella	54	5
Open pulmonary tuberculosis	11917	10532
Other Tuberculo sis	8483	5269
Haemophilus influenza type b infection	43	16
Influenza comlicated severe case	96	25
Mumps	971	4
Varicella	10568	0
Other diseases	1164	438
*Hantavirus syndrome	3	3
Tetanus	14	0
Acute Viral hepatitis B	275	245
Acute Viral hepatitis C	760	154
Acute Viral hepatitis D	12	5
Acute Viral hepatitis E	72	11
Unspecified acute Viral hepatitis	17	9
*Leprosy	11	11

Note 1:Data was re-downloaded on 2007/02/07 and period was from 2006/01/01 to 2006/12/31.

Note 2:Data was analyzed by onset data.

Note 3:*Includes only confirmed cases.

Note 4:26 malaria confirmed cases were inported.

Note 5:Leprosy includes foreigners.

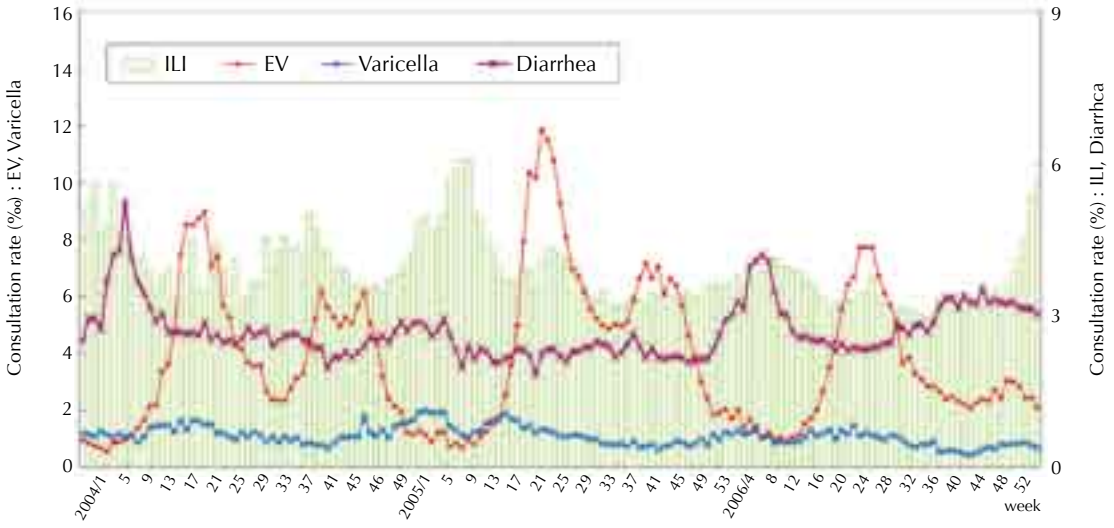
About 12.4% (120/966) of the reported cases were found to be positive in CDC laboratory tests. The positive rates were 14.9% (11/74) for acute hemorrhagic fever syndrome, 19.4% (63/325) for acute respiratory syndrome, 8.6% (24/280) for acute neurological system syndrome, 7.9% (21/265) for acute jaundice 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 respiratory syndrome cases, Chlamydia pneumoniae (39 cases) took the lead, which was followed by

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

3. Sentinel Surveillance System: Like previous years, the major wave of influenza-like illness (ILI) epidemic in 2006 appeared in the winter and a comparatively mild one came in the summer. As for the enterovirus diseases epidemic, it peaked in spring and summer, and a comparatively mild wave emerged in early winter. The chickenpox epidemic period used to prevail in the interval between winter and spring. The diarrhea epidemic peaked in winter (see Figure 2).

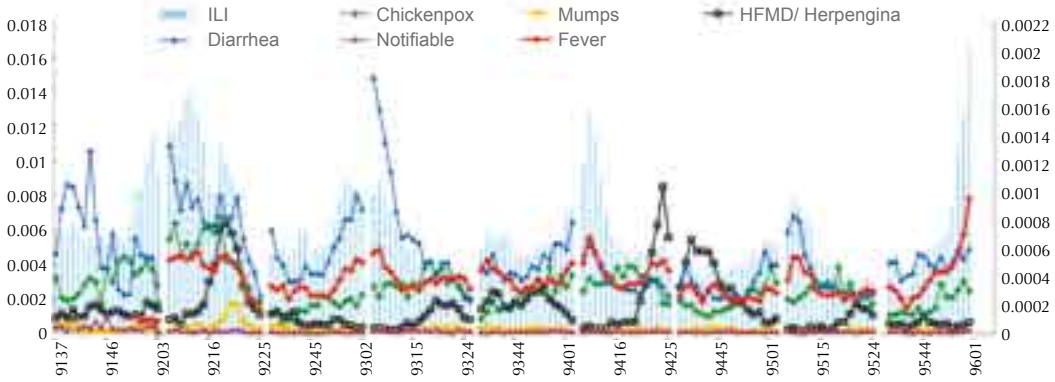
Figure 2

Weekly consultation rate of ILI, EV, varicella and diarrhea cases reported from clinic sentinel sites in Taiwan, 2004-2006 (Week Ending 2006/12/30)



4. School-based Surveillance System: At present, 454 primary schools have joined the school-based surveillance system, which monitors near 350,000 pupils. Due to the promotion of this system, sick leave 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 obtained through the school-based surveillance system about any flu-like illness, hand-foot-and-mouth disease, and herpangina have been compared each week to data obtained from other surveillance systems (see Figure 3) and are analyzed by the Taiwan CDC. The school-based system focuses mainly on seven epidemic types: flu-like illness, chickenpox, notifiable communicable diseases, fever, mumps, diarrhea, hand-foot-and-mouth disease, and herpangina. A comparison of the trend found on the school-based system was similar to the findings of the Sentinel Surveillance System with regards to flu-like illness, hand-foot-and-mouth disease, and herpangian. 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.

Figure 3



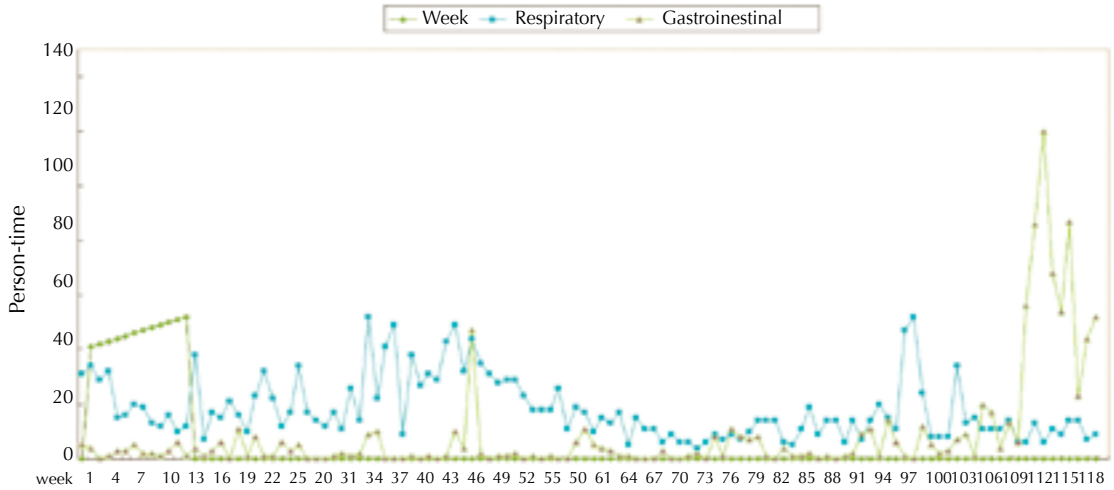
Morbidity of seleted diseases reporting by School-based Surveillance System
(2002.09.08-2006.12.30)

Note : 1. morbidity = infectious student number / total weekly attendance x100
2. 2003participants were 451 primary schools and their kindergartens.
3. 51th week of 2002, the system was conducted in Pintung City and from 9th of 2003 "fever" was included for reporting.
4. 17th oh 2003, Hoping Hospital was isolated for SARS infection, causing panic in society and suspension of classes in schools.
5. Left-hand Y axis for flu-like illness, and right-hand Y axis for other diseases.

5. Syndrome Surveillance System: In 2006, 90 specimens were taken from patients being checked for human infection with influenza A (H5N1) in Taiwan. All of the specimens, 14 were influenza AH1 (+), 1 was influenza AH3 (+), and 1 was influenza B (+).

6. Surveillance System for Populous Institutions: By the end of 2006, this surveillance system had 1,700 organizations participants. These institutions had 160,000 workers and inhabitants. In 2006, a total of 648 people were reported for suspected respiratory illness and 93 people for showing gastrointestinal symptoms (see Figure 4). Lab tests showed that there were 26 flu positives of 24 suspected respiratory illness clusters, 204 Norovirus positives of 60 suspected enteroviral clusters.

Figure 4



Weekly Report Person - Time of Respiratory & Gastroinestinal Symptoms in Populous Institutions

Infection Control

Hospital-acquired Infection Control

Hospital-acquired infection policies and their effectiveness

Since the 2003 outbreak of Severe Acute Respiratory Syndrome (SARS), a high degree of importance was attached to the effective reduction of nosocomial infection in medical care institutions. The Taiwan Centers for Disease Control (CDC) formulated important policies and implemented two important programs (Nosocomial Infection Control Monitoring Procedures and National Health Insurance Plan for Augmenting Infection Control).

1. Major nosocomial Infection Control Policies of the Centers for Disease Control

To formulate protective measures and infection control guidelines, the Taiwan CDC monitored the nosocomial infection surveillance system and surveillance system for infectious diseases. These policy goals are: (1) early detection and the immediate reporting of possible mass infections; (2) active investigations to determine whether mass infections have taken place in medical care institutions; and (3) guidance to ensure that medical care institutions adopt more effective control measures to ensure patient safety.

2. Nosocomial Infection Control Monitoring Procedures

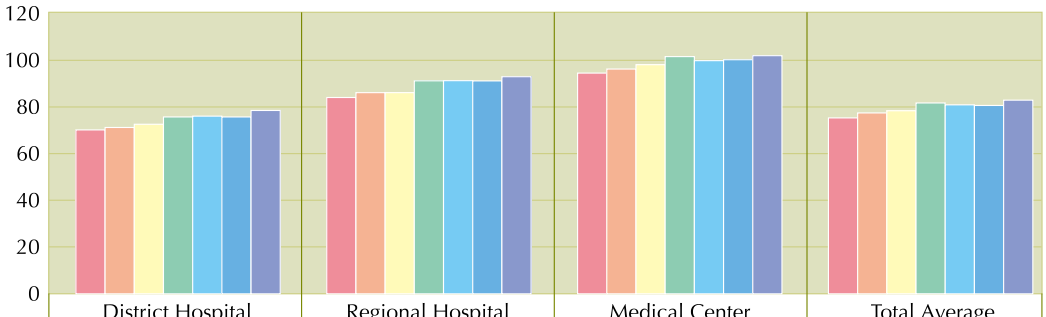
Ideally, these procedures enhance the infection control capabilities of medical care institutions in nosocomial infections, improve medical treatment quality, and reduce the spread of nosocomial infections. In accordance with Article 30 of the Law on the Prevention and Control of Infectious Diseases, the Taiwan CDC endorsed the Regulations Governing the Inspection of Measures on the Communicable Disease Infections Control and Immunization in Medical Care Institutions; thus, establishing evaluation standards and implementing the nosocomial Infection Control Monitoring Procedures.

Beginning in 2005, they expanded the evaluation scope of medical facilities and have continued to adjust and increase the scope, raising evaluation standards each year. Since implementation, the percentage of medical care institutions meeting the standards has significantly increased. As of the end of 2006, almost 99% of all medical facilities passed with only 7 of 521 medical care institutions not meeting standards. All medical care institutions are expected to pass after 2007.

	1st Branch	2nd Branch	3rd Branch	4th Branch	5th Branch	6th Branch	Evaluation Result of 95	Evaluation Result of 95
Number of medical facilities evaluated by health bureau	130	64	110	79	126	15	524	522
Not up to standard	6	7	4	4	3	1	25	89
Pass rate	95%	89%	96%	95%	98%	93%	85%	83%
Random inspection by each branch	26	17	33	16	25	13	130	128
Not up to standard	1	5	0	0	1	0	7	21
Pass rate	96%	71%	100%	100%	96%	100%	95%	84%
Year-end result								
Number of medical facilities evaluated	129	64	110	79	124	15	521	523
Not up to standard	1	5	0	0	1	0	7	39
Pass rate	99%	92%	100%	100%	99%	100%	99%	93%

3. Collaboration program with national health insurance

To improve the medical care institutions' participation in the control of nosocomial infections we must promote the "strengthen infection control" program. If one hopes to encourage hospital infection control, improve the organization and its functions; to improve the hospital infection control quality, train hospital staff for disease prevention and treatment.



	District Hospital	Regional Hospital	Medical Center	Total Average
1st quarter	70.03	85.01	94.08	74.76
2nd quarter	72.06	88.24	96.54	77.62
3rd quarter	73.46	88.17	98.59	78.88
4th quarter	75.97	92.10	102.40	81.73
5th quarter	76.10	91.88	101.16	81.41
6th quarter	76.07	92.53	101.56	81.72
7th quarter	78.85	93.04	104.43	84.04

Since 2005, each hospital's infectious disease control and prevention abilities have been judged in three key areas: (1) the specimen collection quality and laboratory examinations; (2) the quality of the reporting and handling of epidemics; and (3) cooperation with infectious disease prevention work. Marks have improved in all of these areas. (The following chart is a "report card" showing how medical institutions performed with regards to the implementation of the Plan for Augmenting Infection Control during seven quarters over 2005 and 2006). The scores were reported to the Bureau of National Health Insurance which then provided incentives to hospitals.

Future Prospects

1. Continue promoting the Assistance Program for Hospital Infectious Disease Control for Various Districts to decrease the risk of hospital-acquired infection. At the same time, enhance the hospitals' ability to respond to any hospital-acquired infection crises, improve the quality of medical care, and ensure patient safety.

2. Enhance epidemic monitoring to diagnose and treat infectious disease as early as possible, thereby improving public health.

3. Promote prevention measures for "the spread of multiple drug-resistant microbes" and encourage hand washing as a means to reduce the occurrence of hospital-acquired infections.

Infectious Disease Prevention Network

Background

In 2003, the whole world came under the impact of SARS epidemic. In Taiwan, SARS spread in the Hoping and Ren Ji hospitals, triggering a strong shockwave throughout the medical community, quickly spreading to the general public.

On May 20, 2003, the DOH announced a graduated care plan for SARS patients to avoid more clustering breakouts. A medical system was established for treating infectious patients based on the seriousness and urgency of the disease.

In July 2003, Deputy Minister Li Long-Teng of the DOH went to Executive Yuan to report to the Cabinet on controlling communicable diseases. The report's stated goals were to reduce the impact of communicable disease outbreaks on normal medical systems and enhance the nation's capability to cope with any contingencies from emerging infections.

On August 23, 2003, the DOH approved the Taiwan CDC's plan to establish a medical network to prevent and control communicable diseases. To carry out this medical treatment plan and make it

permanent, the plan was incorporated into both the "Post-SARS Reconstruction" and "2005-2008 Biological Defense Against Emerging Infections" plans.

Objectives

The medical network for the prevention and control of infectious disease has combined the medical and public health systems to provide safer, more effective treatments for infectious patients and protocols for health care personnel. Furthermore, this network helps avoid nosocomial infection.

Strategies

1. First, divide the country into six districts: Taipei, North, Central, South, Kaokaoping and East. Next, contract with 23 hospitals to serve as designated hospitals for the treatment of communicable diseases. These designated hospitals have a total of 394 negative-pressure isolation rooms and 161 ordinary isolation rooms. The hospitals use the isolation rooms to handle their patients, but when there is a communicable disease outbreak, these hospitals will convert their isolation rooms to immediately treat epidemic patients.

2. Organize a command center in each district, comprised of personnel from the local health bureau, any district medical centers, the infectious disease hospitals and any other related organizations. A commander and a deputy commander are selected to orchestrate the operations of the infectious disease hospitals. Furthermore, they oversee installation and improvement of the negative-pressure isolation rooms.

3. Set up a communicable diseases committee composed of epidemiologists, lab researchers, emergent medical rescue workers, hospital superintendent, and jurists. It will offer professional advice and serve as an advisory body for policy formulation.

4. Streamline the reporting system. For an epidemic outbreak, this system disseminates reports to the health department, the local branch of Taiwan CDC, and all command center commanders. Using the patient status reports, the commanders decide where the patient should be sent for treatment. In doing so, the commanders use the patient referral and hospital bed management systems.

5. Improve quarantine ward management. When a designated communicable disease hospital is activated, it should make the quarantine wards ready for use by reserving all isolation rooms, even if that means a whole floor of the hospital is reserved to accommodate communicable disease patients. At the extreme, the entire hospital may be emptied to admit communicable disease patients in order to avoid spreading the disease and prevent further transmission.

6. Support the 23 designed infectious disease hospitals with supporting hospitals that helps train medical staff and develop medical services.

7. Ask the designated infectious disease hospitals to create and maintain a list of qualified medical personnel and support staff. Before any pandemic, all staff must complete training by the hospital or local authority.

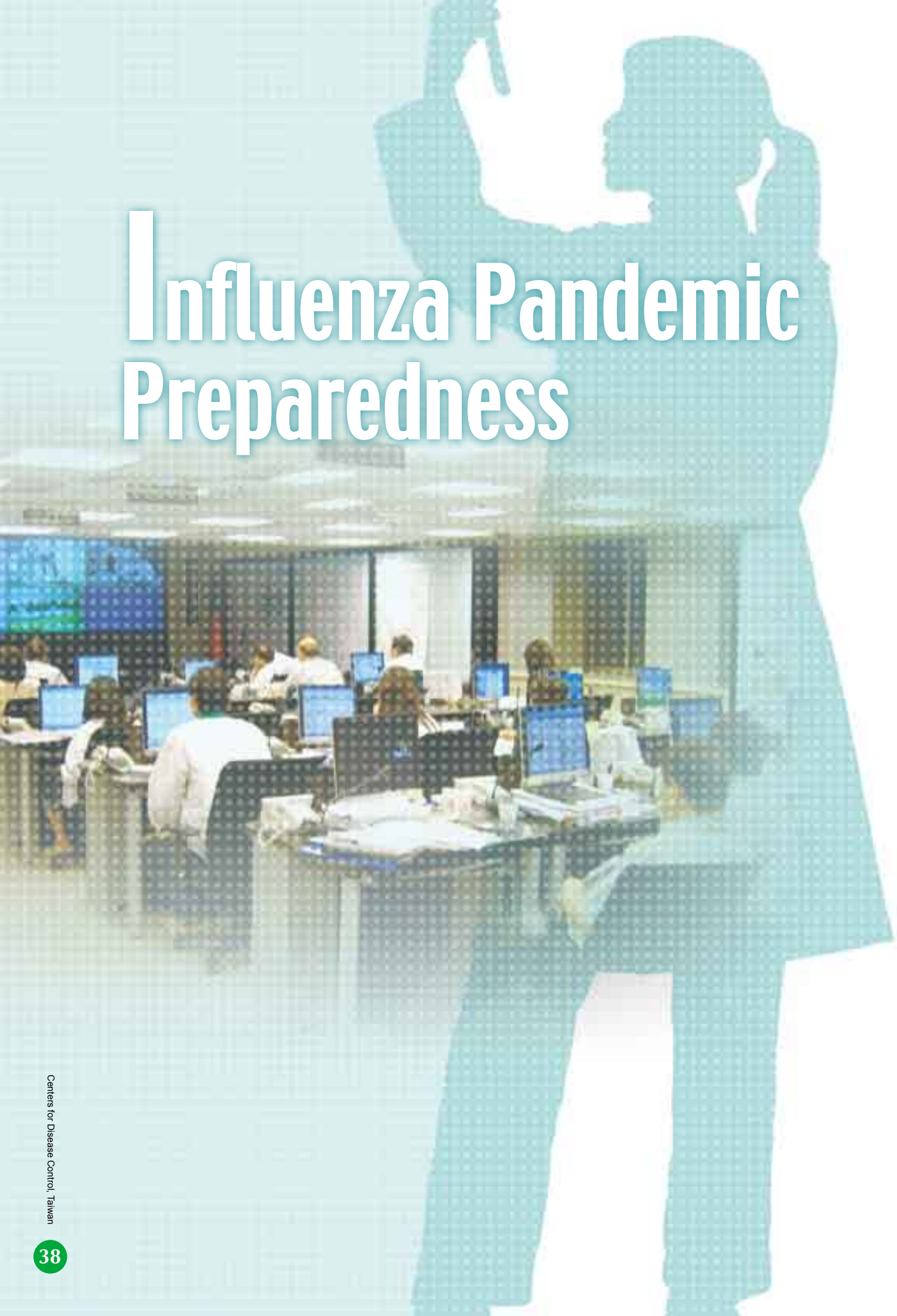
Achievements

1. Twenty three hospitals have signed contracts obligating them to care for infectious patients.
2. Selected consulting committee commanders and deputy commanders responsible for the networks that medically treat infectious patients.
3. Formulated guidelines to support operations and personnel deployment.
4. In conjunction with societies and hospitals involved with the control of communicable diseases, trained the disease control staff and the public health personnel.
5. Established the DOH Infectious Prevention Center.
6. Verified operational plans for mutual support and cooperation among hospitals under contract by the medical network for communicable diseases.
7. Conducted 6 courses of health education and training for specialists and technicians engaging in nosocomial infection control.
8. Completed 34 exercises on the control of communicable diseases.
9. Commissioned the Institute of Occupational Safety and Health to inspect the negative-pressure isolation rooms designated by the 23 hospitals.
10. Held the Flu-exercise “Egret Number 1” to test the off-shore medical care system.
11. Designed the shelter’s logo.

