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CDC

Annual Report 2008

TAIWAN CDC

Centers for Disease Control,
Department of Health, R.O.C. (Taiwan)

CDC

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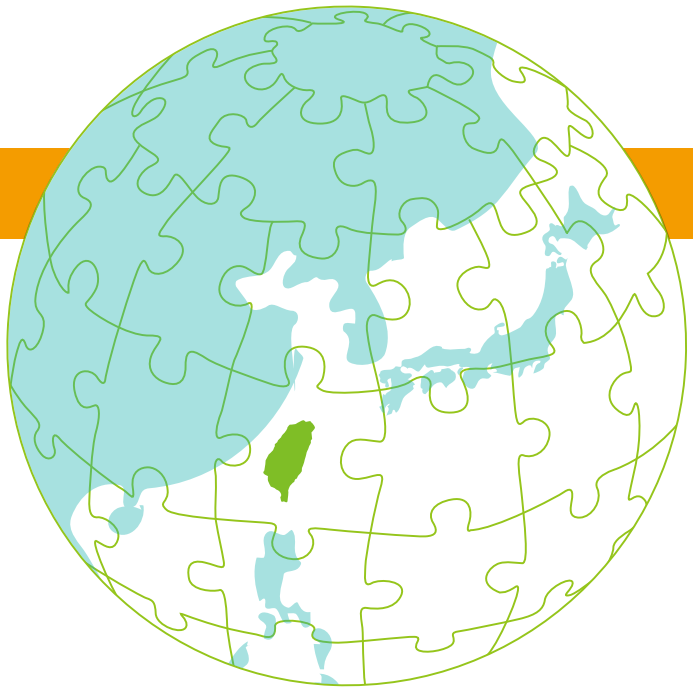

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Contents

Taiwan Centers for Disease Control

Annual Report 2008

Message from the Director

Welcome to the 2008 annual report from the Taiwan Centers for Disease Control (Taiwan CDC). This report aims to provide the reader with an overview of Taiwan CDC's major events and achievements in 2007.

Taiwan CDC is a leading public health agency that plays a key role in protecting all people on the island from infectious diseases. In this report, you will see how Taiwan CDC's outstanding employees effectively work together to ensure a healthier environment for the people in Taiwan and a safer place for the people around the world. Last year, we experienced a dengue fever outbreak in southern Taiwan and worked quickly to control this outbreak. Meanwhile, we are actively seeking ways to overcome many looming challenges posed by emerging diseases such as avian influenza and HIV/AIDS.

In view of the fact that the highly pathogenic avian influenza runs the risk of becoming a worldwide epidemic, Taiwan CDC has worked collaboratively with many related authorities to formulate pre-emptive measures concerning prevention and control of the disease and I am pleased to say that Taiwan remains as a non-affected area. We have stepped up our efforts in detection of human cases of avian influenza and clusters of influenza-like illnesses by setting up a multi-pronged surveillance system and establishing the National Influenza Center (NIC) in order to integrate the existing influenza surveillance systems, analyze the antigens and genes of influenza viruses, and regularly release influenza epidemic information to the public. In addition, the National Health Command Center (NHCC), with well-equipped communications facilities and systems that collect up-to-date information on international epidemics, including H5N1 influenza, has been set up to monitor the activity of novel influenza, which could result in pandemic influenza crises. We believe that the aforementioned centers provide Taiwan with an extra layer of protection against the possible invasion of avian influenza.

From the discovery of the first HIV case in 1984 to October, 2007, 15,345 people in Taiwan have been infected with HIV. In 2005, 70% of newly infected HIV patients were injecting drug users, the highest rate in recorded history. In response to this new route of HIV transmission, Taiwan CDC has been working closely with the Ministry of Justice and the local health and jurisdictional authorities to implement nationwide harm reduction programs. This collaboration has led to significant success in reducing HIV transmission. Taiwan has been

recognized as being amongst the countries effectively implementing harm reduction programs to rapidly reverse the epidemic. Therefore, HIV/AIDS control through harm reduction programs will remain one of the most important missions for Taiwan CDC.