Future Goals

1. Continue network operation designed to prevent and control infectious diseases until it attains it’s objectives.
2. Complete the “Infectious Disease Prevention Center” to admit and treat patients. Furthermore, establish a training center that addresses clinic treatment of communicable diseases, neighborhood disease prevention, and infection control.
3. Reinforce coping mechanisms for all contingencies in the prevention and control of infectious diseases.

Influenza Pandemic Preparedness



Centers for Disease Control, Taiwan

Influenza Pandemic Preparedness in Taiwan

Background

The next influenza pandemic threat comes from the epidemic spread among fowls caused by influenza A virus subtype H5N1 (H5N1) and its occurrence in human cases. Since mid-2003, highly pathogenic avian influenza (HPAI) has ravaged poultry and animal farms in eight East Asian countries. It was even more widespread during 2004 and 2006. There were more than thirty countries in Africa, Asia, Europe and Middle East reporting their first H5N1 infection in wild or domestic birds. Because the virus' scope expanded, human exposure to the virus is getting higher; thus the risk of infection increases. With every one case of human H5N1 flu, the virus could become more adaptive to the human body or the risk of gene re-assortment between the human and fowl virus increases, hence forming a new human influenza virus. Once this virus evolves and spreads easily among humans, a majority of the world population may be infected within a very short period of time, since there is no antibody against this novel virus.

With regards to the social impact caused by any influenza pandemic, it is estimated that between 2 and 7.4 million fatalities may occur based on the 1968 influenza pandemic model. If this pandemic virus is as virulent as the one in 1918, then the number of deaths may be far more. In economic terms, during the period SARS ravaged the region, the GDP of the East Asia countries experienced a 2% drop in the 2nd quarter of 2003. The number of deaths attributed to SARS was a mere 800 people. Assuming the GDP of all affected countries drops 2% and the epidemic situation persists for a year, there will be a pecuniary loss of $800 billion (USD).

Objectives

1. Prevent the domestic occurrence of any human H5N1 case before pandemic onset.
2. After the H5N1 virus has emerged from abroad, every effort to prevent further domestic transmission will be pursued.
3. If the H5N1 virus becomes more contagious, then aggressive intervention of medical and public health measures will be implemented to reduce the impact to citizen's health. Social and economic activities will keep functioning as much as possible.
4. After the pandemic runs its course, social psychological and economic recovery plans will be launched.

Strategies

In response to an influenza pandemic, the "4 major strategies and 5 lines of defense" plan are the main framework for pandemic control.

Four Major Strategies

Strategy I – Early detection

The most important surveillance functions are (1) detecting any unusual cluster of cases at an early stage, (2) discovering abnormal clinical manifestations in cases, and (3) understanding virus characteristics through analysis. Once the virus' transmission ability enhances, early detection will facilitate executing epidemic control measures to prevent the epidemic situation from worsening.

Strategy II – Interruption of transmission

Besides medical interventions such as antivirals and vaccine, there are several non-pharmaceutical public health interventions, such as, personal hygiene practices (including washing hands frequently and wearing a mask when being ill), isolation of patients, quarantine of contacts, social distancing, etc. All of these are important and economically balanced containment measures.

Strategy III – Antivirals

At present, the cure and preventive function of the neuraminidase inhibitor antiviral has been confirmed for seasonal influenza. Consequently, it is expected to be effective in treatment and post-exposure prophylaxis for avian influenza and pandemic influenza. Furthermore, it is expected to block the virus from spreading; thus reducing morbidity and mortality.

Strategy IV – Influenza Vaccine

The annual influenza vaccination program has effectively decreased morbidity and mortality of the seasonal influenza. Similarly, it is expected that, during an influenza pandemic, a sufficient amount of effective vaccine can be obtained through purchase or domestic manufacture. This will maintain major public functions and safeguards the health of high-risk groups.

Five Lines of Defense

Line of Defense I – Containment abroad

Only the containment of the virus spread at the earliest human adaptation phase can obstruct or delay the occurrence of an influenza pandemic. Therefore, it is essential to actively participate in the global collaboration plan; reinforce the sharing of epidemic control information; and build up tight cooperation channels. Concurrently, changes in the international epidemic situation should be tracked, and border control measures need to be upgraded to reflect the situation's severity.

Line of Defense II – Border quarantine

The risk of an influenza pandemic occurring overseas is higher than domestically. Should the virus' transmission ability continue to increase, quarantine inspection reinforcement at airports and seaports is a major method of protecting our people's health. Health monitoring and management of incoming passengers will be gradually upgraded depending on the international epidemic situation. Potential patients will be identified immediately and treated promptly to prevent epidemic spread within our country.

Line of Defense III – Community epidemic control

If the influenza virus transmission ability becomes extremely contagious and the virus is impossible to block by containment abroad or with border quarantine measures, then the community epidemic control becomes the next major tool used to decrease its impact. However, implementing each public health intervention thoroughly depends on whether people understand the necessity of each measure, so they obey and cooperate. The government will combine forces with civil groups and volunteers to provide people with the correct information, thus ensuring the public's level of cooperation with community epidemic control measures. Presently, recruitment and training of backup human resources have been started.

Line of Defense IV – Maintaining normal medical system function

When another influenza pandemic occurs, a large influx of influenza patients will definitely bring enormous challenges to the medical system. A National Medical Network for Prevention and Control of Infectious Diseases plan has been established to prevent patients with other diseases from being deprived of necessary medical resources and provide more extensive care to a large number of pandemic flu patients. It also provides an emergency epidemic control response. Besides, local governments need more advanced planning time to set up large-scale care facilities.

Line of Defense V – Individual and family protection

Correct hygiene habits should be formed during ordinary days, thus they are easier to maintain during a pandemic period. In case there is an influenza pandemic, people should be instructed to stay home as much as possible so they can reduce unnecessary social interaction. In addition, any person with a mild disease should be encouraged to recuperate at home. Currently, the government demands higher levels of personal and household hygiene be practiced during a pandemic, while avoiding public panic.

Achievements

1. Multiple surveillance systems have been built to detect any human H5N1 flu cases of any unusual clusters of influenza-like illness; so far there is no H5N1 case detected in Taiwan.

2. To respond to influenza pandemic, a three plan hierarchy has been developed: the National Influenza Pandemic Preparedness Plan (Preparedness Plan), the Strategy Plan for Execution of Influenza Pandemic Response (Strategy Plan), and the Mobilization and Preparedness Plan for Influenza Pandemic Prevention (Action Plan).

3. The administrative level of influenza pandemic control has been raised to the national security level. A three-tier control and management hierarchy has been established: the Office of the President (National Security), Executive Yuan and the Department of Health (DOH).

4. The current neuraminidase inhibitors stockpile total is 2.37 million doses (June 2006), which can cover at least 10.44% of the population.

5. The "Influenza Vaccine Self-Manufacture Plan" was approved by Executive Yuan in November 2004 to build up the domestic vaccine manufacture capability.

6. Several exercises have already been held, including a functional exercise for pandemic phase A1~A2, a functional exercise for novel influenza phase B, an airport management drill of incoming passengers, and an exercise on the local governments' response.

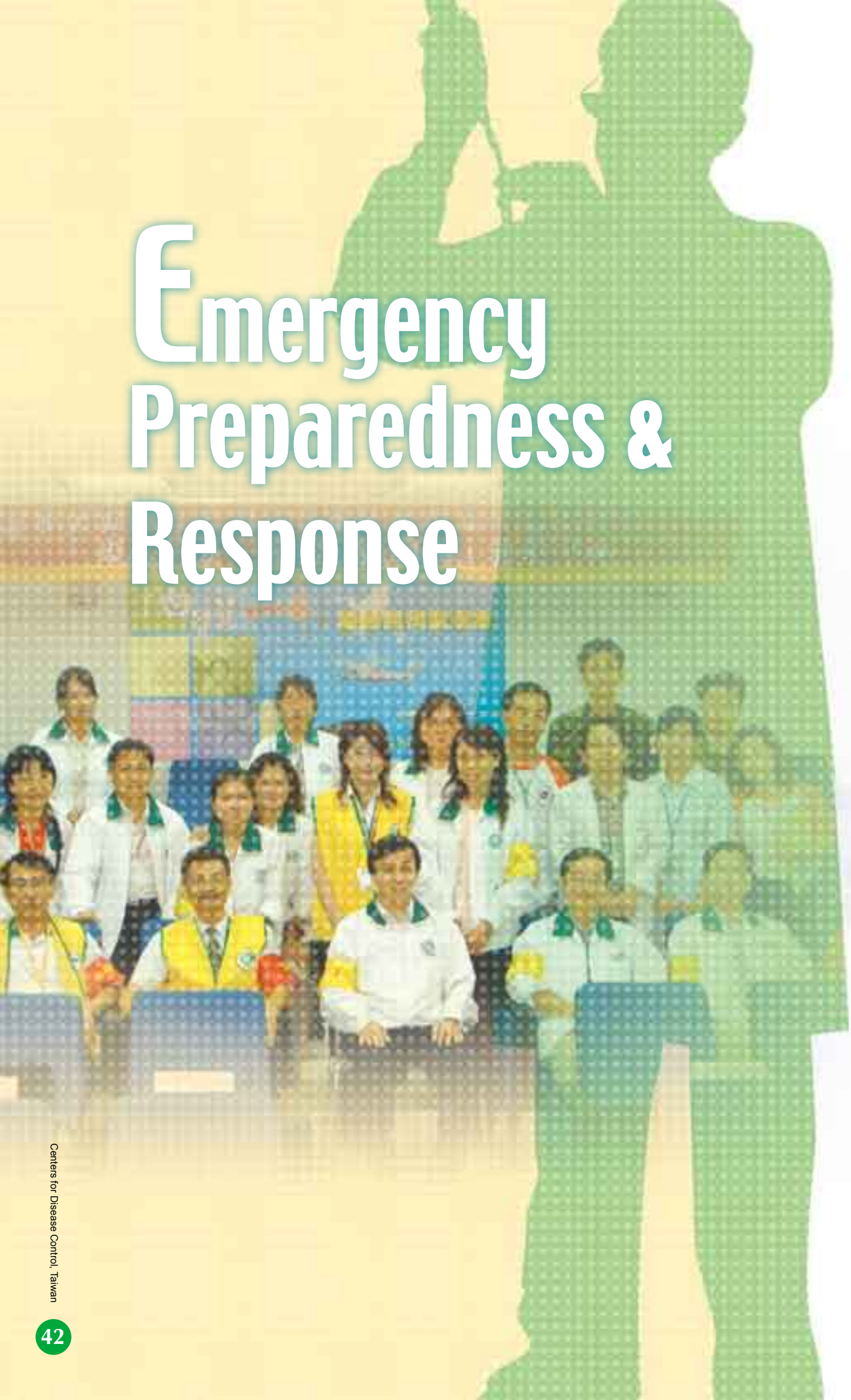
Future Prospects

1. Based on the latest H5N1 situation and World Health Organization's recommendations, the plan, guidelines and standard operating procedures for pandemic flu should be regularly updated.

2. A portion of the stockpiled antivirals will be used to contain H5N1 or any other potential pandemic flu virus.

3. By 2009, the first flu vaccine plant will be completed. An annual production of 16 million doses of seasonal influenza vaccine is expected. When an influenza pandemic occurs, the plant can provide pandemic strain vaccines that cover one fourth of Taiwan's population within 3 months.

Emergency Preparedness & Response



Centers for Disease Control, Taiwan

Counter Bioterrorism

Background

The terrorist attacks in September 11, 2001 on the United States and the subsequent anthrax letters bioterrorism gripped the whole world with fear. Two years later, an extremely infectious disease called Severe Acute Respiratory Syndrome (SARS), exposed the weakness of the global public health, bio-defense and national security systems. Both the deliberate distribution of biological agents and naturally occurring novel pathogens have proved that they can easily destroy people's physical, mental and economic well-being.

Therefore, being prepared for bioterrorism and biological threats from novel pathogens has become one of the burning tasks of our times. To prevent bioterrorism requires comprehensive training, perfect preparedness, early detection, real-time mobilization and timely action.

The Executive Yuan strengthened Taiwan's national security by bringing the intelligence, finance, economic, health and judicial departments together to counter bioterrorism. Thanks to the cooperation and coordination of these departments, we are now able to detect bioterrorism quickly and act swiftly to epidemics.

Objectives

1. Bioterrorism Prevention and Preparedness

   Formulate a counter bioterrorism plan by: (a) organizing a taskforce; (b) stockpiling vaccines, antibiotics, antiviral treatments and antitoxins for bio-warfare; and (c) setting up vaccination and mobilization plans.

2. Bio-defense drill

   Evaluate the command system, reporting mechanisms, and capabilities of first responders through bio-defense drills and exercises.

3. Bio-defense training for public health personnel

   The Taiwan CDC and the Ministry of National Defense have conducted trainer courses to teach instructors in the standard procedures to be employed against biological weapons.

4. Information dissemination

   Information on how to fight bioterrorism was disseminated to all experts, health care providers and the general public. The Taiwan CDC has collected relevant bioterrorism information and compiled

handbooks on the standard operation procedures against Anthrax and Smallpox for public health personnel. Such information has also been posted on the public web site [http://www.cdc.gov.tw/index1024.htm].

Public Notification

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

Major Events

1. Policy improvement

   Drafted the Response Plan to Counter Bioterrorism.

2. Bio-defense related drills (2006)

   a. On November 23, a bio-defense drill with advanced warning was held at the High-Speed Rail Station in Taipei. The hypothetical situation for this drill was “Suspected Biochemical Agent Disseminated at a Station”.

   b. Another bio-defense drill was carried out on November 28 in Taizhong’s seaport. In this drill, it was hypothesized that a commercial vessel had been contaminated with biological agents by terrorists and that no advance warning had been given.

3. Bio-defense related training

   a. Held four retraining courses for bio-defense personnel between July 7 and August 4.

   b.Between July 7 and August 4, additional training for fourth tier bio-defense personnel was carried out.

   c. Between August 8-23, training was held for counter-bioterrorist personnel.

   d. Provided 96 on-line lessons using both practical and digital materials for epidemic control workers on counter bioterrorism education training.

Future Goals

1. Request the Health and National Defense ministers to jointly develop a mobilization and back-up plan to deal with biological events in accordance with the All-out Defense, Mobilization and Preparedness Act.

2. Establish a Health Command Center in accordance with the Communicable Disease Prevention Act. The Health Command Center will be the central contact for GIS resources, web-conferences, and inter-government cooperation.

3. Develop standard operating procedures for bio-agents. Standardize the guidelines for disease examination, treatment, prevention and control.

4. Improve the counter–bioterrorism defense training courses by tailoring them to the needs of the public, medical staff, public health workers, and emergency personnel.

5. Provide an on-line counter bioterrorism course to improve the public's awareness.

6. Draw up the counter bioterrorism plan and Counter-Terrorism Action Plan (CTAP) on protecting the health of communities in accordance with the APEC's strategy.

Biological Disaster Prevention and Response

Background

The Department of Health (DOH), under Executive Yuan, instituted the "Biological Disaster Prevention and Response Plan" (hereafter, called the "Plan") to address the following:

1. Disasters caused by biological agents;

2. Consolidate prevention equipment and relevant prevention procedures;

3. Improve response personnel exercises and training; and

4. Promote public disaster prevention education.

Local governments and designated authorities regard the Plan as the basis for preventing, responding, and recovering from biological agent disasters. The Plan is an integrated disaster prevention and response system. It enhances overall response competency, provides efficient emergency rescue, reduces the shock of the disaster and recovery reconstruction, and protects the life and property of the public. This Plan was approved by Executive Yuan's Disaster Prevention and Response Commission on April 7, 2005, and was sent to each government agency on May 20 for implementation.

Introduction

This Plan 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. These regulations govern the preparedness, response and recovery to biological agents before, during and after the disaster. When an epidemic occurs, whether natural or induced by bio-terrorists, the relevant disease control measures must be enforced and the national defense reserves mobilized.

Action of Response Working Groups

To fight a pandemic or bioterrorist attack, the central authority requires Executive Yuan's approval to establish a Central Epidemic Command Center. The functions of the Center are:

1. Evaluate the disease tracking information. Formulate and promote emergency disease control policies.

2. Integrate the resources, facilities, and manpower of all appropriate organizations needed to control the disease.

3. A myriad of other responsibilities: Control news, information and education dissemination. Prioritize mass media dissemination. Control national border entry and exit points, including airports and harbors. Enforce house quarantines. Manage cooperation with international organizations. Requisition transportation. Clean and disinfect public areas. Secure necessary labor. Promote public hygiene education. Control communicable diseases common to humans and animals. And finally, implement any other necessary control measures against major communicable diseases.

The Center may establish a secretariat, departments of implementation, planning, logistics, and finance. Each department may establish several task force sections, in turn.

Major Achievements

1. The county and city authorities completed their prevention and response plans to control local pathogens.

2. The health agencies of local governments have formulated a plan to establish a mechanism to mutually support the different regions. They also nominated a point of contact (that must be regularly updated) to rapidly and effectively deal with biological disaster information.

3. In accordance with the current global strategy to prevent and control biological disasters, the Executive Yuan's National Disasters Prevention and Response Council amended the Disaster Prevention and Response Basic Plan to include policies to prevent disasters from biological agents.

Constructing the National Security Network and the All-out Defense

With Executive Yuan's guidance, the Taiwan CDC has completed mobilization preparations by building up its emergency medical treatment and rescue systems. In case of disaster, these systems can be used to protect peoples' lives and properties. The major tasks completed in 2006 are:

1. Devised a plan for mobilization against communicable diseases and coordinated a county/city preliminary mobilization plan in accordance with the All-out Defense Preparatory Act, the Communicable Disease Prevention Act, the Guidelines for All-out Defense Preparations, and the Initiative for Health Mobilization Preparations.

2. Held a major C-level flu epidemic training exercise for a treatment center in Pingdong County, Taiwan in conjunction with the Wan-Ann No. 29 Military Exercise.

3. Participant in meeting to coordinate high-level responses. The resultant proposal from the meeting was to improve disaster rescue, civil defense, communicable disease control, and information exchange by incorporating a horizontal connection among all the systems of the all-out defense.

4. Participated in the "All-out Defense 2006 Touring Workshop" to educate local health workers on performing their tasks.

5. Inspected and assessed the mobilization performance of 25 counties and cities on communicable disease control.

Stockpile Management Information System (MIS)

During the SARS crisis in early 2003, there was a severe shortage of personal protective equipment (PPE) in Taiwan, such as N95 masks, surgical masks, procedure masks and protective clothing. However, when the epidemic gradually ended, large quantities of PPE were left behind that needed to be stockpiled and cared for. An important task of the post-SARS Taiwan CDC was to review the current epidemic prevention plan and ensure a better response to any future infectious disease crisis. Thus, the plan was revised on June 23, 2004 and the Resource Management Section was established on July 1, 2004. The revised plan details the PPE stockpile logistics and distribution, relevant information collection, ongoing planning and inspection, and educational training. The Fourth Division of the Taiwan CDC took over the work of the Resources Management Section on October 1, 2005.

In 2004, there was a drastic policy and strategic improvement of PPE management. Since then, there was progress in the following four major aspects:

1. Establish a safe PPE stockpile. Channeled surplus materials handed over by Department of Health into a three-tier stockpiling system, i.e. the central, local, and hospital levels. Not only is the responsibility imposed on every concerned user, each user is also asked to maintain at least one month's supply. The current PPE stockpiles contain 2.8 million N95 masks, 4.57 million protective clothing, 9.9 million surgical masks and 9.6 million procedure masks – all above the recommended safe level.

2. Prepare and deploy MIS stockpile. The newly established MIS website posts regularly updated information about PPE stockpiles at 547 hospitals, 378 local health agencies, and 20 CDC offices. According to a recent survey, the average number of visits per day of the MIS website is 560, which translates to approximately 204,000 visits per year. The latest version of the website divides the content into six categories: the conventional PPE, snake anti-venom serum, anti-virus drugs, vector control pesticides, sampling materials and methadone.

3. Ensure swift delivery. All the PPE are kept in the air-conditioned warehouses, dispatched with the AS/RS system and tracked with professional logistics. Materials ordered to be deployed anyplace in Taiwan and Penghu are delivered within 24 hours. It takes no more than three days for the two farthest islands, Kinmen and Matsu.

4. Long-term planning. There is a four-year long-term plan beginning FY2005 through FY2008. The main purpose of the plan is to establish a step-by-step procedure for a high level bio-safety capability and respond to any emerging infectious disease. Secondary, it helps equip us for any possible bio-terrorism incident in the future.

Investigation Taskforce for Disease of Unknown Cause

To effectively control diseases, the Taiwan CDC has constructed a tracking system for unknown diseases. Concurrently, it established the Field Epidemiology Training Program (FETP) through the joint efforts of the government's administrative system of health, all levels of disease control (including the Taiwan CDC of the DOH, county and city health departments, and local health stations) and the academic research system (including the National Institute of Health, Council of Agriculture, medical colleges, public health colleges, and hospitals). This will reduce the spread of diseases of unknown causes through field investigations made by health organizations, graduates of the FETP, and experts from diverse fields (i.e., public health, epidemiology, toxicology, entomology, environmental health, community health, infection, and infantile infection control).

An infectious disease of unknown cause case report can be generated by a medical institution, the infection reporting and management tracking system, or the general public. Once received, the Investigation Taskforce for Disease of Unknown Cause (ITFDUC) immediately mobilizes the district's epidemiologists, clinicians, health departments/stations, any relevant Taiwan CDC units, and FETP trainees. They will proceed to the site to handle the case. The taskforce coordinates the medical laboratories to isolate the factors of infection and the path of transmission as quickly as possible; thereby, containing and controlling the infection. Because of the experience gained from this process, the Taiwan CDC's capability to control disease has been enhanced. In 2006, the Taiwan CDC handled eight cases of unknown causes.

This taskforce has worked unfalteringly to integrate the diverse information available across all platforms to help investigate and analyze communicable diseases. The various community, medical, health, and infection investigation systems provide prompt information for the policy-making authorities. It uses a digitalized distribution system to disseminate the disease control information throughout the community, so that an epidemic can be brought under control quickly.

Communicable Diseases of Interest to the Public

Prevention of Tuberculosis (TB)
The Status of the TB Epidemic in Taiwan

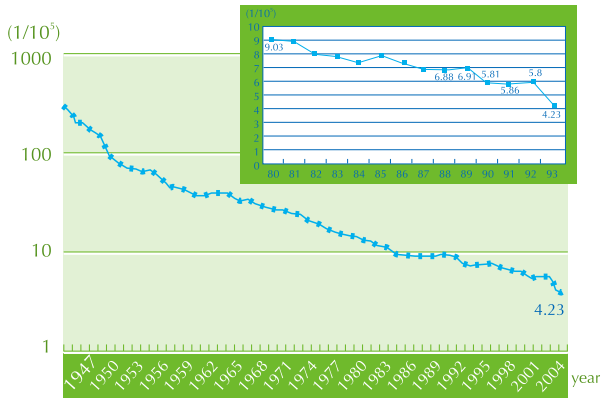
Mortality Rate

In 2005, the mortality rate for TB in Taiwan was 4.3 per 100,000 people with 970 total fatalities or 0.7% of all deaths in Taiwan, making it the 13th leading cause of death in Taiwan. It has been the number one killer among Notifiable Communicable Diseases for years. In 1947, the mortality rate for TB in Taiwan was 294.44 per 100,000. The amount decreased to 4.3 per 100,000 in 2005. The morality rate has declined every year; however, the rate of decline has been slowing down in recent years (Figure 1).

Organized according to gender, in 2005, the TB mortality rate for males was approximately 3.2 times that of females. When organized by age, the TB mortality rate increases with age. Out of the total of 970 TB-related deaths, 81.2% or 788 were elderly people over the age of 65, followed by individuals between the ages of 45 and 64 (Figure 2). Compared with the past, the age distribution of TB deaths has become noticeably concentrated among the elderly. The mortality rate among younger people has also been declining in recent years.

When the data is organized according to urban and rural areas, mortality rates and incidences of TB have parallel tendencies. Eastern Taiwan has a higher rate than Western Taiwan and Southern Taiwan is higher than Northern Taiwan. The mortality rate in cities is also usually lower. In 2005, Taitung County had the highest mortality rate from TB with as many as 12.52 deaths per 100,000, followed by Pingtung and Hualien Counties. In 2005, the mortality rate in mountainous regions was 16.52 per 100,000, 3.8 times the overall 4.27 per 100,000.

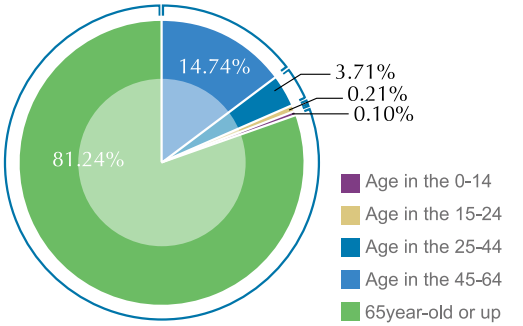
Figure 1 : TB Death Trend in Taiwan, 1947–2005



In 2005, tuberculosis was the 13th major cause of death in Taiwan with 970 deaths or 0.7% of all deaths attributed to the disease.

Clarification: The tuberculosis death rate has decreased over the years, but the decrease has decelerated.

Figure 2 : Age distribution of TB deaths in Taiwan, 2005



Clarification: Over 80% of deaths to tuberculosis are in 65 year-old or up, followed by the age in 45-64.

Prevalence

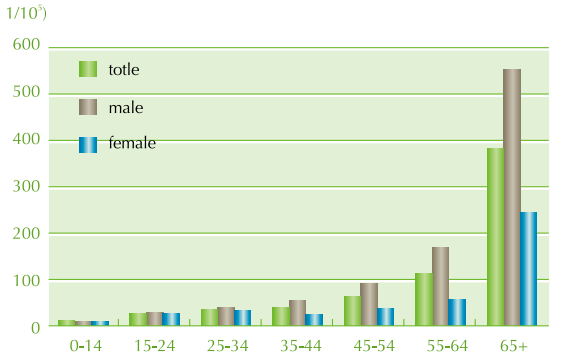
Starting in 1957, a pulmonary tuberculosis prevalence survey has been carried out every five years in Taiwan to examine epidemic trends. The data has been used as a basis in the formulation of TB prevention strategies, but other kinds of TB were not included. Eight such prevalence studies have been carried out between 1957 and 1993.

In the first TB prevalence survey in 1957, chest X-rays for people 20 years of age and above showed 5.15% of those checked were possibly infected. Additional bacteriological tests brought the number down to 1.02%. From the eighth prevalence survey in 1993, chest X-rays on people 20 years old and above indicated that 0.65% of that population was possibly infected. Again, bacteriological tests reduced that number to 0.06%. The prevalence of TB declined by 87.4% and 94.1%, respectively, in those decades. Past surveys all revealed higher incident rates among older people and that pulmonary TB was 2.2 to 3.3 times more prevalent among males than females.

Incidence

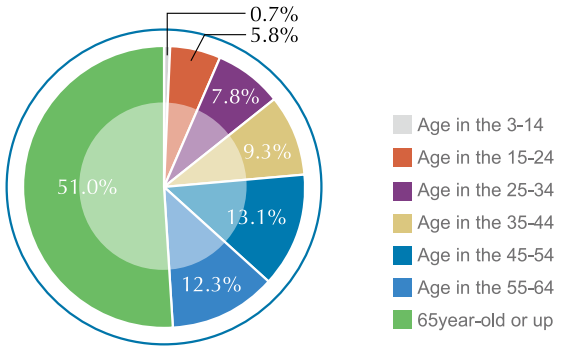
22,666 people were reported as possibly being infected by TB in 2005. Following diagnosis, 16,218 new TB patients were reported and the incidence rate was 72.47 per 100,000. TB has been the number one incidence rate of any notifiable communicable disease for years. Organized according to gender, about 2.3 times more male patients were diagnosed with TB than females. The incidence rate for males was 2.18 times that of females. Organized according to age, the number increased significantly with age (Figure 3). There were 51.04% new TB cases among individuals age 65 and above. The incidence rate increased with age and was more prevalent among males than females (Figure 4). In 2005, the incidence rate for TB in mountainous regions was 292.87 per 100,000, 4.04 times higher than the overall 72.47 per 100,000.

Figure.3 TB incidents by sex and age, 2005.



Clarification: Incidence rates increase with age, and males affected more than females.

Figure.4 Age distribution of TB incidents in Taiwan, 2005.



TB Prevention Strategies

1. Enhance coordination between public health network, laboratory testing network, and medical care network.
2. Build consensus concerning standard operational procedures for reporting, diagnosing, treating, laboratory testing, examination of contacts, case management, and DOTS.
3. Implementation Methods

(1) Case location programs

A. Enhance tuberculosis patient databank functions.

B. Establish a multi-function internet inquiry system on tuberculosis reporting.

C. Establish tuberculosis reporting policies.

D. Enhance tuberculosis monitoring of certain occupations and ethnic groups.

(2) Laboratory capacity improvement

A. Select laboratories with high standards as contracted hospitals.

B. Collect specimens for testing from health stations and medical care institutions.

C. On a special project basis, contract quality control associations to perform routine monitoring of contracted laboratories.

D. To improve the quality of testing laboratories will be supervised, be subject to on-site inspections, and have test specimens of the same level from the College of American Pathologists (CAP).

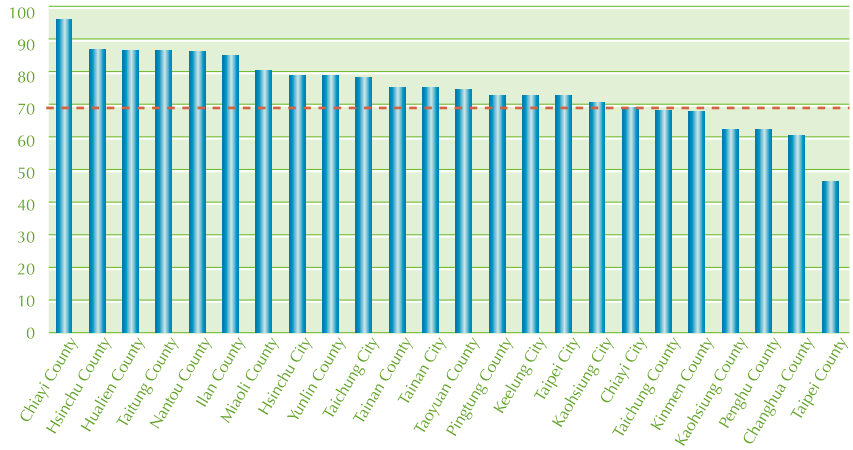
(3) Direct Observe Treatment System (DOTS) (Figure 5)

A. Place positive sputum smear cases under mandatory isolation in hospitals.

B. Offer DOTS and other relevant case-management measures to all hospitalized tuberculosis patients while they are under hospitalization.

C. Care for sputum-positive cases when they are placed under community home care by care workers.

Figure 5 : DOTs Coverage Rate for Smear Positive TB Patients by city/county, 51th week, 2006



(4) Hospital Care Enhancement

A. Compile the second edition of the "Treatment Guidelines for Tuberculosis in Taiwan by Inviting TB Experts and Physicians".

B. Continue certifying designated physicians for the diagnosis and treatment of tuberculosis.

C. Certify tuberculosis diagnosis and treatment hospitals in coordination with the tuberculosis medical payment improvement plan of the Bureau of National Health Insurance.

D. Set up an expert counseling/referral mechanism for physicians diagnosing and treating tuberculosis

(5) MDR-TB Project (DOTS-Plus)

A. Collaborate with hospitals to provide qualified medical care services to multidrug-resistant (MDR) tuberculosis patients.

B. Develop incentive schemes to encourage the above-mentioned patients to remain under medical care and thus to improve the complete cure rate and to prevent the spread from infection sources.

(6) LTBI treatment pilot program

Individuals five-years old or younger diagnosed positive using acid fast bacteria from sputum smears in index cases or negative on acid fast bacteria that is then cultivated into positive tubercle bacillus are to be reported and must undergo tuberculin skin testing and chest X-rays. If no signs of relapse are evident after seeing a physician or undergoing consultation, it is recommended that they undergo treatment of LTBI and receive DOPT (Directly Observed Preventive Therapy). They are to be included as target subjects for the program.

(7) Air Travel control

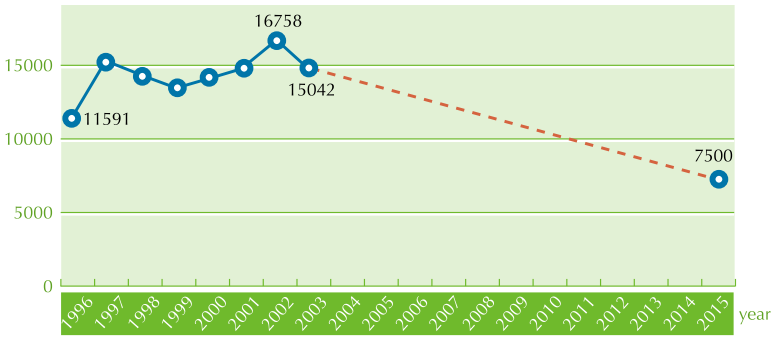
Set up regulations to prevent all infectious TB patients from traveling by air on flights exceeding eight hours in length until they have completed at least two weeks of treatment. This is in accordance with World Health Organization's of Tuberculosis and Air Travel: Guidelines for Prevention and Control (2nd Ed.).

Major challenges Ahead: Halve the Number of TB Patients in 10 Years

Tuberculosis control in Taiwan is still way behind other developed countries. The US CDC report for 2004 shows that the incidence of tuberculosis in the US was 5 per 100,000 and that the mortality rate from tuberculosis in 2004 was <1 per 100,000. In Japan, the incidence rate for

2004 was 30, while the mortality rate was 4 per 100,000. In Taiwan, the incidence rate for 2005 was 72.47 and the mortality rate was 4.3 per 100,000. Taiwan still has a long way to go. The Taiwan CDC declared on World Health Day in 2005 its goal of cutting in half the number of tuberculosis patients in ten years from about 15,000 new cases each year to 7,500 (Figure 6).

Figure 6



Target for 2015 (after 10 years from 2005)—The Program To Reduce New Cases by Half in a Decade from 15,000 to 7,500 cases.

However, tuberculosis control is not the government's responsibility alone. Policies formulated by the government need to be thoroughly implemented. The effective control of tuberculosis, the final goal of tuberculosis control, and the protection of the health of the people will require the efforts of all, including the government, the private sector, academia, and medical circles.

Figure 8 : DOTS Program in Taiwan

HIV-AIDS

Background

HIV destroys the normal functions of the immune system and is transmitted from an infected person through blood, semen, or vaginal fluid to others through broken skin or the mucus membrane. The infection can be passed from an infected woman to her child during pregnancy, birth, or through breast feeding. The loss of immune functions can lead to AIDS (Acquired Immunodeficiency Syndrome). AIDS is expected to be one of the largest human catastrophes of the 21st century.

The first HIV case in Taiwan was reported in 1984. By 2006, the number of HIV patients had risen to 13,702 (13,103 of which were Taiwanese nationals) and 1,570 HIV patients have died. New HIV infections surged in 2005 to 3,399, a 124% increase over the previous year. The reported number of HIV infections in 2006 was 2,942. This was the first trend reversal since 1984 towards greater numbers of HIV cases each year (Figure 1).

In terms of age, the largest number of infections in 2006 was in the 30-39 age group which accounted for 1,123 or 38.2% of all cases. The second largest group was the 20-29 age group, numbering 1,051 or 35.7% of all cases (see Figure 2). An analysis of risk factors shows that in 2006, similar to recent years, the highest percentage of HIV infections was injected drug users (IDUs), accounting for 60%. The second largest percentage of infections was a result of sexual relations: men having sex with men (MSM), which accounted for 20% of all cases. Heterosexual encounters accounted for 15% (see Figure 3). Of Taiwanese nationals infected by HIV in 2006, 2,634 or 89.5% were males and 308 or 10.5% were females. The ratio between infected male and female was 9:1. The annual increase among females was higher than that among males. The major cause for this was a sharp increase of female drug users. 16 of the 30 pregnant women found infected with HIV in 2006 were IDUs. The sharing of needles by IDUs has become a new problem and challenge in the fight against HIV/AIDS.

Figure 1 : Report Cases of HIV/AIDS by Year of diagnosis in Taiwan1984-2006 (Taiwanese)

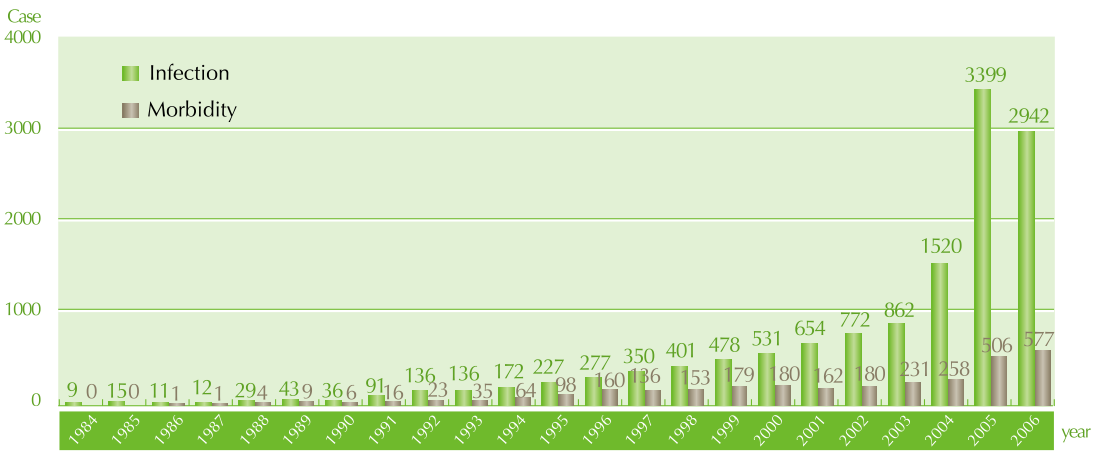
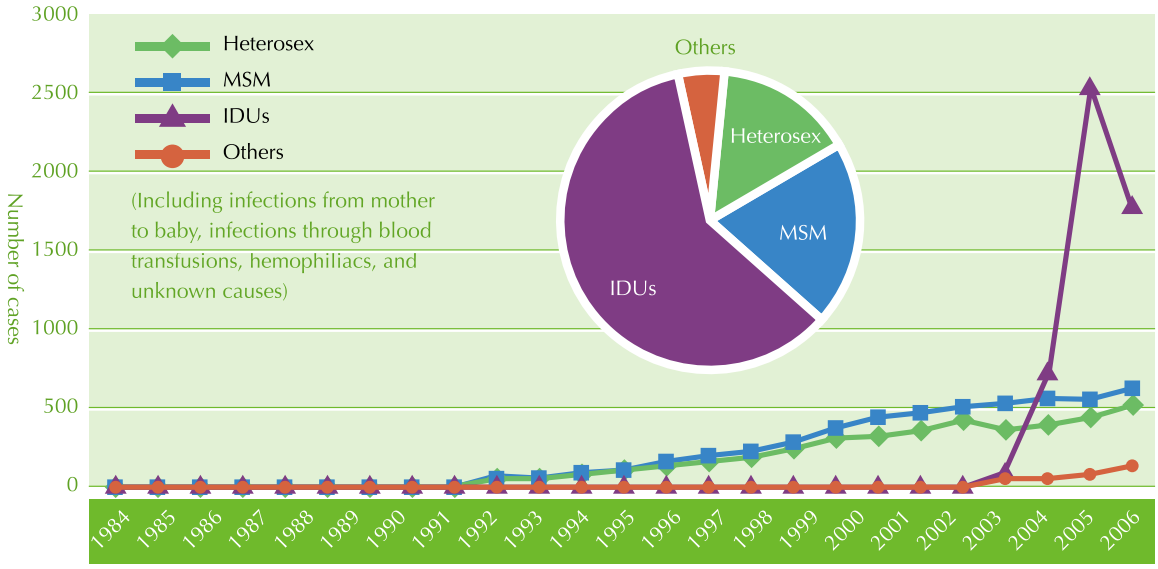


Figure 2 : Age distribution of HIV patients in Taiwan (1984-2006) 2005/2006/1984-2006

	2005		2006		1984-2006	
Age	Cases	Percentage	Cases	Percentage	Cases	Percentage
0-9	5	0.1%	6	0.2%	32	0.2%
10-19	71	2.1%	41	1.4%	406	3.1%
20-29	1389	40.9%	1051	35.7%	5000	38.2%
30-39	1231	36.2%	1123	38.2%	4659	35.6%
40-49	526	15.5%	547	18.6%	1957	14.9%
50-59	133	3.9%	135	4.6%	675	5.2%
60-69	32	0.9%	26	0.9%	240	1.8%
70-79	9	0.3%	11	0.4%	105	0.8%
Over 80	3	0.1%	2	0.1%	14	0.1%
Unknown	0	0.0%	0	0.0%	15	0.1%
Total	3,399	100.0%	2,942	100.0%	13,103	100.0%

Figure 3 : Statistics on risk factors of HIV infections in Taiwan in 1984- 2006



Objectives

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

2. Provide infected individuals with adequate medical care and enhance the quality of their lives.

Strategies

1. Organizational mobilization and declaration of will — To control AIDS, the Executive Yuan established an AIDS Control Promotion Committee, composed of 13 ministers and prominent figures in society in December 2001, to oversee a working group charged with mapping out national plans for controlling the AIDS epidemic. When the Executive Yuan was restructured in February 2005, the committee was changed to the Executive Yuan DOH AIDS Prevention and Control Committee chaired by the Health Minister (Figure 4). The new committee seeks to enlist the support of the private sector to control AIDS. To carry out the task, the heads of county and city governments have been asked to create action groups.