As a responsible member of the international community, we look for opportunities to work with international institutes around the world to combat infectious diseases. On June 27, 2007, Taiwan CDC established GOACT (Global Outbreak Assistance Corps of Taiwan) after more than two years of preparatory work, marking a milestone in Taiwan's efforts in globalizing disease control programs. In fact, members of GOACT have been involved in several international public health emergencies during the past few years, including the tsunami disaster in Southern Thailand in 2005, the Rift Valley fever outbreak in Kenya, and the dengue fever epidemic in Paraguay in 2007. Taiwan CDC persistently utilizes Taiwan's disease control expertise to contribute to the international community on public health issues, thus also improving Taiwan's capabilities and preparedness in the fight against emerging and re-emerging diseases through the accumulation of such overseas experiences.

Taiwan CDC's outstanding employees form our frontline in the battle against epidemics, and they devote every effort to helping our people cope with infectious diseases. We stay true to our motto: "Disease prevention should be regarded as a battle. Unity, professionalism and action are the keys to success." We work hard to reach our disease control targets and make Taiwan a healthier country to live in. I sincerely hope you will enjoy reading this report and continue to support us.

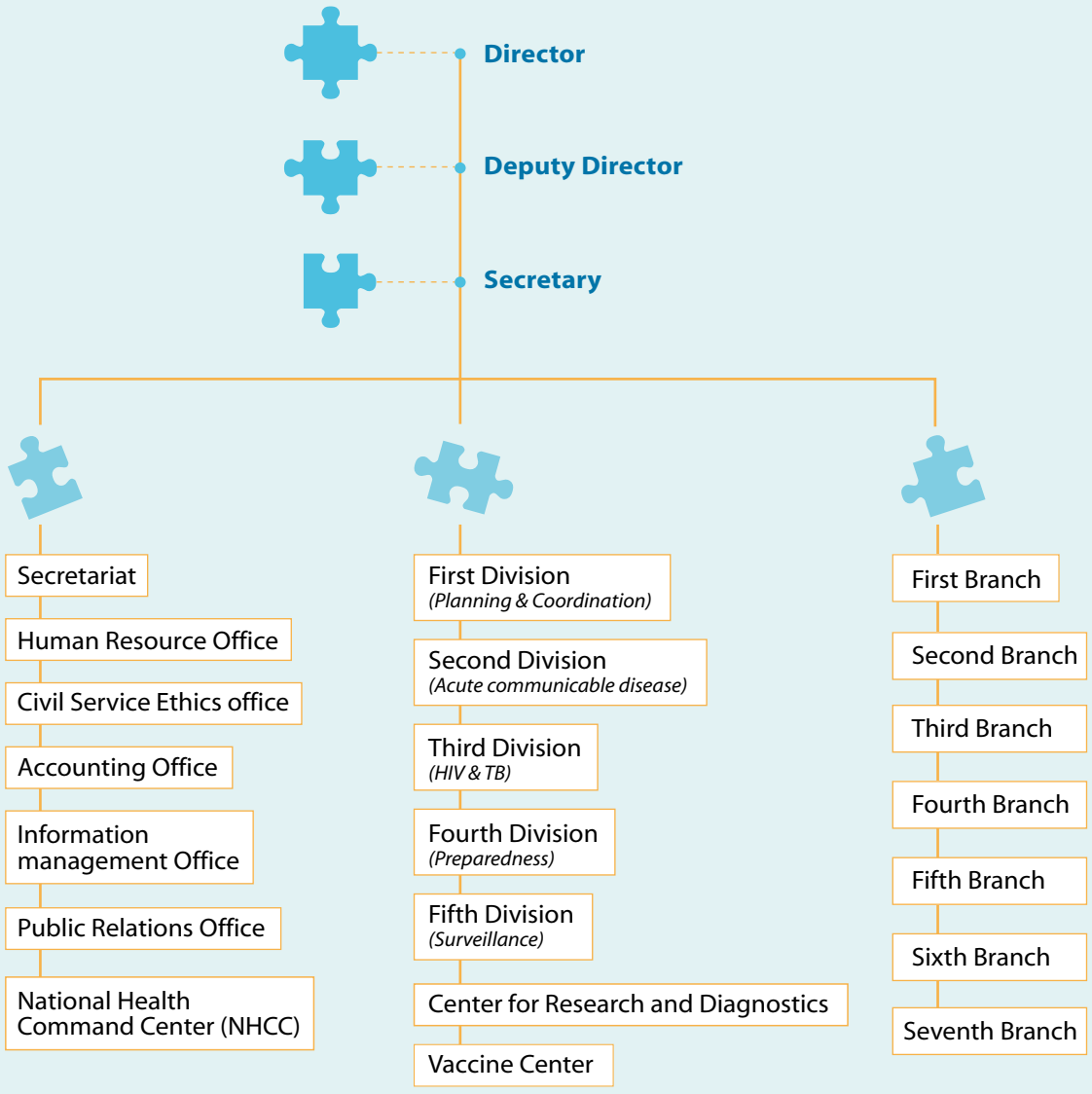
Steve Hsu-Sung Kuo, MD, MPH, PhD
Director
Taiwan Centers for Disease Control