2. Increasing public awareness of AIDS: An assortment of media channels, targeting selected groups in the community, are being used to raise AIDS awareness.

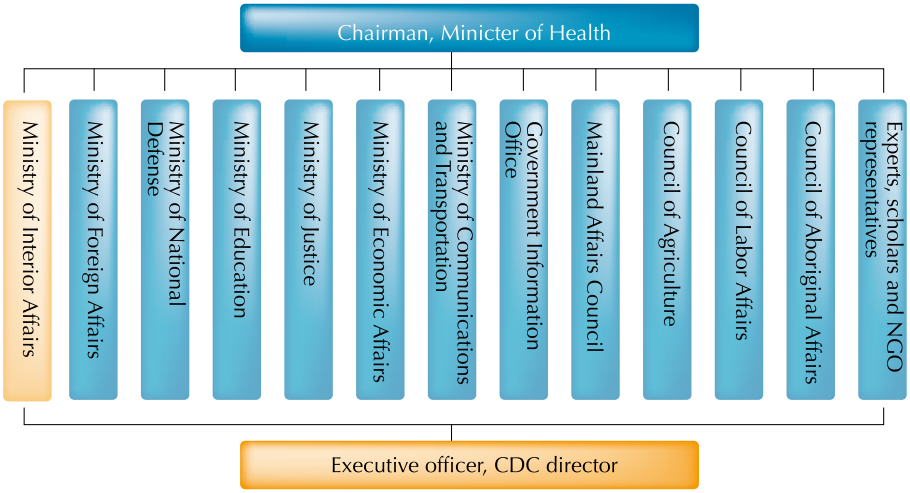
   a. Ascertaining paths of infection: The three main paths for HIV infections include unsafe sex, blood transfer (blood infusion and needle sharing), and mother-to-baby infection. HIV is not spread through shaking hands, embraces, or using common toilets.

   b. ABC and CNN to AIDS prevention: A. Resist sexual temptation. B. Be faithful to your sexual partner. C. Use condoms when having sex. N: Use clean needles. N: Improve negotiation skills. The purpose of condoms is to prevent infection through sexual contact. The purpose of clean needles and other penetrative instruments is to prevent infection through injection with dirty bloodied needles. Negotiation skills are needed to negotiate for safe sex or safe injection with partners.

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

   d. Activities held to demonstrate caring for AIDS patients: With World AIDS Day on December 1st and the AIDS epidemic currently facing Taiwan, a series of activities demonstrating how to care for and act towards AIDS patients were held in December, 2006. It was used to remind the public of AIDS prevention measures; such as, “being faithful to one partner for life,” “not sharing needles,” and “HIV testing for pregnant mothers”. Finally, a call to arms was issued for the people of Taiwan to not only take precautions protecting themselves, but in the hope that the Taiwanese people would take a positive attitude with HIV-positive individuals, cast aside prejudices, and extend a compassionate hand to those with HIV to help them come out from under the shadow of the disease.

Figure 4. Executive Yuan DOH AIDS Prevention and Control Committee



3. Target high-risk behavior groups: Provide sustainable support to mobile demographic groups, including sex workers, MSM, drug users, and sailors. Furthermore, map out plans for controlling HIV/AIDS among them.

4. Promote harm reduction programs: Curbing the epidemic of HIV infections among IDUs, a harm reduction plan was implemented in Taipei, Taoyuan, and Tainan Counties as well as Taipei City on a trial basis in 2005. It was made nation-wide in July 2006. The programs implemented include "Needle-Syringe Programming (NSP)", "Drug Substitution Treatment", "Information, education and communication (IEC)".

5. Provide HIV patients support and respect: Provide HIV/AIDS patients with appropriate medical treatment, respect their rights, enhance the care system, and render support to patients and their families.

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

7. Engage in research and development in science and technology: Enhance 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 2006.

2. To increase disease surveillance, Taiwan began to screen blood donors in 1988, draftees in 1989, prison inmates in 1990, and alien laborers in 1991. Since 1977, ten hospitals have provided

anonymous HIV blood-screening services, screening 6,088 people in 2006, with 151 found HIV positive, accounting for 2.5% of the total. Furthermore, coping with the increase in female HIV patients and the problem of mother-to-baby infection, an HIV screening plan was established for pregnant women. Thus far, it has detected 31 positive cases, accounting for 15.7 per 100,000 women screened.

3. The Taiwan government has provided HIV/AIDS patients with free medical treatment since 1988 and free HARRT since 1997. At the end of January 2007, 36 designated hospitals provided free treatment to HIV/AIDS patients. Nations around the world encourage HIV patients to return to their homes and communities. If an HIV patient takes one's medication according to the prescribed schedule, one's immunization system can be maintained at a certain level, allowing him to avoid coming down with AIDS. He or she will be able to lead a nearly normal life. The government subsidizes private institutions to take care of HIV patients who are rejected by their families. These institutions, which include the Garden of Mercy Foundation, the Harmony Home Association, and the Catholic Lourdes Association, provide care and compassion to HIV patients.

4. In the area of scientific research and development, Taiwan CDC conducted 10 projects in 2006 and commissioned the National Taiwan University Hospital to establish an AIDS treatment center to train physicians to build up a specialist medical corps to help bring HIV/AIDS under control.

Future Prospects

According to statistics of the National Health Insurance Bureau (NHIB), NT$300,000 in medical resources is expended on each HIV patient every year. Medical expenses for HIV patients in 2006 totaled about NT$1.2 billion. Furthermore, other AIDS-related costs (such as popular education and screening) and all other medical costs (clinical examinations and psychological consultations) also increased immensely. The loss to labor and technology, freezes on foreign investment, reductions in exports, and the decline in revenues are inestimable.

At the onset of the world AIDS epidemic, the Executive Yuan's Department of Health rallied medical and health experts and private institutions in an effort to prevent and control AIDS. After years of hard work, they have achieved remarkable results, but have been unable to bring the number of new cases under control. We hope that in the future, the cross-ministerial AIDS Prevention Control Committee will make prevention of infection the thrust of its efforts and stop the spread of HIV/AIDS.

Dengue fever

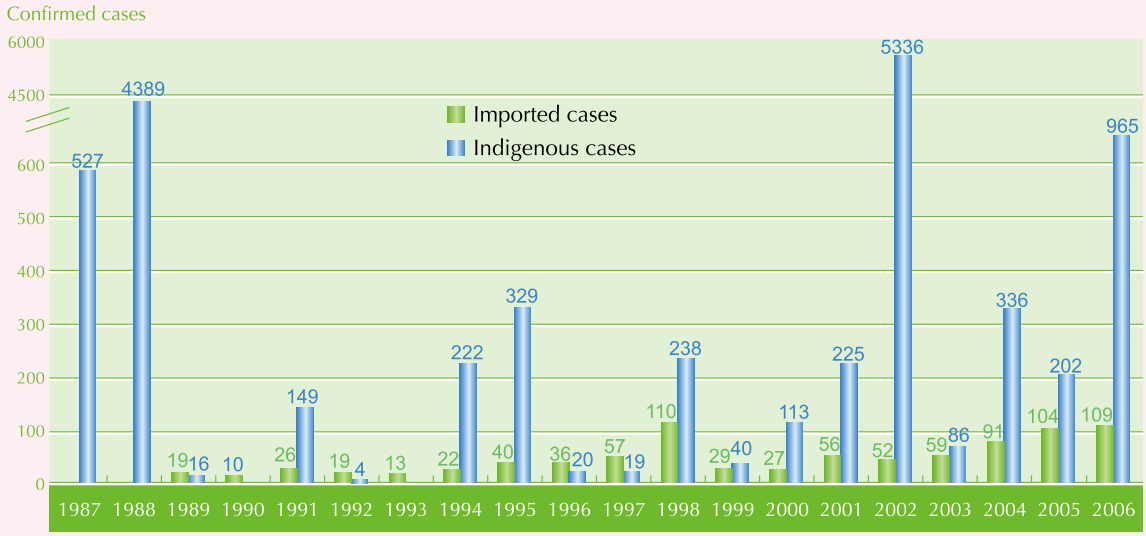
Background

During the first half of the 20th century, there were three island-wide Dengue fever outbreaks in Taiwan in 1915, 1931, and 1942, respectively. After almost forty years of dormancy, a DEN-2 outbreak

occurred in Luchiu Township, Pingtung County in 1981. Thereafter, more Dengue fever outbreaks took place in Kaohsiung (1987-1988), Chungho, Taipei County (1995), Taichung (1995), Taipei City (1996) and several others in the greater Kaohsiung area, Tainnan City, and Pingtung County. In 2002, another Dengue fever outbreak occurred in Southern Taiwan. It was similar to the 1988 outbreak which actually started in 1987. The number of Dengue fever cases increased a great deal starting in mid-June. The epidemic originated near the border between Chienchen, Kaohsiung City and Fengshang, Kaohsiung County. The epidemic gradually spread to other places, including Pingtung County, Tainan City, and Penghu County. The total number of confirmed cases was 5,336, including 242 cases of Dengue fever hemorrhagic fever (DHF) which caused 21 deaths. Only 86 confirmed indigenous cases occurred in 2003. Of these, 51 were reported in Kaohsiung and Pingtung before March 8. All were considered residual cases of the 2002 outbreak. In 2004, 336 indigenous cases were reported. Five of them were of the hemorrhagic variety, but caused no fatalities. In 2005, there were 202 indigenous cases of Dengue fever, of which three were of the hemorrhagic variety, but they led to no deaths (Figure 1).

In 2006, there were 965 indigenous cases of Dengue fever, including 19 cases of Dengue fever hemorrhagic fever (DHF), which caused four deaths. The cases were concentrated mainly in the South, including Kaohsiung City, Kaohsiung County, Pingtung County, Tainan County, and Tainan City. Other cases in Taichung County, Taipei County, and Keelung City were infected in Southern Taiwan.

Figure 13 : Numbers of confirmed dengue fever cases reported from 1987 to 2006



Objectives

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

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 the 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. Implement health education through various communication channels to promote Dengue fever awareness.

   b. Involve the community in improving environmental and household hygiene as well as in reducing vector sources through volunteer training.

   c. Encourage regular inspection and cleaning of vector breeding sources by cleaning empty houses, vacant lots, and other potential vector breeding sources and keeping a record of these places for future inspections.

   d. Strengthen education training for disease prevention workers and volunteers.

   e. Set up a vector surveillance mechanism to check places with a high mosquito density probability to promptly wipe out vector sources.

2. Secondary Prevention

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

   b. Set up an emergency/contingency mechanism to promptly investigate suspected transmission sources and spray insecticide to eliminate those sources. Furthermore, perform health education about the importance of eliminating vector-breeding sites to prevent any possible infections from occurring.

3. Tertiary Prevention

   Establish guidelines for Dengue fever hemorrhagic fever (DHF) diagnosis and treatment and organize continuing education for medical personnel to raise healthcare quality and lower mortality rates.

Achievements

In Southern Taiwan, 965 people were infected with Dengue fever in 2006. As a result of the joint efforts between the central and local governments and the organized mobilization of the community,

Taiwan was much better able to bring Dengue fever under control when 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 2006, 47 cases of imported Dengue fever were detected, accounting for 43.1% of the total number of 109 imported cases (Table 1). This measure effectively limited the import of the disease.

2. Health education and publicity publications including leaflets, posters, buntings, Combat Manual for Dengue Fever (2nd edition) and VCDs.

3. Produce publicity materials for the mass media, including publicity recordings, epidemic control programming, newspaper ads. This includes 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 the public to eradicate Dengue fever vector breeding grounds.

Table 1: Serotypes and origins of imported dengue fever cases, 2006

	Serotype					
Country of Infection	1	2	3	4	ND	Total
Vietnam	7	11	3	1	14	36
Indonesia	5	4	3	1	8	21
Philippines	1	5	6		4	16
Thailand	3	4		3	2	12
Cambodia			4		5	9
Malaysia	3		1		1	5
Bangladesh			2		1	3
India	1	1			1	3
Myanmar			1		1	2
Madagascar	1					1
El Salvador	1					1
Total	22	25	20	5	37	109

4. The fifth edition of the Combat Manual for Dengue Fever guidelines were published for the various health organizations in their fight against the epidemic.

5. Formulation of the Community Mobilization Plan for Cleaning Up the Breeding Grounds of Dengue Fever Vector. The Taiwan CDC encouraged community organizations in counties and cities in Southern Taiwan to propose plans for the CDC subsidies and organize volunteer teams to exterminate mosquitoes. The results were evaluated during the first half of December 2006,

with an awards ceremony in the second half. Demonstrations on exterminating mosquitoes were also given. Volunteers that performed especially well shared their experiences with others. A total of 165 villages and boroughs participated in the program, recruiting 1,650 volunteers.

6. Engaged scholars and experts in insecticide efficiency and resistance studies of Dengue fever vectors. The findings were referenced in procuring insecticides. The Taiwan CDC procured 2,655 bottles of insecticides to exterminate Dengue fever vectors. These insectides were sent to health bureaus in Southern Taiwan for use.

7. The Central Trust of China processed joint supply contracts for the centralized purchase of pesticides for special environments for one year starting on December 1.

8. Promoted Dengue fever vector mosquito surveys and the Dengue fever control plan. Implementation was entrusted to the health bureaus of high risk counties and cities in Southern Taiwan (areas infested with Aedes aegypti). Under the plan, 110 people were hired to conduct the surveys. In 2006, surveys were conducted in more than 50,000 villages and boroughs, on average once every 1-3 months.

B. Secondary Prevention

1. An incentive system was established to encourage physicians and the public to report cases so as to facilitate early detection of disease transmission. NT$2,500-NT$5,000 was awarded to the physician or other medical worker that reported the first indigenous case of dengue fever of the year and to the individual that 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 the village or township of residence, the individual was awarded NT$2,500.

2. The frequency of dengue fever vector density surveys and investigations was increased to one per month for every village in and around the areas in Southern Taiwan where dengue fever was prevalent. In 2005, a total of 52,404 vector-density surveys were conducted in villages in Taiwan.

3. A total of 55,885 of the captured vectors (consisting of 32,777 Aedes aegypti and 23,108 Aedes albopictus) were examined for virus. “Eight pools” of them tested positive. These virus-carrying vectors were captured in Koahsiung City (Types 2 & 3).

4. To understand shifts in insecticide resistance of vectors after indigenous dengue fever broke out in Southern Taiwan in 2006, Taiwan CDC sent vector experts to areas where emergency spraying was carried out to evaluate the insecticide resistance of dengue fever vectors. They also offered timely advice on the use of insecticide and equipment to make control efforts more effective.

C. Tertiary Prevention

In September and October, five training sessions on clinic diagnosis and treatment of dengue fever and hemorrhagic dengue fever were held for traditional medical physicians.

Future Prospects

Taiwan CDC will draw up a reinforced plan for dengue fever control – a four-year program for eradicating vector-breeding sources and eliminating indigenous dengue fever to strengthen dengue fever control. Taiwan CDC, the 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, thereby stopping the occurrence of indigenous dengue fever once and for all.

Enterovirus

Background

The 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 known enteroviruses, especially in respect to neurological complications. Enterovirus is found in the gastrointestinal tract (the stool of infected persons, mouth, water, food) and respiratory tract (aerosols such as saliva, sputum, or nasal mucus, coughing, sneezing). Infections can be produced by direct contact with the secretions of infected persons or with contaminated surfaces or objects.

According to survey data from five consecutive years provided by the Department of Health's Centers for Disease Control, the number of outpatients infected with enterovirus increases in late March every year and peaks around mid-June. It decreases after mid-June. There is usually another smaller outbreak of enterovirus infection when schools reopen in September. Many types of enteroviruses exist around the world and they live inside humans. Man appears to be the only known host and source of transmission. There are currently no preventative vaccines for non-polio enteroviruses and no known highly efficacious medicine to eliminate the virus that lives inside the human body. Therefore, enterovirus will continue to exist and pose a threat to human health in the foreseeable future.

The peak season for enterovirus infections in the temperate region is summer. According to various surveys, trends in enterovirus infections in 2005 suggest that children under the age of 5 are more prone to critical complications and death from enterovirus infections. 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. In 2006, 11 severe cases were confirmed, but no deaths resulted.

Objectives

1. Control trends in enterovirus infections in Taiwan and set up an active enterovirus database in Taiwan.

2. Lower the number of deaths resulting from enterovirus complications.

3. Establish a consultation channel for the treatment of enterovirus complications.

4. Schedule enterovirus conferences on a regular basis to ameliorate the academic standard in the field of enterovirus studies.

5. Develop an enterovirus 71 prototype vaccine.

Strategies

1. Enhance case surveys and disease evaluation capabilities.

   The CDC will continue to collect and analyze enterovirus infection information both abroad and at home (especially in Taiwan) to build an enterovirus infection database to better understand outbreaks of the disease and to create better suited policies.

2. Augment health education — knowledge reduces fear.

   The Taiwan CDC consolidates government and public resources to educate the general public, medical personnel, educational conservatives, and the media about the basics of the enterovirus through a variety of media. For instance, the following disease prevention information is presented to the public: (1) general cleanliness and frequent hand washing can boost one's immune system; (2) people are encouraged to install proper hand washing facilities both in homes and in public

places; and (3) people are urged to seek immediate medical treatment if they develop enterovirus symptoms. Health care workers are trained in the latest treatments. Disease prevention can only be effectively accomplished when everyone practices personal hygiene.

3. Enhance emergency disease control mechanisms

Many problems arise from enterovirus infection. Problems involve prevention work, the entire medical system, education, media, economics, and so forth. It is crucial that central and local governments build control centers and enterovirus prevention policies in the event that the disease surveillance system breaks down. Additionally, coordinating the actions of the central and local government agencies needs to be preplanned for efficient disease control. This plan means a complete disease prevention network providing timely and adequate medical treatment, research, and case inspection. The plan must also include counseling services for slowing or stopping the spread of the disease, decreasing the number of deaths, and calming fears caused by the disease.

4. Thorough research and personnel training

Epidemiological research and vaccine development are among some of the programs currently underway. Human resource training improves prevention methods as well as diagnoses and treatment of enterovirus infections. The goal of these programs is to halt the threat of enterovirus to both the health of individuals and society.

Achievements

1. Survey and database creation

Figure 1 illustrates enterovirus infection trends in Taiwan. The annual number of enterovirus outpatients begins to increase in mid-March and peaks in mid-June. The number generally decreases soon afterward. Enterovirus has become a seasonal epidemic in Taiwan.

Figure 1 : Suspected Enterovirus Infection Cases Reported from Sentinel Sites in Taiwan, 2002-2006

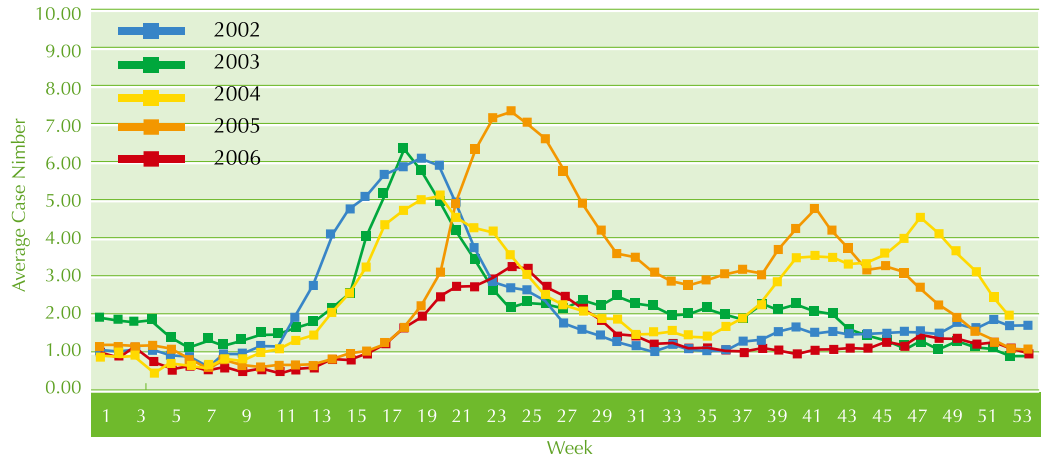


Figure 2 shows the annual fatality rate from severe cases in Taiwan.

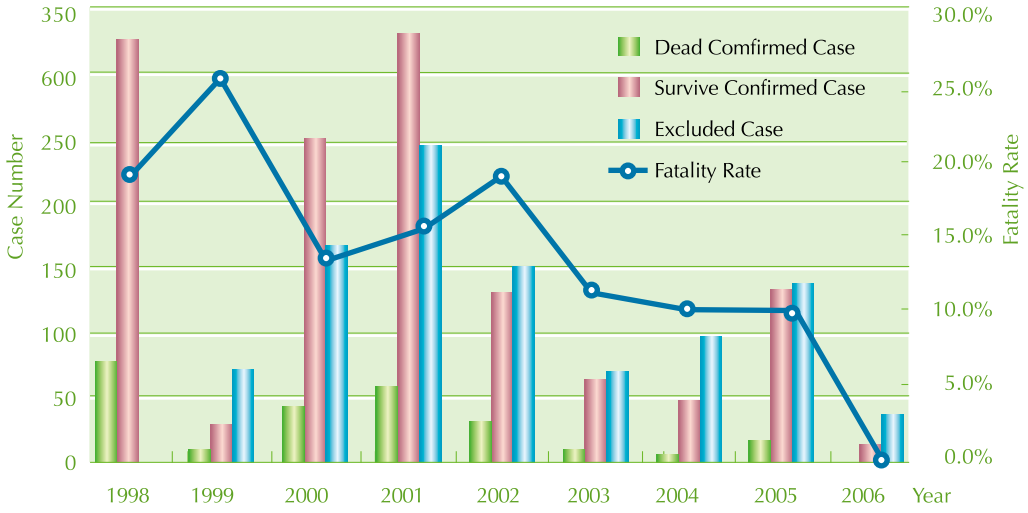
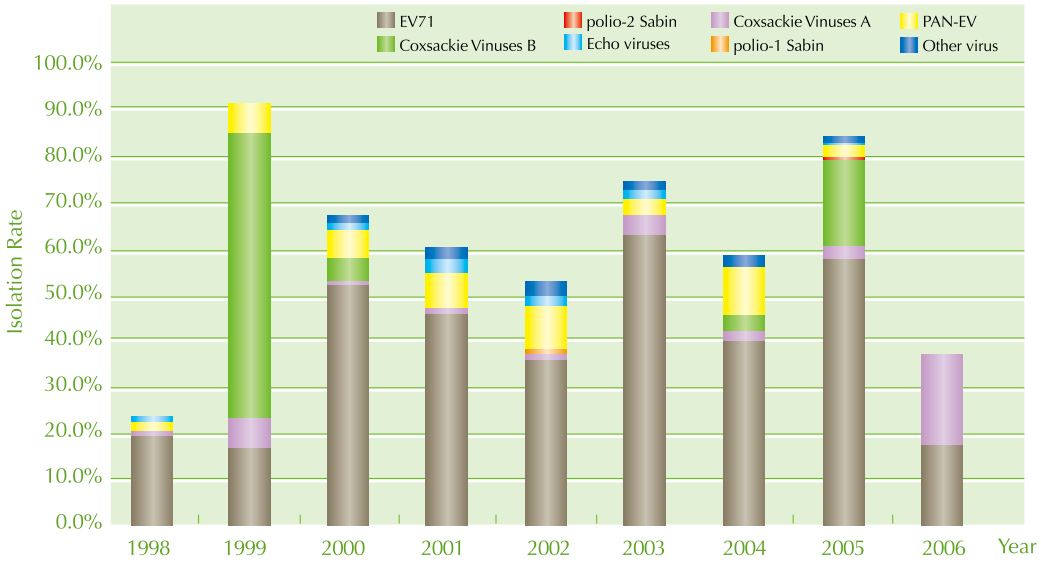


Figure 3 shows that EV71 is the major causative pathogen of severe cases in Taiwan.



2. Health Education

a. Red banners hung in schools teach about enterovirus. Talks are given on enterovirus preventative measures for children and related health issues.

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

c. Restaurants, schools, hospitals, clinics, and other public gathering places are required to conduct regular inspections for environment hygiene and facilities for washing hands.

3. Consultation channels are established by recruiting clinical professionals island-wide. They provide clinical healthcare consultation and construct guidelines for treating enterovirus complications. Providing primary care to patients with complications can effectively lower the mortality rate.

4. The Manual for Enterovirus Prevention and The Handbook for Enterovirus Prevention for Child Care Workers list all necessary precautions and have been published in large quantities for distribution to local governments in Taiwan.

5. Workshops on the clinical treatment of critical enterovirus complications enhance doctors' skills in treating the disease, raise treatment quality, and reduce mortality rates and sequelae.

6. There is no effective medicine for curing enterovirus infections, so beginning in 2000, efforts have been made to develop an enterovirus-71 vaccine to boost the public's immunity from the disease.

Future Prospects

1. Enterovirus prevention enhancement
   a. Intensify the Household Hand-Washing Activity Drive by asking adults to wash their hands before coming in contact with children.
   b. Encourage people not to go to school or work when they are sick.
2. Assessment of current prevention policies
   a. Assess consequences resulting from having no school policies.
   b. Conduct research on the integrity of medical facilities throughout the area to assess the treatment criterion of severe enterovirus cases.
3. Related research
   a. Continue research on an enterovirus 71 vaccine (EV-71 Vaccine).
   b. Start seroepidemiologic surveys for EV71.
   c. Study risk factors involved in cases with severe enterovirus complications.
   d. Study biological characteristics of the enterovirus.

Quarantine Services

International Ports Quarantine Activities

Background

As a subtropical country, Taiwan is confronted with the challenge of various imported tropical diseases. This is especially true because of Taiwan's thriving international tourism and trade. To tighten quarantine, the government has set up quarantine offices at airports (Taoyuan and Kaohsiung), seaports (Keelung, Kaohsiung, Taichung, Hualien, Suao, Mailiao, and Heping), and the two terminals (Kinmen and Matsu) used in the "Three Mini-Links" with China. This helps prevent the import of disease and protect the public health. The planning and supervision of quarantine work at these airports and seaports is the responsibility of the Taiwan CDC Second Division.

To meet the International Health Regulations 2005 (IHR2005) requirements and prevent the import of diseases by aircraft and ships, the Taiwan CDC has revised the Regulations Governing Quarantine at Ports. These regulations authorize the quarantine units to take all necessary quarantine measures against inbound ships and aircraft as well as their crews, passengers, and cargo for national security and the protection of public health.

Objectives

1. Improve information management: Improve the one-stop information system for quarantine operations, making the quarantine process and information management more efficient.

2. Streamlining process operations: Calls for timely revision of the operational process by responding to the latest epidemic information and taking advantage of historical precedence.

3. Quarantine procedure follow through: All inbound aircraft and ships, including their crew, passengers, and cargo, are subject to quarantine to prevent the import of diseases. After release from quarantine, follow-up health checkups can be performed.

Strategies

1. One-stop information service: Establish a one-stop information system for all information regarding quarantine operations. This includes quarantine operations for aircraft, ship quarantine, de-ratting certificates, vaccination, fee collection, online checks, and statistics.

2. Aircraft and ship quarantine:

   a. Quarantine by review: Any craft destined for a Taiwan port is required to report the state of its sanitation and passenger health prior to arrival via telegraph, telex, fax, mobile phone,

or e-mail. Permission to enter the port is granted after reviewing the report and finding there is no danger of importing a disease. The procedure is intended to shorten the time of possible quarantines.

b. On-board quarantine: There are five possible scenarios for on-board quarantines: inbound ships or aircraft that have (1) not applied for quarantine; (2) applied but failed to meet quarantine requirements, (3) reported passenger/crew members of suspected of having a communicable disease, (4) reported abnormal death of animals, and (5) reported suspected patient or death. In these cases, quarantine officers may board and quarantine ships or aircrafts. The following table shows quarantine statistics in 2006:

Statistics on quarantine work at international ports in 2006

Quarantine unit	Ships	Passengers	Aircraft	Passengers	Cargo Planes	Tonnage of cargo
1st Branch Office (Keelung)	7,451	18,054				
1st Branch Office (Suao)	657	0				
1st Branch Office (Kinmen)	3,479	620,454				
1st Branch Office (Matsu)	918	45,780				
2nd Branch Office (Taoyuan)			63,879	9,294,915	14,936	4,474,413
3rd Branch Office (Taichung)	5,710	2,924	296	20,127		
3rd Branch Office (Mailiao)	2,510	2				
5th Branch Office (Kaohsiung)	17,323	44,169				
5th Branch Office (Xiaogang)			14,542	1,673,963	637	208536
6th Branch Office (Hualien)	1306	257	26	2,309		
Total	39,354	731,640	78,743	10,991,314	15,573	4,682,949

3. Crew and passenger quarantine: Early detection and prevention of communicable diseases requires all arriving passengers to have their body temperature scanned with an infrared thermal apparatus. Only passengers showing symptoms are required to fill out the Communicable Disease Survey Form. Depend on the severity of the symptoms and travel history, those individuals reported with possible symptoms are required to give an onsite specimen and/or follow up with local health authorities.

Of the 11,722,954 passengers arriving in Taiwan last year, only 6,084 showed symptoms and were put on the local quarantine tracking list. Arriving passengers who become ill after entry are encouraged to seek medical advice and inform their doctors of their recent travel history. The Taiwan CDC installed a nationwide toll-free hotline (1922) for consultation purposes. Last year, using data from completed forms and body temperature scans, the Taiwan CDC discovered 13 cases of shigellosis, 44 cases of Dengue fever, 1 case of malaria, 1 case of paratyphoid fever, and 1 case of Chikungunya.

4. Control of disease vectors in ports: The purpose is to control vector density (i.e., infectious disease carriers, such as rats and mosquitoes) at ports to stop the spread of communicable diseases. The following measures have been taken to stop the breeding of vectors.

   a. Rat control:

      (1) Anticoagulant bait is placed year round where rats are most active. The bait is replenished every 10-15 days to ensure its efficacy.

      (2) Monitoring the parasites and infectious serum of rats in port areas (including Kinmen, Matsu, the two "Three Mini-Links" terminals with the mainland) was performed. The rats caught were examined for parasites to understand the varieties and quantities of parasites. Furthermore, the blood serum of the rats was examined for evidence of plague and Hanta virus.

   b. Mosquito Control:

      Mosquitoes are vectors of several communicable diseases, including yellow fever and Dengue fever. The mosquito population density is closely related to the development of epidemics, so it is necessary to understand the varieties and quantities of mosquitoes. Controlling populations can prevent epidemics. The following methods have been adopted:

      (1) Controlling the breeding of dengue fever vectors: Empty containers that tend to retain water (e.g., bottles, jars, tires) are checked monthly to track the breeding of vector mosquitoes. Any larvae are killed.

      (2) Setting ovitraps: Traps are placed around ports/airports for mosquitoes to lay eggs. They are pieces of coarse cloth wetted with Temephos. After the eggs hatch, the baby mosquitoes are killed with insecticide. The traps are replaced monthly, and the number of eggs laid is used for calculating the mosquito index in port areas.

      (3) Surveying mosquitos: Lamps are hung in selected places to trap mosquitoes to identify their types and track their activities.

(4) Organizing the international port sanitary groups:They are selected by the Taiwan CDC's branch offices from personnel of the port authority, the port police, the customs office, the cargo transportation station, and other related organizations. Depending on the circumstances, these representatives meet every three to six months, to plan, coordinate, and implement matters concerning sanitation.

c. Shipboard rat control:

To prevent the spread of disease by rats on ships on international routes, the Taiwan CDC imposes control of infested ships in accordance to Article 53 of the WHO International Health Regulations and Article 35 of the Regulations Governing Quarantine at Ports.

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

(2) To prevent rats from going ashore on mooring cables, a rat guard must be hung on cables. Any ship that fails to do so will be ordered to correct the situation immediately and will be put on record for quarantine reference for its next port call.

d. In coordination with the “Three Mini-Links” from the mainland to Kinmen and Matsu, the Taiwan CDC has installed quarantine units on the two outer islands.

e. The quarantining of illegal mainland immigrants caught at various fishing ports is entrusted to local health authorities.

f. The Taiwan CDC's quarantine units have invited various relevant organizations to establish an "international port sanitation group."

Future Goals

1. Increase manpower and equipment, strengthen quarantine functionality, and perform quarantining conscientiously to prevent the import of disease.

2. Strive to develop professional quarantine personnel, encourage the development of new quarantine techniques, and enhance the quality of quarantine officers' skills and their work.

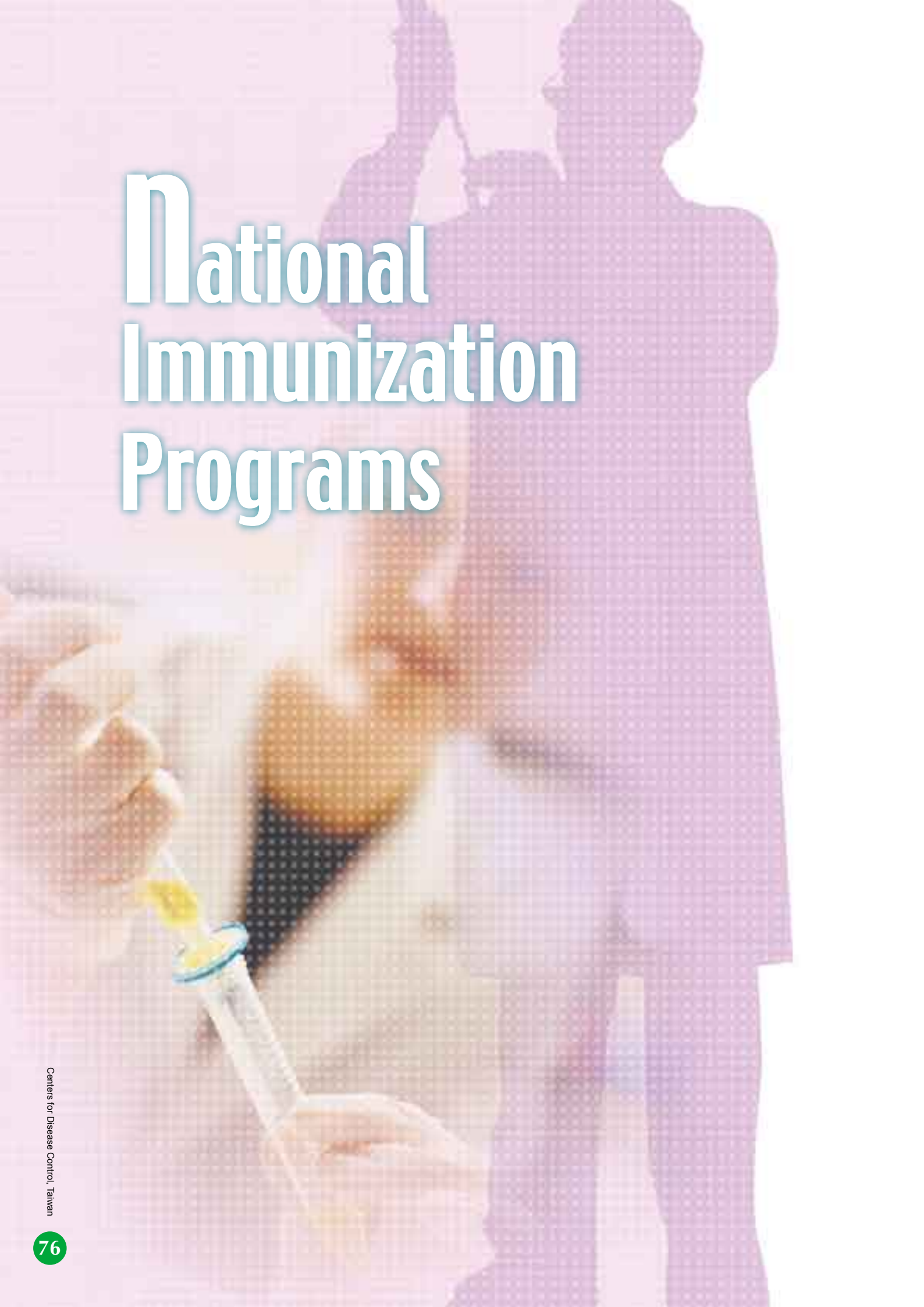
3. Improve the eradication of rats on ships and rat population monitoring in port areas to prevent the spread of communicable diseases.

Foreign Labor Health Management ,2006

The government began importing foreign labors in October 1989, because of the large number of laborers needed for Taiwan's economic development. Presently, there are approximately 330,000 foreign laborers in Taiwan. They are mainly from Indonesia, Malaysia, Philippines, Thailand, and Vietnam. All legal foreign laborers are required to have a health examination before applying for an entry visa to prevent importation of diseases. Moreover, all admitted foreign laborers are required to have a routine health check-up within the first three days of arrival. Furthermore, they must have a physical examination on the 6th, 18th and 30th month after their arrival during their stay in Taiwan. Currently, the mandatory check-up includes a chest X-ray, HIV screening, syphilis screening, hepatitis B surface antigen screening, intestinal parasite screening, and a pregnancy test. Additionally, the general health check covers psychological health and leprosy screening.

If a foreign laborer has an intestinal parasite (excluding Entamoeba histolytica), he or she is required to be treated within 30 days of the detection. On the other hand, if a foreign laborer tests positive for any other aforementioned items or has any of the five notifiable communicable diseases, he or she will immediately repatriated. The number of health check-ups for the foreign workers in 2006 totaled 448,459. Of this, 19,917 failed, representing a failure rate of 4.44%. Moreover, 19,263 of the workers tested positive for intestinal parasites, registering the highest failure rate (4.30%) of all the tested items. The second highest failure rate was the chest X-rays, in which 446 people had tuberculosis, representing a failure rate of 0.10%. Only 55 people tested positive for the HIV antibody.

National Immunization Programs



National Immunization Information System

Background

In 1992, the Department of Health began a drive to computerize health center operations, setting up the DOS-based Primary Health Information System (PHIS) which includes immunization management. After years of hard work, more than 300 health centers in Taiwan have come online. To handle a variety of situations, including immunization work demands and the enhancement of data bank efficiency and to keep pace with rapid advances in information and network technologies, the Centers for Disease Control, under the Executive Yuan's Department of Health, began making plans for a National Immunization Information System in 2001. The objective is to utilize the Internet to concentrate all immunization data scattered among various health centers into the Centers for Disease Control. Overall operations, which commenced in 2004, have served to effectively integrate and upgrade immunization data, making it more comprehensive, while enhancing the efficiency of vaccine inoculation and management operations.

Current State of Immunization

In an effort to prevent outbreak and to curb the spread of the various communicable diseases, the government provides routine infant immunizations (schedules are shown in Figure 1). Hospitals and clinics in various counties and cities have been contracted to offer full spectrum immunization to make it more convenient and raise immunization rates. So far, there are more than 1,600 contractual hospitals and clinics across the nation. In 2006, more than 4,000 hospitals and clinics participated in the flu immunization program (including vaccination for children).

Figure1: Current Immunization Schedule in Taiwan

Age Vaccine	≥24hr	2-5days	1 m.	2m.	4 m.	6 m.	9 m.	12 m.	15 m.	18 m.	24 m.	27 m.	30 m.	6years	≤65years
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 dose 1 and dose 2.

\# In selected aboriginal areas.

Objectives and Strategies

1. County and city health departments continue to use NIIS to put their signed hospital contracts online. The usage rate (98%) can be used as part of their performance reviews and evaluations.

2. Household data is obtained from the Department of Civil Affairs of the Ministry of the Interior. The information is updated daily and is collected for transmission to the National Immunization Information System (NIIS). Then the data (including moving in, moving out, birth, and death information) is passed to health stations for referral consolidation. This immunization data distributed throughout the health stations can be consolidated for registration, the elimination of data storage, lower referral consolidation expense, and cost effectiveness.

Achievements

1. Completion of immunization electronic reportage operations for contractual medical facilities (apx. 1,600).

2. Progressive replacement of magnetic disk with National Insurance IC cards used by medical facilities to report preventive inoculation data. Approximately 600 contractual medical facilities have completed the changeover.

3. Actively enhancing the functions and efficiency of the central database to handle rapid increases in data quantities over the years. Management efficiency has improved markedly.

4. The vaccine coverage rate is 95% (with the exception of JE2). This has greatly increased efficiency by which relevant authorities directly manage the operations that take place within their jurisdictions.

5. The computerization of immunization data has enhanced referral and management efficiency.

6. Vaccine-related operational procedures, performed manually in the past, have been computerized, greatly increasing efficiency.

Future Goals

The NIIS digitalized the household registration departments, health agencies, and medical institutions through comprehensive rapid online database connections. Digitalized referral forms reduce the amount of the referral slips (“yellow cards”), reduces personnel workloads, and increases convenience. Urging people to receive immunization can facilitates the work of disease control.

In the future, we'll continue to enhance the real-time online reporting of immunization administered outside of medical facilities.

Prenatal hepatitis B check up information and immunization reminders are sent via mobile phones, text messages, and email to make the NIIS database as complete and effective as possible. This is to be linked up with the Communicable Disease Information System to be effectively used in epidemic prevention and control.

The Central Database Subsidiary System can be used to support strategic policy decisions, to evaluate vaccine efficacy, to supervise disease control through immunization, and to obtain disease control information instantly. In the future, Taiwan health and medical operations will move toward internationalization. The 21st century requires health and medical information be disseminated via the web.

Expanded Immunization Program (EPI)

Background

Vaccination is one of the most cost-effective strategies that has been adopted to fight vaccine-preventable diseases. Since 1948, the government of Taiwan has provided free-of-charge to children immunization, including BCG vaccine, diphtheria, whooping cough, tetanus (DTP), polio, hepatitis B, chicken pox, measles, mumps, German measles (MMR), Japanese encephalitis, and influenza. Twelve types of vaccines are provided to the children of Taiwan, as a result, the aforementioned communicable diseases have been brought under control and in some cases eradicated. Examples of the successes mentioned above show that immunization is the most effective and economic means for preventing communicable diseases.

Strategies

1. Continue routine immunization services. Observe global disease control strategies. Improve the immunization system. Promote a supplement plan.

2. Increase the immunization coverage and quality of services.

3. Develop a high-quality supply and vaccine management program.

4. Provide an appropriate evaluation program for the routine promotion of EPI program.

5. Review and modify EPI strategic plans to control national and international infectious diseases, meet immunization needs, and enhance capabilities.

Work Focus Objectives

1. Manage and maintain the purchase, distribution, and cold chain system of the vaccines recommended by the EPI program.

2. Increase immunization coverage by improving immunization services and promoting the supplement plan.

3. Hold training seminars on the cold chain system, storage management, and immunization practices to ensure vaccine quality and the professional knowledge of medical personnel.

4. Plug any loopholes in the disease control network. The CDC urges parents to bring their babies' health passports and IC cards when taking them to contractual hospitals or health stations for vaccination.

Future Goals

1. Build up a safe vaccine supply system and to increase immunization coverage of all vaccinations by implementing the immunization services to reach eradication and elimination goals.

2. Include a new vaccine to the EPI-recommended vaccine list after: (1) reviewing the current situation of communicable disease control; (2) assessing its impact on public health, social economics, and medical costs; (3) updating any vaccine R&D, production and supply information; (4) allocating the health fiscal budget for vaccines purchase.

3. Develop and promote an appropriate immunization program for the elderly to reduce mortality and morbidity rates from complications of vaccine-preventable diseases.

4. In 2006, members of the Advisory Committee on Immunization Practices under the Executive Yuan's Department of Health recommended the following list of newly-added inoculations to become routine inoculations in the future.

   a. Substitute Td, currently being used to immunize first year elementary school students, with Tdap.

   b. Inoculate high risk children five-years old and under with pneumococcal conjugate vaccine (PCV).

   c. Make DTaP-Hib-IPV or DTaP-Hib-IPV-HepB a routine immunization for children.

   d. Make pneumococcal conjugate vaccine (PCV) a routine immunization for children.

   e. Inoculate individuals 65 years and older with pneumococcal polysaccharide vaccine (PPV).

Hepatitis Immunization Program

From 1982 to 2002, four five-year plans have been completed under the Hepatitis Control Program. The fifth five-year-plan started in 2003 and will end in 2007. The priorities are: improving the surveillance system for acute cases, severing Hepatitis A infection paths, enhancing health education on liver disease control, improving blood transfusion management, and raising hepatitis examination quality. The Taiwan CDC will move in the following directions: early detection screening of hepatocellular carcinoma and seeking effective hepatitis treatment.

Objectives and Strategies

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

Accomplishments:

1. Immunization:

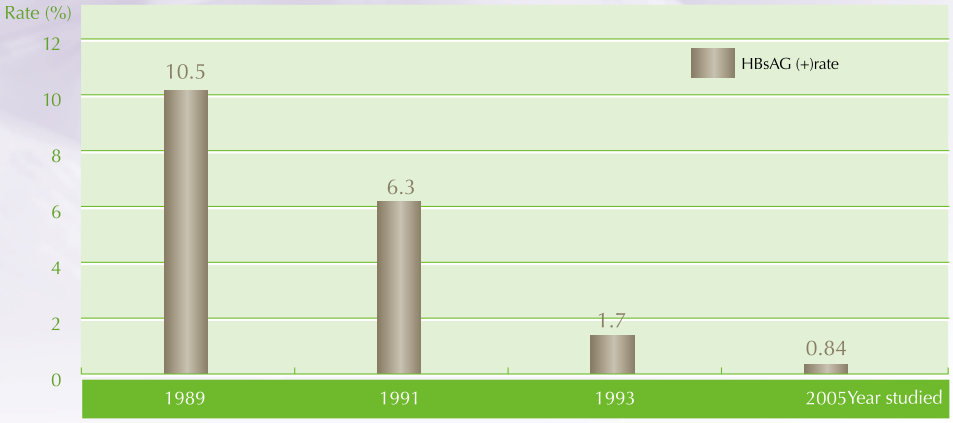
Hepatitis A

The confirmed cases of acute viral Hepatitis A in aboriginal regions were reduced from 183 in 1995 to 2 in 2006 and the incidence rate was lowered from 90.74 out of 100,000 people in 1995 to 1.0 out of 100,000 in 2006 (Figure 1).

Figure 1 : Incidence rate of Hepatitis A in Taiwan aboriginal and other regions, 1995-2006

Incidence rate in regions populated by indigenous people, incidence rate in regions populated by non-indigenous people

Figure 2 Hepatitis B carrier rate (HBsAg) at age six in Taiwan



Hepatitis B

(1) This study shows that yearly carrier rates have declined significantly and steadily from 10.5% in 1989 to 0.84 % in 2005 (Figure 2).

(2) The coverage rates of the second and third doses of HBV for the babies born in 2005 are 97.56% and 95.44%, respectively.

(3) A review of the vaccination records of new elementary school students shows that Hepatitis B vaccination rates are 99.55% for the second dose and 99.17% for the third dose.

2. Quality control of hepatitis diagnosis:

The Taiwan CDC supervised and monitored the quality control of hepatitis diagnosis in hospitals with a scale equivalent to or greater than regional-level hospitals and local health bureaus. The HBsAg specificity rate has reached 98% in 2006.

3. Hepatitis study and research:

The research program to prevent all types of hepatitis began with an effort to understand problems associated with the situation of incidence, sequela on the infected, mechanisms, and treatments. The results of the studies were used to develop the hepatitis prevention policy.

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

There are approximately 2.5 million Hepatitis B carriers and 700,000 people infected with Hepatitis C in Taiwan. To give appropriate treatment to the infected population and reduce the incidence rate of liver cirrhosis and liver cancer, the Bureau of National Health Insurance began promoting the Enforce Hepatitis B and C Trial Treatment Program. Between October 2003 and December 2006, the program treated 20,334 and 11,943 Hepatitis B and C patients, respectively.

Future Efforts:

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

Polio, Measles, Congenital Rebella Syndrome, and Neonatal Tetanus Eradication Programs

Background

Taiwan launched the polio, measles, congenital rubella syndrome, and neonatal tetanus eradication programs in 1991. The goal of polio eradication was achieved on October 29, 2000. However, eight nations in central and western Africa that had been declared polio free were infected again by the polio rampant Nigeria and Niger. In 2003 and 2004, there were 63 imported cases registered.

In Taiwan, more than 95% of babies receive three doses of polio immunization, but 5% still fail to do so in time. This is a loophole in the polio control network. Before the virus is eradicated in the world, it could still invade Taiwan. Although Taiwan has eradicated polio, it has to maintain vigilance.

Measles can be eliminated through vaccination. It is the primary eradication target after polio. In recent years, single-digit measles incidences have been registered. 2002 was an exception when 24 cases were reported.

No cases of neonatal tetanus have been reported since 1995. The sole exception was reported in 2001 and was an isolated case involving a child born to a foreign mother.

Since 1994, three cases of congenital rubella syndrome have been confirmed, all in 2001 (two of the patients had foreign mothers).

This indicates that the latent danger of communicable diseases cannot be ignored, especially in view of the frequent business exchanges, booming tourism, the import of alien labor, and the increasing number of marriages between Taiwanese and foreigners or Chinese mainlanders. It is, therefore, necessary to continue the eradication program for polio, measles, congenital rubella syndrome, and neonatal tetanus.

Objectives and Strategies

1. Maintain high immunization rates for all diseases

   This involves coordination with contractual immunization hospitals and clinics to improve service quality. Furthermore, we need to conduct immunization completion rate surveys to ensure

appropriate remedial measures are taken for all women of childbearing age (especially foreigners) to protect against rubella, to maintain the cold chain system, and to shore up the immunization information system.

2. Improve disease surveillance

We need to focus on continuously tracking AFP, measles, rubella, and congenital rubella syndrome - analyzing this data immediately and improving the reporting and tracking system for babies who are not born in hospitals so as to fully understand neonatal tetanus cases. Furthermore, we must continue the zero-tolerance reporting system and follow-up telephone interviews and continue regular evaluations of county and city tracking operations. If shortcomings are discovered, the local health authorities are to be asked to propose plans for improvement. Furthermore, a rewards plan should be made to encourage excellent reporting.

3. Augment lab examination capabilities

In addition to using the traditional serum methods to identifiy clinical cases, Taiwan should establish a molecular biology technology for diagnosing in line with the WHO measles eradication strategy. To examine antigens and separate viruses, samples need to be collected in reported cases. Sampling quantities and timing should be regulated.

4. Enhance completeness rates and correctness of case surveys

In addition to correct sampling, good case surveys must include immunization history, travel history, and information on whether or not contacted persons also display symptoms. This should all be part of the standard operational procedure for improving the training for local health workers.

5. Conduct health education and publicity

   This should be done through different media channels to remind people of the need to immunize infants, especially of those born to spouses from mainland China.

6. Research and surveys

   This involves a larger study of virus separation and assessment technology for measles and rubella; a molecular biological study of the genomic sequence; an evaluation of serum epidemiology; a cost-effect study of the immunization information system; and increases in immunization completion rates.

Achievements

1. In 2006, 74 AFP cases with patients under the age of 15 were reported and investigated. Investigations were completed within 48 hours for 91% of them. Clinical data showed none of them were polio cases.

2. In 2006, 24 measles cases were reported. The investigation rate was 100% and the sampling rate was 100%. Four of the cases were confirmed to be measles.

3. Two cases of congenital rubella syndrome were reported in 2006. Investigation and complete sampling were made. Both cases were excluded in lab tests.

4. No neonatal tetanus cases were reported in 2006. None of the cases involving babies not born in hospital were tracked down.

5. Since 2002, foreign (and mainland Chinese) female spouses have been required to obtain an updated rubella/immunization certificate.

Future Goals

1. The eradication of polio must be maintained by preventing the import of the disease.

2. Complete strategic planning of the world's polio eradication program.

3. Monitor measles and identify cases of measles infection.

4. Complete measles elimination certification in accordance with the WHO schedule.

5. Maintain zero reporting for congenital rubella syndrome and neonatal tetanus.

Research and Development

Manufacturing of Serums and Vaccines

Research and development of serums and vaccines

1. Taiwan's Pandemic Influenza Vaccine Research and Development Program

In 2006, the CDC established the National Influenza Vaccine Research Team for the purpose of realizing its major research goals. Clear milestones, a schedule for results, and a budget must be established for every research project. Furthermore, budget funds and resources are allotted based on the progress of each project and funds are only provided when results are presented on time. In the event that results are not up to expectations, contracts can be rescinded. A summary of results of twenty projects implemented in 2006 are as follows.

(1) Launched the ferret immunization model.

(2) Completed the biological information model for forecasting antigen variations.

(3) Completed integration of NCBI's Influenza Virus Resource and LANL's Influenza Sequence Database (ISD) (both of the USA) and influenza virus sequence information from Taiwan's CDC.

(4) Established a basic model for predicting the dissemination of the flu virus in the Taiwan region.

(5) Successfully assessed and analyzed the complete genome for a new type of flu virus and produced a flu virus strain using reverse genetics.

(6) Produced approximately 28,227 doses of H5N1 buck vaccine solution (each dose consisting mainly of 15μg HA protein). The preparation of 5,000 doses of inactivated H5N1 vaccine for clinical trials. Clinical trials are expected to begin during the third quarter of next year.

(7) Utilized the high reservation of the DNA series in the H5 gene to build five types of H5N1 avian influenza virus recombination H5 DNA. After being medicated with H5 DNA virus, mice were completely protected. Their weight and survival were completely unaffected by avian influenza virus NIBRG-14 strain infections.

(8) Submitted a draft entitled "Provisions Governing the Registration and Market Approval of New Influenza Vaccine." Currently also assisting the Department of Health's Bureau of Pharmaceutical Affairs in the promulgation of laws.

2. Development of vaccines for enterovirus type 71

(1) A new candidate strain E36 with genotype C4 was screened with a neutralization response that is broader than the prototype vaccine strain E59.

(2) Completed virus harvest, mass production, concentration, purification, as well as the ELISA, SDS-PAGE, and western blot analysis of 20 batches of enterovirus type 71 prototype vaccine. The production process was consistent.

(3) The results of experiments on mice showed that the neutralization titer is up to 1:40 with 5ug protein immunization.

(4) Completed two batches of prototype vaccine stability test.

(5) Completed two batches of prototype vaccine abnormal toxicoty experiments on mice.

3. Developed the IgY antibody produced in duck eggs to be used against snake venom.

(1) Employed double diffusion and western blotting on IgY antibodies of B. multicinctus and B. Naja naja atra purified using ammonium sulfate precipitation to verify it was specific, identifiable, and highly stable for snake venom ii. Preliminary results showed that approximately 85% could be saved in costs if duck eggs were used to produce IgY antibody against the venom of B. multicinctus and B. Naja naja atra instead of horse plasma.

Regularly prepared and supplied vaccines, toxoids, antitoxins, and antivenin serums, for a total of 1,645,646 doses.

1. Cholera: 108,368 doses.
2. Antivenin for Tr. Mucrosquamatus and Tr. stejneteri Lyophilized: 2,285 doses.
3. Antivenin for agkistrodon acutus (hundred-pace snake): 1,069 doses.
4. Bacillus Calmette-Gu rin (BCG): 604,290 doses.
5. Tetanus toxoid: 8,986 doses.
6. Tetanus and diphtheria toxoids absorbed (40 doses): 419,360 doses.
7. Tetanus and diphtheria toxoids absorbed (6 doses): 114,234 doses.
8. Diphtheria and tetanus toxoids absorbed (6 doses): 36,630 doses.

Inspection as well as research and improvement on biological preparation methods

1. Completed work on the standard operational procedures for quality control, a series of four volumes (95 copies) and product specification books, a series of four volumes (78 copies), including making amendments, double checking, and file work.

2. Completed work on other standard operational procedures for quality guarantee a series of seven volumes (35 copies), including making amendments, double checking, and file work.

3. Completed inspection work on biological preparation, including 17 batches of finished products, 45 batches of undiluted serum, 103 batches of raw materials, and 28 batches of materials.

4. In 2006, Taiwan had 4 cases of clinical experiments involving Russel's viper (chain snake) anti-venom serum. One patient died because the serum was applied too late, so the recovery rate was 75%. The license for this bio-agent is currently pending.

Animal breeding and experimentation

1. Numbers of animals supplied in 2006: 41,121 mice for experiments, 686 guinea pigs, and 64 rabbits. Utilized horse immunity against snake venom, diptheria toxoids, and tetanus toxoids to produce antivenin serum. Produced 382 liters of horse plasma for the year. 2006 sales receipts for vaccines totaled NT$38,413,100.

2. Continued to import ferrets for experimentation. In 2006, assisted in the completion of production of four types of flu antibodies (B, H1, H3, and H5).

Major Challenges for the future

Integrating Taiwan's limited resources and specialists in the field, establishing a national vaccine research and development team, promoting a contagious disease prevention infrastructure and local vaccine production capabilities, establish Taiwan's vaccine production capabilities for producing vaccines used against global pandemics as well as against infectious diseases indigenous to Taiwan. Furthermore, utilizing this as a model, to establish virus strain and vaccine strain data bank, virus production technologies, mechanisms associated with clinical experimentation, regulation, and management for Taiwan and the Asian region, and to promote development of the vaccine production industry.

Research and Diagnostic Center

Foreword

The primary objectives of the Center are to conduct research into more efficient and comprehensive diagnostic methods, to perform laboratory-based epidemiological study, and to study the communicable disease pathogenesis. Other goals of the Center are to establish national reference laboratories, perform diagnostic services and technical support for notifiable and reportable communicable diseases and to assist national and international health agencies consolidate control strategies and policies. In 2006, the Centers had 176 employees. The number of diagnostic specimens received and processed in 2006 totaled 154,217. Facing the challenge of the continuously emerging and re-emerging communicable diseases, the Center emphasized international collaboration with special emphasis on information exchange and new advances in laboratory technology. In addition, Center laboratories took proficiency tests (CAP) regularly to assure the quality and consistency of their diagnostics. The Center is divided into ten laboratories and two administrative sections, namely Viral Enteric and Emerging Diseases Laboratory, Viral Respiratory Diseases Laboratory, Vector-Borne Viral and Rickettsial Diseases Laboratory, Vector Biology Laboratory, Bacterial Respiratory Diseases Laboratory, Bacterial Enteric and Emerging Diseases Laboratory, Mycotic Diseases Laboratory, Mycobacterial Diseases Laboratory, Parasitic Diseases Laboratory, Pathology Laboratory, Biological Resources Section and Quality Assurance and Biosafety Section.

2006 Focuses

Viral Enteric and Emerging Diseases Laboratory

1. Continue HIV-1 genotyping and drug-resistant surveillance, specifically targeting intravenous drug users.
2. Molecular epidemiology study of EV71 infections.
3. Establish primary bank for viral emerging diseases.
4. Execute acute flaccid paralysis surveillance system to comply with the WHO Global Polio Eradication Initiative.
5. Serological study of severe enterovirus infections and antiserum development.

6. Quality assurance program for detection of HIV-1 and Hepatitis B/C virus infections among Teaching hospitals and medical laboratories.
7. Expand the virus diarrhea surveillance system to include norovirus and astrovirus infections.
8. Establish the genome data bank to include HIV-1, enterovirus 71, Hepatitis B virus, and Rotavirus.
9. Develop a multiplexing system to detect emerging viral diseases.
10. Cooperate with teaching hospitals, academics, life science research institute, and international public health research institutes such as CDC in the USA and NIID in Japan.

Viral Respiratory Diseases Laboratory

1. Performed routine diagnoses of respiratory viruses including SARS, influenza virus, measles virus, rubella virus, mumps virus and VZV.
2. Tracked the evolution of the influenza virus in Taiwan, including antigenic and genetic changes.
3. Prepared ferret antisera against local flu virus strains and facilitated virus diagnoses and typing.
4. Maintained contact with the WHO Collaborating Influenza Centers and delivered the current influenza viruses of Taiwan to aid surveillance, epidemiology, and control of influenza.
5. Investigated the genotypes of measles viruses and rubella viruses in Taiwan.
6. Used using ELISA and PCR technologies to perform routine diagnoses of respiratory viruses.
7. Designed real-time PCR primers and probes to enhance the specificity and sensitivity of lab tests.
8. Established real-time PCR methodology for other new influenza viruses, such as H5, H7, and H9.

Vector-Borne Viral and Rickettsial Diseases Laboratory

1. Established a Flavivirus reference laboratory to provide laboratory references and diagnostic services to national and international health agencies.
2. Established a Rickettsia reference laboratory to provide laboratory references and diagnostic services to national and international health agencies.
3. Conducted routine diagnoses of Dengue fever, Japanese encephalitis, yellow fever, hantavirus, scrub typhus, and typhus fever using serological methods (ELISA and/or immunofluorescence assay), molecular methods (real-time PCR), and isolation methods (cell culture).
4. Conducted an airport fever screening program for the surveillance of the importation of Dengue virus and other Arboviruses.
5. Conducted seroepidemiologic and molecular epidemiologic studies of Dengue virus infection in southern Taiwan.
6. Tracked Japanese encephalitis virus epidemic by testing swine anti-Japanese encephalitis virus IgG antibodies.
7. Conducted seroepidemiologic study of hantavirus infection in Lien-Chiang County, Taiwan.
8. Built genomic databases for the Dengue virus, Japanese encephalitis virus, and Orientia tsutsugamushi.

9. Established international cooperation program with Japanese NIID for project "Characterization of Dengue Virus Prevalent in Taiwan and Other Mosquito-borne Viruses Prevalent in Asia."

Bacterial Respiratory Diseases Laboratory

1. Diagnose and identify bacterial pathogens by conventional and molecular methods.
2. Identify bacterial pathogens using electron microscopy.
3. Investigate bacterial pathogen outbreaks.
4. Develop real-time PCR detection methods for bacterial pathogens.
5. Molecular genotyping of Legionella spp., Bordetella pertussis, and group A streptococcus that caused scarlet fever in northern Taiwan.
6. On October 3, 2006, deployed PulseNet Taiwan, a national molecular subtyping network to track bacterial infectious diseases.

Bacterial Enteric and Emerging Diseases Laboratory

1. Conduct conventional diagnoses of Vibrio Cholera, Salmonella typhi, paratyphi, Salmonella spp, Shigella spp, Escherichia coli O157, Burkholdera pseudomallei, Yersinia pestis, Leptospira interrogans, Borrelia burgdorferi, Bartonella henselae, Francisella tularensis.
2. Deploy bacterial diarrhea surveillance system and its epidemiological study.
3. Molecular study of the topoisomerase and efflux pump-mediated resistance to fluoroquinolones in Shigella spp.
4. Establish nationwide and international reference laboratory.
5. Establish genomic databases for Vibrio Cholera, Burkholdera pseudomallei by molecular genotyping (PFGE, MLST and MLVA).
6. Participate in outbreak investigations.
7. Explore and develop multiplex detection system for emerging bacterial diseases such as Burkholdera pseudomallei and Leptospira interrogans.
8. Establish ELISA method for Francisella tularensis detection (international cooperation with Military Institute of Hygiene and Epidemiology, Poland)
9. Participate in CAP tests.

Mycobacterial Diseases Laboratory

1. Provide diagnosis and identification services.
   a. Standardize conventional and molecular diagnosis methods.
   b. Develop and evaluate new molecular diagnosis and genotyping methods.
   c. Provide species identification and confirmation services.

2. Be involved in outbreak and pseudo-outbreak investigations.
   a. Conduct laboratory investigations of cases from schools, hospitals, long-term care facilities, etc.
3. Conduct molecular epidemiological studies.
   a. Surveillance of Beijing family Mycobacterium tuberculosis strains, 2002-2006.
   b. Investigate transmission dynamics of Mycobacterium tuberculosis isolates in high-risk populations.
   c. Track multiple-drug resistant Mycobacterium tuberculosis strains.
4. Establish the mycobacteria genomic database.
   a. Molecular genotyping of Mycobacterium tuberculosis isolates using RFLP, spoligotyping and MIRU-VNTR.
   b. Sequence analysis of nontuberculous mycobacteria.
   c. Sequence analysis of drug resistance and virulence genes.
5. Maintain a mycobacteria strain banking system.
6. Implement the laboratory external quality assessment program.
7. Provide technical training and educations.
8. Maintain a mycobacterial laboratory surveillance system.
9. Initiate international collaborative activities.

Parasitic Diseases Laboratory

1. Apply the molecular diagnostic system for the routine enteric amebiasis examination of reported patients and alien workers.
2. Continue the molecular epidemiology project of amebic infection for high-risk groups, such as institutional psychiatric patients.
3. Apply the molecular surveillance system for malaria to microscope examination.
4. Organize two amebiasis and two malaria laboratory training short courses for lab workers from local health departments and hospitals. Teach workers how to prepare health examinations for patients and alien workers.
5. Attending CAP tests (Parasitology and Blood Parasite Surveys) for professional evaluation.

Mycotic Diseases Laboratory:

1. Conduct routine diagnostic services for fungal pathogens, such as Cryptococcus neoformans and Candida spp, as well as special pathogens, such as Chlamydia pneumoniae and Mycoplasma pneumoniae.
2. Develop quantitative and real-time diagnostic systems to diagnose fungal and special pathogens.
3. Establish a novel multiplex beads array platform to rapidly detect clinically-important fungi, Chlamydia trachomatis, and other nosocomial pathogens.

4. Molecular surveillance of Candida spp. in Taiwan by PFGE genotyping and MLST.
5. Molecular epidemiology study of Candida albicans infection in high-risk groups (AIDS and ICU patients).
6. Molecular epidemiology study of Chlamydia trachomatis infections in Taiwan by MOMP genotyping.
7. Studies of epidemiology of Chlamydia pneumoniae and Mycoplasma pneumoniae infections in Taiwan.
8. Build a PFGE fingerprint and an MLST database of Candida spp. in Taiwan.
9. Participate in the CAP tests (Yeast and Mycology Surveys) for proficiency evaluation.
10. Collaborate through international exchange of typing data.

Vector Biology laboratory

1. Isolate rickettsiae from ticks and mites collected from rodents.
2. Detect pathogens in unengorged larvae of trombiculid mites.
3. Conduct routine mosquito surveillance for Dengue and malaria.
4. Conduct routine diagnostic services for mosquito infection of arboviruses and conduct mosquito species identification.
5. Develop the diagnostic methods to understand mosquito blood sources.
6. Establish genomic databases of Aedes aegypti for commonly used insecticides.

Major Achievements in 2006

1. Molecular epidemiologic study of Dengue:

   In 2006, performed a molecular epidemiologic laboratory study of the Dengue surveillance in Taiwan. The results showed that multiple dengue epidemics were caused by six different imported dengue virus strains, which were co-transmitted in Southern Taiwan between June 2006 and January 2007. The results demonstrated that the application of a real-time molecular epidemiological investigation on virological surveillance could help monitor the transmission dynamics of present and newly introduced Dengue virus strains.

2. Airport fever screening for imported Dengue and other Arbovirus surveillance:

   In 2006, a total of 107 imported Dengue fever cases were identified in Taiwan. Among those, 45 cases were identified by the airport fever screening program. In addition, the first imported chikungunya case was identified as coming from Singapore by an airport fever screening.

3. Drug-Resistant Mycobacterium tuberculosis in Taiwan:

The Taiwan Surveillance of Drug Resistant Tuberculosis (TSDRTB) program was initiated by the Taiwan Centers for Disease Control (CDC) in 2002. The survey conducted in 2003 showed that the "combined any" and "multiple drug resistance" rates were 20.0% and 4.0%, respectively. Compared to previous data, the rates of the "combined any" and "multiple drug resistance" rates are in decline in Taiwan.

4. External Quality Assessment of Sputum Smear Microscopy in Taiwan:

A training course organized by the Eastern Region International Union Against Tuberculosis and Lung Disease in 2004 identified errors in sputum smear microscopy in laboratory-supplied course slides. Therefore, in 2005 the Taiwan CDC initiated a pilot program of external quality assurance of sputum smear microscopy. Nine CDC contracted mycobacteriology laboratories kept all their slides of their routine work for this pilot program. A sampling strategy based on lot quality assurance selected which slides to evaluate and recheck. Controllers did not know the original laboratory reported results. Slide results that disagreed with the original laboratory results were re-read by a second controller to make the final decision. A total of 1,017 slides were evaluated for smear quality. Of these 1,017 slides, 637 (62.6%) had proper smear size, 492 (48.4%) had proper thickness and 884 (86.9%) had proper staining. Rechecking 981 readable slides revealed that 54 slides had errors: 25 (2.5%) were major errors and 29 (3.0%) minor errors. Of the 9 laboratories, only one had one high false positive and eight had at least one high false negative result. Supervised visits were conducted to find the causes of the errors and to take any corrective actions. The obvious conclusion is that a routine smear EQA program must be included in the National Tuberculosis Program to assure the quality of the sputum smear microscopy.

5. Mycobacterium bovis infected human cases in Taiwan:

Mycobacterium bovis (M. bovis) is the causative agent of tuberculosis (TB) in humans and animals. The epidemiology of M. bovis TB is very complex. The prevalence of M. bovis in Taiwan remains unknown due to difficulties in differentiation. In this molecular epidemiological study, spoligotyping and VNTR-MIRU were genotyped. Additional patient and demographic data were also analyzed. From July 2004 to November 2005, 15 TB patients were diagnosed with M. bovis infection in Taiwan. Their average age was 62.2. Two (13.3%) were extrapulmonary and thirteen (86.7%) were pulmonary TB cases, respectively. Three (20%) were female and twelve (80%) were male. The majority (73%, 11/15) of the cases were identified in Eastern Taiwan. Only one spoligotype was observed in all 14 M. bovis strains identified. Two VNTR-MIRU profiles, 523232324253322 (92.9%, 13/14) and 523222324253322 (7.1%, 1/14), were revealed among 14 strains, respectively. No apparent animal contacts and other epidemiological linkage were found in most cases. There is a major M. bovis clone that accounts for human M. bovis-associated TB cases in Taiwan. The prevalence of the disease in Eastern Taiwan must be monitored in the future.

6. Multilocus sequence typing (MLST) characterized the genetic profiles of 51 Candida albicans isolates collected from 12 Taiwan hospitals. Due to the diploid nature of C. albicans, MLST was

more discriminatory than the pulsed-field gel electrophoresis–BssHII restricted fragment method in discriminating epidemiologically related strains. MLST is able to trace the microevolution over time of C. albicans isolates in the same patient. All but one of the DSTs of our Taiwanese strain collections were novel to the internet C. albicans DST database (http://test1.mlst.net/). Our result showed that the DNA type of each isolate was patient specific and associated with ABC type and decade of isolation but not associated with mating type, anatomical source of isolation, hospital origin, or fluconazole resistance patterns.

7. We conducted a molecular epidemiology study of Candida albicans isolates from three HIV-infected patients over a period of 3 years. Pulsed-field gel electrophoresis of SfiI restriction digests of the genomic DNA from the isolates revealed that isolates from the same swab specimen were identical despite differences in susceptibility to fluconazole and isolates recovered over time from the three patients retained clonally related DNA fingerprints within each patient. This small-scale study confirms the persistence of oral colonization of C. albicans strains in HIV-infected patients. Clinical data also suggests that the primary infecting strain may become a persistent colonist in the oral cavity once the immune function of the patient has been restored.

8. A study was conducted to determine the prevalence and distribution of Chlamydia trachomatis genotypes in Taiwan. Urine and endocervical-swab samples were collected from two hospitals located in northern and southern Taiwan. The genotypes of a total of 145 samples tested positive for C. trachomatis and were analyzed by sequencing the omp1 gene – this was successful in 102 samples. Nine different C. trachomatis genotypes were identified. Genotype E was the most prevalent (22%), followed by D and Da (19%), F (16%), J (15%), K (11%), G (11%), H (6%) and Ba (2%). There was a geographical difference in the prevalence of genotype H ($P<0.018$) between northern and southern Taiwan. Sequence mutation analysis by BLAST searching against the GenBank reference sequences identified 12 genetic variants from the 102 omp1 gene sequences.

9. We established a pathogen microarray system and used a viral microarray chip, which contains 44,995 sixty-mer oligonucleotide probes for 5,700 viruses. We have tested the viral chip by using cultured microbes and clinical samples, including influenza A, influenza B, rotovirus and norovirus.

10. We prepared 5 types of ferret antisera against influenza viruses, including two H3N2, one H1N1, one H5N1, and one influenza B virus. They were found to be useful in subtyping the newly isolated influenza viruses.

11. We characterized the antigenic and genetic relationships of influenza B viruses isolated during the 2004-2005 season. The Viruses were divided into two influenza B lineages, B/Yamagata/16/88 (B/Yam) and B/Victoris/2/87 (B/Vic). The B/Vic-lineage isolates were found to have additional amino acid substitutions compared to isolates from previous seasons, indicating that viruses of this lineage continue to evolve significantly and may have the capacity to become the dominant influenza B viruses worldwide. We demonstrated that antigenically and genetically distinct viruses within both B/Vic and B/Yam lineages co-circulate and that reassortment among these two lineages occurs frequently contributing to the genetic diversity of the circulating strains.

12. We collected 80 Bordetella pertussis isolates in Taiwan from 1998 to 2004 and analyzed them using a combination of pulsed-field gel electrophoresis (PFGE) and sequencing of the ptxS1 and prn genes. Through PFGE analysis, all 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. We 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 the other 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. Such information has implications for the vaccine policy in Taiwan.

13. Surveillance of invasive Streptococcus pneumoniae in Taiwan, 2002–2003:

    A total of 522 Streptococcus pneumoniae invasive isolates from diverse sources were collected from January 2002 to December 2003 in Taiwan in order to understand the serotype distribution. The most frequently isolated serotypes of S. pneumoniae were types 14 (18.4%), 23F (15.1%), 3 (13.8%), 19F (13.4%), 6B (8.2%), 9V (3.6%) and 4 (2.5%). The majority of these patients were either under 5 years of age (24.1%) or older than 65 years (36.6%). Serotype distribution in adults over 14 years old and children under 2 years old were similar, except for that of type 3, which was more prevalent in adults. Penicillin-resistant strains accounted for 67.7% of all strains and were the predominant strains of serotypes 23F, 19F, 6B and 14. Most strains were susceptible to the cephem drug, 85.7% of isolates were susceptible to cefotaxime and 92.9% were susceptible to ceftriaxone. A total of 72.6% (379/522) of the isolates were resistant to at least two antibiotics. The 23-valent vaccine in the current commercial market would cover 87.2% of the serotypes and 100% of the penicillin-resistant serotypes of S. pneumoniae in Taiwan. The coverage of 7- and 11-valent protein conjugate vaccines of the serotypes in children under 2 years old would be 78.8% and 86.5%, respectively. These results will help to assess the efficacy of the Taiwan marketed vaccine formulations.

14. Enterotoxigenic, Enteropathogenic and Enteroinvasive E. coli of diarrheal patients in northern Taiwan:

    Among 261 clinical diarrheal stool samples, a total of 137 suspected diarrheagenic E. coli (DEC) isolates were identified by commercially available antiserum. The most prevalent serogroups were O1 (12/137, 8.7%), O25 (9/137, 6.5%), and O44 (9/137, 6.5%). The specific virulence genes were analyzed by a mutiplex real-time PCR assay developed for this study. Fifteen (10.9%) out of 137 were confirmed as true DEC, indicating that serotypic markers did not correlate with specific virulence genes. Enterotoxigenic E. coli (ETEC, 66.7%) was the most prevalent, followed by enteroinvasive E. coli (EIEC, 20%) and enteropathogenic E. coli (EPEC, 13.3%). No enterohemorrhagic E. coli (EHEC) was identified from the specimens. Four novel serotypes were found, two in EPEC (O111:H9, O63:H6) and two in EIEC (O63:H9 and O169:H9). In conclusion, true DEC was present in 5.7% (15/261) of the diarrheal patients in northern Taiwan.

15. Mosquito infection of Dengue viruses in southern Taiwan:

    In 2006, 55,885 Aedes mosquitoes were collected in southern Taiwan and grouped to 7799 pools for detecting Dengue viruses. Among them, seven pools were positive for DENV-3 and one pool was positive for DENV-2. The mosquito infections were sympatric with human outbreaks with the same Dengue serotypes.

16. Resting sites of Anopheles minimus:

    The resting sites and blood source of Anopheles minmius were studied by using sucking machines and by the PCR/ELISA methods. No Anopheles adults were collected inside the houses and only a single female An. minimus and An. maculatus were collected outside the houses in 185 premises of 17 villages. In addition, this species was collected in banks of larval habitats and by light traps. Based on this result, we concluded that the indoor residual spray was not effective in controlling An. minimus. The nighttime spray (applied after 10 PM) and residual sprays applied to animal shelters, breeding sites and outdoors are still effective. Special caution on the selection of breeding sites should be evaluated before application to avoid water pollution by insecticides.

17. An imported malaria case with twice Plasmodium vivax infections:

    In January and June 2006, an imported malaria Indonesian patient was reported twice to the Taiwan CDC. Both blood samples were positive to P. vivax by microscopy and SSU-rDNA gene PCR. Because the infections might be caused by malaria relapse or recurrence, the P. vivax samples were further typed according to csp and msp1 block 2sequences. The results indicated that this patient was infected by two different P. vivax strains.

18. A new single tube duplex real-time PCR for the diagnosis of Entamoeba histolytic and E. dispar Amoebiasis continues to be major causes of morbidity and mortality in developing countries. Differentiation of E. histolytica and E. dispar is an important goal of the clinical parasitology laboratory. This study evaluated a novel duplex real-time PCR with the conventional nested PCR as methods for identification and differentiation of E. histolytica and E. dispar. The new approach overcomes the conventional PCR's time-consuming and labor intensive procedures. A total of 215 stool and liver abscess pus specimens were analyzed. More patients with E. histolytica infection (20.5%) than patients with E. dispar infection (14.4%) were found by the real-time PCR assays. While the conventional nested PCR revealed 18.1% E. histolytica and 10.7% E. dispar infections. This method is reliable and applicable in the field of epidemiological studies.

19. Developed anti sera for enterovirus cosackievirus A2, A4, A5 and A10 for routine diagnostic use in IFA tests. The sensitivity and specificity of these anti sera laboratory produced are above 95%. Therefore they are suitable to be used in IFA analysis. Currently they are provided to 13 CDC contracted laboratories for enterovirus surveillance network.

20. Taiwan experienced a huge increase, nearly double, in HIV-1 infections from 2004 to 2006. The majority of those reported cases were from intravenous drug users. Based on genomic sequences

analysis, we found that HIV-1 CRF07_ BC originated from mainland China. It may have followed a drug trafficking route from Yunnan Province to southeast China, moving through Guangxi Province or Hong Kong to Taiwan.

21. The BED capture enzyme immunoassay (BED CEIA) for recent infection was applied to estimate the HIV-1 incidence in the population from a single cross-sectional survey. Appropriate approaches, based on individual principles or a combination of principles, can be used to develop simple assays for identifying any individuals recently infected with HIV-1, that is, within 153 days after exposure.

Future Goals

1. Develop a multiplex detection system.
2. Develop a rapid detection method for identification of vaccines derived poliovirus or OPV in the era of polio eradication.
3. Establish an internationally recognized flavivirus research center. The final goal is to establish a Dengue fever network with laboratory-based surveillance systems among all APEC members. A standardized information exchange system will be implemented for communication among members in the Dengue fever surveillance, clinical and laboratory diagnoses, prevention, clinical treatment, and control.
4. Establish the National Tuberculosis Research Center – the Integrated Tuberculosis Surveillance System
5. Build up the capability to identify imported mycoses.
6. Apply advanced high-throughput and multiplexing diagnostic techniques, such as beads array or the microarray system, to improve diagnostic and genotyping capabilities.
7. Establish a genotype databank and participate in global surveillance.
8. Establish collaboration programs with renowned international research institutes. In August 2007, the Taiwan CDC will host the 3rd Asian Regional Dengue Research Network Meeting at the Grand Hotel, Taipei, jointly sponsored by the Pediatric Dengue Vaccine Initiative (PDVI) and the Novartis Institute for Tropical Diseases.

Major SCI Publications (2006)

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9. Ying-Yan Chen, Shu-Man Yao, Chen-Ying Chou, Yi-Ching Chang, Pei-Wun Shen, Chung-Ter Huang, Hsun-Pi Su, Shu-Ying Li* (2006) Surveillance of Invasive Streptococcus pneumoniae in Taiwan, 2002-2003 J. Med. Microbiol. 2006; 55 (Pt 8):1109-1114.

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Conference Abstracts

1. Huang W.-L.; Chen; H.-Y., Tang, J.-H., Chen, M.-H., Jou, R. *, 37th Union World Conference on Lung Health, Mycobacterium abscessus Pseudonosocomial Outbreak in A Respiratory Care Center, 2006.

2. Chiu, C.-C., Chin, P.-J., Jou, R.*, 37th Union World Conference on Lung Health, Human Mycobacterium bovis Cases in Taiwan, 2006.

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6. Chuang, P.-C., Liu, H., Chiu C.-C., Jou, R.*, Conference of Preventive Medicine on Both Sites of the Straits, The 7th Guangdong, Hong Kong, Macau & Taiwan Conference on Preventive Medicine, in Taiwan,Spoligotypes of Mycobacterium tuberculosis Strains in Taiwan, p.32, 2006 (oral presentation).

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Laboratory Biosafety

Regulations Governing Management of Infectious Biological Materials and Collection of Specimens from Patients of Communicable Diseases, formally implemented on 26 March 2006, was an important milestone in realizing laboratory biosafety management in Taiwan. The main emphasis of these regulations include (1) self-management: each unit is charged with setting up its own biosafety committee responsible for overseeing and managing all levels of infectious biological materials in its possession as well as safety in all biosafety laboratories of all levels under its authority; (2) reporting mechanisms: in the event of laboratory infection, use, or changes in the situation of any level 3 or higher of all infectious biological material, units are to send a report and an action checklist to the CDC for approval; and (3) inspection mechanisms: the CDC is to carry out actions on an unscheduled basis or as needed in all units in Taiwan that store contagious biomaterials of level 2 or higher or in laboratories that handle contagious biomaterials of level 3 or higher.

In August 2006, a research student was infected with bacillary dysentery in a university laboratory in Taichung City. It was the first instance of laboratory infection verified by the CDC following the implementation of the above-mentioned regulations. The infection was most likely a result of mishandling on the part of the individual in question. This coupled with the laboratories poor layout resulted in contact infection. A number of potential risks and dangers could be hidden in a number of places, including the operations of the university's biological safety committee, implementation of laboratory biosafety procedures, understanding on the part of laboratory managers, training of technical personnel as well as the safety inspections of laboratory facilities and equipment. The CDC will continue to encourage the implementation of management of all levels of laboratories by biological safety committees and to carry out a minimum of one internal safety audit annually. Sensible risk evaluations are to be carried out to determine appropriate biosafety management regulations based on laboratory biosafety protection levels as determined by various factors at each laboratory, including special characteristics of infectious biological materials handled there, the safety conditions of its facilities and equipment, and types of personnel protective equipment. Only by taking into consideration both comfortable use of equipment and safety

precautions can laboratory biosafety be guaranteed.

Establish and Apply Pathogen Molecule Sequence Database in Taiwan (2006)

This project has already established many individual genomic database units of key pathogens over the past four years. We also made use of the relevant genomic data to (1) speculate on possible infection sources of disease outbreaks; (2) conduct surveillance on imported or newly emerging pathogens; and (3) provide timely, reliable molecular epidemiological data and information. This last point is important for early notification of emerging infectious disease incidents and formulating government disease control policies.

We finished entering quite a few genomic database units, including enterovirus, influenza virus, dengue virus, Mycobacterium tuberculosis, Japanese encephalitis virus, HIV, adenovirus, rotavirus, rickettsia, hepatitis viruses, Legionell pneumophila, Salmonella, Shigella, Bordetella pertussis, Group A beta-hemolytic Streptococcus, and various pathogenic fungi, such as Canidas.

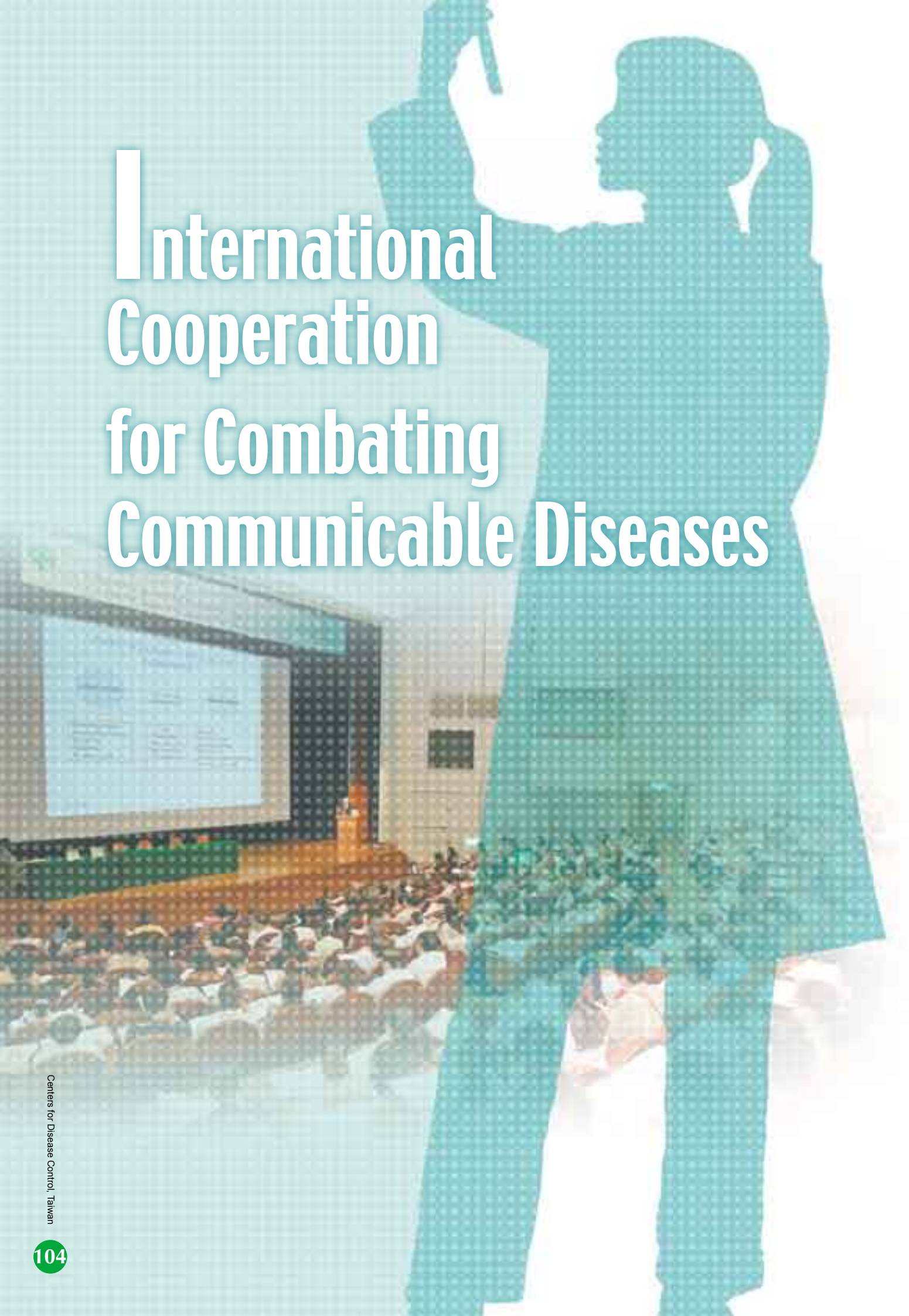
An analysis of the pathogenic genomic sequences and other individual case epidemiological data was helpful in separating the disease infection sources as well as transmission paths. Typical examples include a devastating outbreak of EV71 a few years back, the currently worsening epidemics of Dengue fever in Southern Taiwan, the rapid increase in the number of HIV cases among drug-abusing population, and the monitoring of influenza viruses. From genomic sequence data, we were able to better speculate the infection magnitude and possible origins. Additionally, we were able to formulate a more effective disease control strategy, which enabled us to respond quickly enough to halt the spread of the disease and effectively control outbreaks. Furthermore, the accumulated genomic sequence database can be vital for the development of new vaccines against infectious diseases and possible diagnostic agents or tools.

What we accomplished this fiscal year:

1. A new version of Taiwan Pathogenic Microorganism Genome Database software developed in collaboration with Advanced Bioinformatics Core (ABC) of National Science Council. The old version was limited to viral only data, we requested that ABC revise the database. This new version features all genomic typing data; the integrated epidemiological information of all viruses, bacteria, and fungi ever dealt with by the Taiwan CDC laboratories; and more analytical capabilities. The new system was officially deployed in January 2007.

2. We integrated and renewed the original sequencing analysis and laboratory information management system. We adapted a custom-made information system, combining the entire reception flow of the genome-sequencing laboratory under the Taiwan CDC's Center of Research and Diagnostics. The flow of the PCR and sequencing, sequence comparison, and result analysis is serial and is the basis of a laboratory information system. We then linked it to the new genome database's website. Now, we have a complete web site for the online service and administration of any CDC genome-sequencing laboratory.

International Cooperation for Combating Communicable Diseases



International Cooperation for Combating Communicable Diseases

Background

Communicable diseases knows no national boundaries. In today's world, globalization facilitates the spread and transmission of communicable disease. To build a responsive worldwide disease surveillance and prevention network is a critical prerequisite for protecting the health of the people of Taiwan. As Taiwan is a member of the global village, the Taiwan CDC has a responsibility to cooperate with international partners as well as provide adequate disease-control resources to needy countries to enhance the quality of human life.

In recent years, Taiwan has striven to enhance international exchanges on health affairs. Its efforts include increasing disease prevention cooperation with advanced nations, helping allies raise the quality of their medical care, fulfilling its responsibilities as a member of the international community, participating actively in international conferences, learning and introducing advanced medical technology from other countries, as well as striving to obtain worldwide understanding and support. As a result, Taiwan has seen many impressive achievements in the area of disease control. Furthermore, Taiwan has been able to share its unique experiences with the rest of the world as it has endeavored to realize the ideal of health for all.

Objectives

Actively participate in international health programs. Encourage bilateral and multilateral relationships to promote Taiwan's efforts in the control of communicable diseases. Participate in international humanitarian relief efforts. Work to build more channels for the exchange of information and to enhance the global image of Taiwan.

Achievements

A. Participated in international conferences and activities

1. Participated in five WHO technical meetings, one WHO training program, ten APEC meetings, one APEC simulation exercise, and 44 international conferences.

2. Published 54 papers.

3. Dispatched 123 personnel to international meetings and training programs.

B. Hosted international symposiums

1. The International Conference on Mathematical Modeling of Infectious Disease was held on 2nd July 2006. 200 participants attended and shared their experience.

2. The Pasteur/NHRI/CDC Symposium on Re-Emerging Virus Infections was held on September 1-3, 2006. More than 20 of the world's top experts were invited to share their experience with the 400 participants.

3. The Third Taiwan-Japan Symposium—HIV/AIDS was held on 7-8 September 2006. 14 experts from NIID (National Institute of Infectious Diseases, Japan) took part in the conference and exchanged information with experts in Taiwan.

4. The 8th International HIV/AIDS Conference was held on 9-10 September 2006. The speakers, which came from six countries around the world, shared with 550 domestic and overseas participants.

C. Enhancing multilateral and bilateral cooperation

1. 213 foreign guests from 41 countries visited the Taiwan CDC.

2. Continued to enhance a stable and smooth relationship of cooperation with the USA, Canada, Japan and Vietnam.

3. Dr. Michael Malison, an expert from the US CDC, was invited to serve as a consultant to the Taiwan CDC.

4. The Taiwan CDC director Dr. Steve Kuo was invited to deliver a speech in ECDC in October 2006 and received courtesy calls from disease control experts from the EU, Sweden, Poland, and Greece.

5. Continuing to organize programs dealing with communicable diseases, focusing on shigella and Dengue fever with National Institute of Infectious Diseases, Japan.

6. Dr. Nguyen Tran Hien, head of Vietnam's National Institute of Hygiene and Epidemiology, was invited to the Taiwan CDC to share his experience in preventing avian influenza in March 2006. Possible plans for future cooperation were also discussed.

D. Participating in international aid efforts

1. Dispatched experts in April and June 2006 to Burkina Faso and Chad, respectively, to provide assistance for the prevention of a flu pandemic.

2. Participated in Sao Tome's cholera control program.

Future Prospects

In view of the increasing frequency of international intercourse and travel, the issue of global cooperation is now more important than ever. The Taiwan CDC will do its best to strengthen cooperation with other countries as well as international healthcare institutes. Encouraged by the achievements of training and educational programs, the Taiwan CDC will cooperate with nations around the world to set up a global monitoring network for the prevention and control of communicable diseases. Other Taiwan CDC objectives include training personnel specializing in international public health and emerging infectious disease prevention as well as seeking full involvement in international communicable disease prevention projects. Future efforts are detailed as follows.

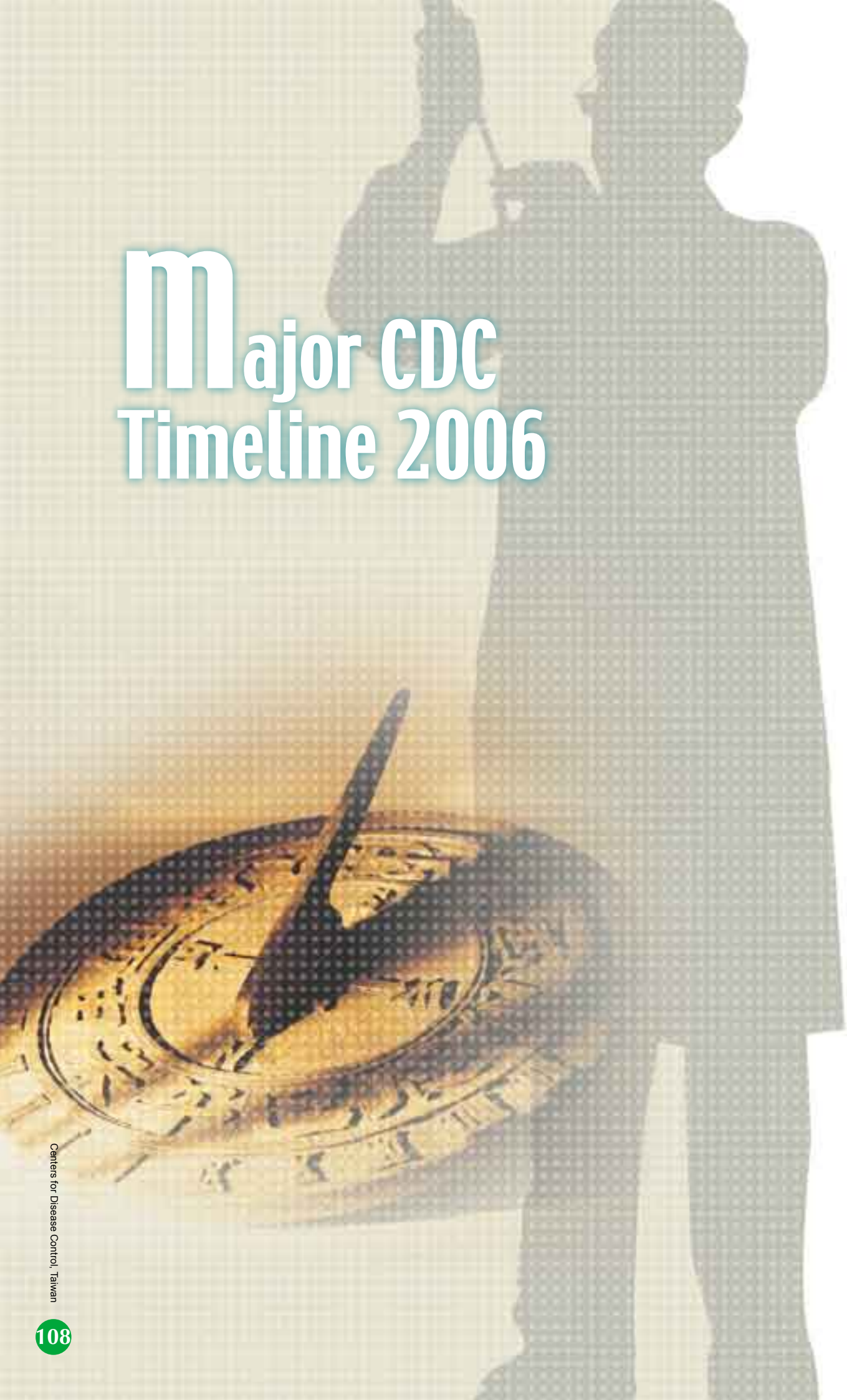
1. Actively participate in WHO, APEC, and related technical conferences and exercises.

2. Exchange information on a continual basis with IHR Focal Point with other countries, WHO, and its regional offices.

3. Actively take part in international humanitarian relief efforts and dispatch epidemiologists and experts to disaster areas to provide support in disease monitoring and prevention.

4. Enhance bilateral and multilateral cooperation with other countries.

Major CDC Timeline 2006



Major CDC Timeline 2006

January

9-12	Participated in "the Third TEPHINET Southeast Asia/Western Pacific Bi-Regional Scientific Conference"
12-13	Participated in "the Japan-WHO Joint Meeting on Early Response to Potential Influenza Pandemic"
15	Completed revision of the Manual for Leptospirosis Prevention
20	Participated in "APEC EINet's Pandemic Influenza Preparedness and Response: Information Sharing through a Virtual Symposium" organized by the United States

February

7	Department of Health reviewed and approved the "Four Year Prevention Plan for Dengue Fever and other Vector-Borne Communicable Diseases" and the "Four Year Prevention Plan for Enterovirus, Intestinal, and Water-Borne Communicable Diseases"
9	Declared smallpox, Lassa Fever, Rift Valley Fever, Ebola Hemorrhagic Fever & Marburg Hemorrhagic Fever, and West Nile Fever as five targeted infectious diseases
13	Epidemiological Investigation System officially went online
18	Donated emergency health kits to mudslide victims in the Philippines

March

9	The president convened the 3rd High Level National Security Conference, which focused on Preventive Countermeasures for the Possible Incursion of Avian Influenza
9	Convened an inspection meeting which focused on the BOO Project for Autonomous Production of Flu Vaccines in Taiwan
16	President Chen Shuibian accompanied officials from various ministries on an inspection of the National Health Command Center
22	Worked with the Medical Affairs Bureau, Ministry of National Defense to complete the "Bioterrorism and Emergency Preparedness Training Program agreement"
22	Formulated the Regulations for Governing Lectures on the "Prevention and Control of AIDS and Other Sexually Transmitted Diseases"
24	Organized "2006 World Tuberculosis Memorial Day Activities and Press Conference"
26	Implemented the "Infectious Biological Material Management and Sample Examinations for the Patients with Infectious Disease"
29	Announced the "Indicators of Microorganism in Hot Spring Water"

April

4	Participated in the "APEC Symposium on Emerging Infectious Diseases"
7	Dispatched personnel to Burkina Faso for avian influenza prevention
12	Completed revisions on "Smallpox Prevention Work Manual"
20	Organized the "Civilian Defense (Wan An No. 29) Drill—Drill for large-scale treatment centers for new flu C level epidemics"
20-21	Organized the "2006 National Infectious Disease Prevention Conference"

May

1-4	Participated in the "17th International Harm Reduction Conference"
2-5	Participated in the WHO Vaccine Conference in Geneva
12	Issued the revised "Regulations Governing Quarantine at Ports"
15	Announced willingness to cooperate ahead of schedule to the implementation of regulations related to IHR2005
17	Announced the first confirmed case of cholera in 2006

June

2	Organized the "International Conference on Mathematical Modeling of Infectious Disease"
7	Participated in the "APEC Pandemic Response Exercise held by Australia"
15-18	Participated in the "12th International Symposium of Infectious Disease"
27	Announced the abolishment of the "Infectious Disease Border Control Strategy schedule"

July

1	Published the inaugural issue of the AIDS/TB e-paper
5	Taiwan's National Influenza Center (NIC) unveiled
7	"Plan for Halving New Tuberculosis Cases in Ten Years" was approved by Executive Yuan
17-21	Organized the "Symposium on Influenza Pandemic Tabletop Exercise"

August

14-15	Participated in "the Review of the APEC Pandemic Response" Exercise.
16-17	Participated in the "APEC Seminar on Assessing Pandemic Plans" held by the USA
17	Egret No. 1, a drill aimed at testing the off-shore medical care system, was held in Lien-Chiang County
22	Held "Egret No. 7, Central Health Command Center's A1 level Influenza Drill"

September

4	Revised and issued the "Regulations Governing the Designation and Management of Hospitals for the Health Examination of Employed Aliens after Entry"
6-7	Held the "Third Taiwan-Japan symposium-HIV/AID"
8	Revised and issued the "Infectious Disease Prevention Incentive Guidelines"
8-9	Organized the "8th Taipei International AIDS Conference"

October

2	Established the "Dengue Fever Central Epidemic Command Center" ministries, set up offices and began work there
3	Officially launched the Taiwan PulseNet
11	Commencement of free flu vaccination for 65 and up elderly and the individuals working in the poultry and livestock industries

November

7	Announced the occurrence of H5 or H7 sub-strain highly pathogenic avian influenza and banned the sale of live poultry in Taiwan
17-27	SVT, Sweden, came to film SARS and avian influenza prevention in Taiwan
23	Worked with the Medical Affairs Bureau, Ministry of National Defense in the organization of training for the biological protection emergency team in Northern Taiwan
30	Flu exercise Egret No. 3 was held to evaluate local governments' preparedness

December

21	Participated in the 2006 Counter terrorism Exercise
22	Completed the Dengue Fever Central Epidemic Command Center's mission, Executive Yuan approved its official completion
27	Held the "2006 Dengue Fever Community Mobilization Award and Demonstration Conference"

CDC Annual Report 2007

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Disease prevention should be regarded as a battle.
Unity, professionalism and swift action are the keys
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