About Taiwan CDC

In 1999, the Taiwan Centers for Disease Control was established by merging the Bureau of Communicable Disease Control (BCDC), the National Quarantine Service (NQS) and the National Institute of Preventive Medicine (NIPM) under the Organization Law of the Centers for Disease Control, the Department of Health, in order to consolidate resources, and to establish a comprehensive infectious diseases control system for the challenges of the 21st century.

Taiwan CDC is under the command of the Director, who is assisted by the Deputy Director and Secretary. The Taiwan CDC is composed of seven divisions, seven offices, and seven branches (see Table 1).

Table 1 Organization of Taiwan CDC



Currently, Taiwan CDC has 827 employees, with an average age of 42.6 years. Statistically, 74% of employees are younger than 49 years old, 46% of the staff have been college and university educated and 34% have advanced degrees (see Figure 1 and Figure 2). With a team that combines credibility, vitality, and innovation, Taiwan CDC is working hard to foster a communicable disease-free environment for the people of Taiwan. Through the efforts of its predecessors and Taiwan CDC's staff, some infectious diseases have been eradicated and many vaccination programs have been implemented.

Figure 1 Age Distribution of Taiwan CDC Employees

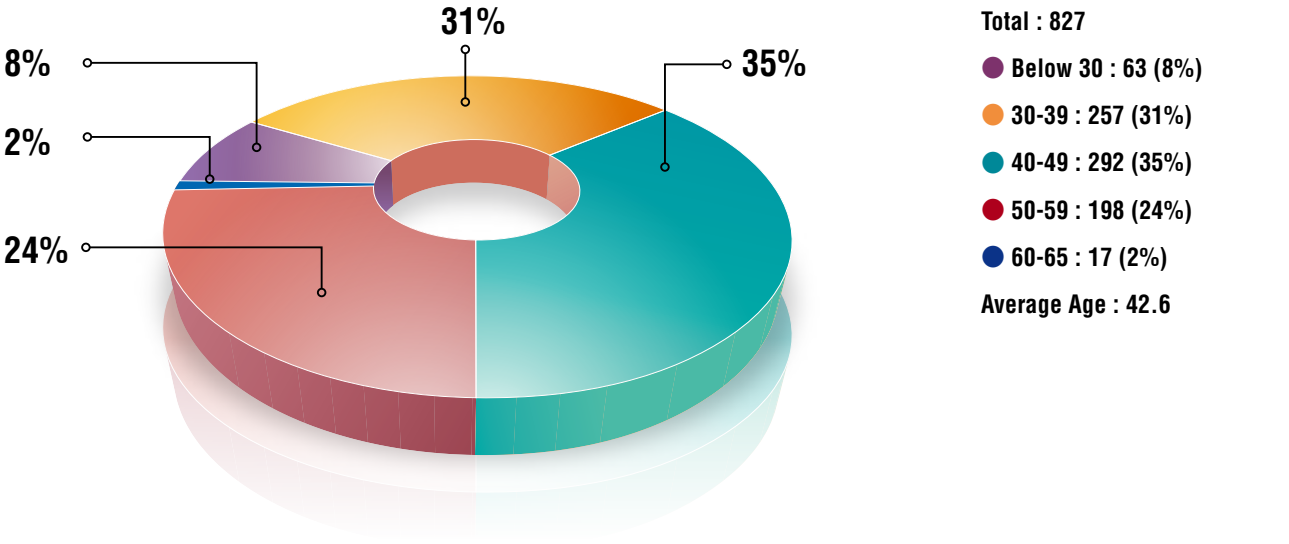
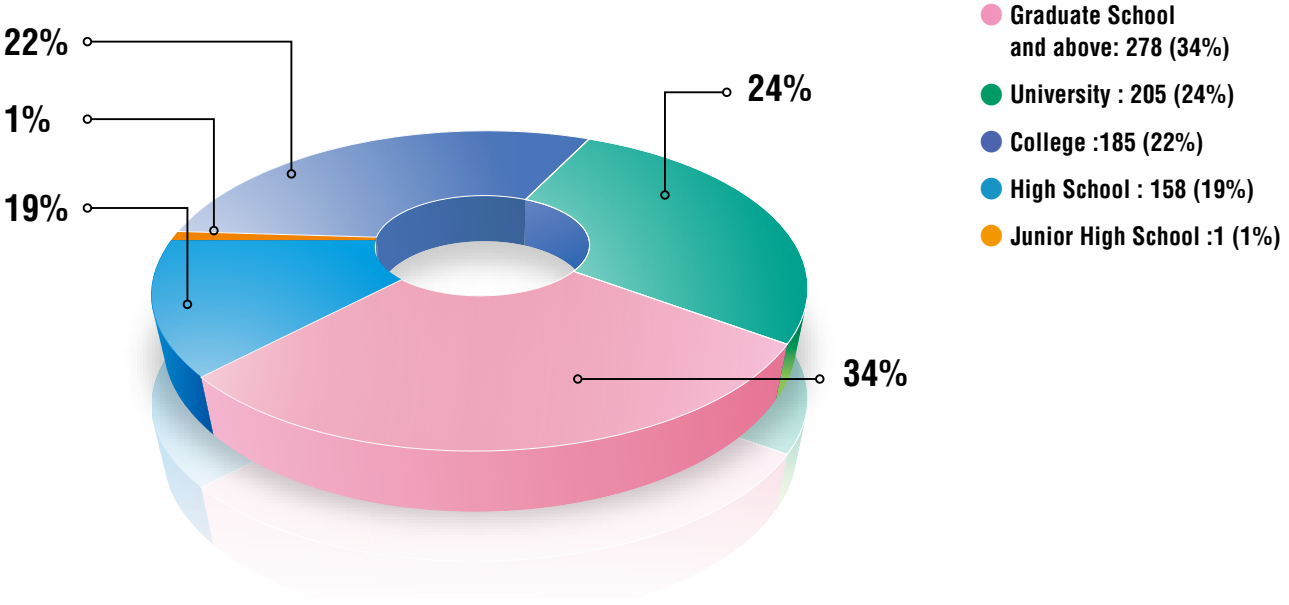


Figure 2 Education Levels of Taiwan CDC employees



Milestones in Public Health

Disease Eradication

1940s

1948 — Plague eradicated

1950s

1955 — Smallpox eradicated

1959 — Rabies eradicated

1960s

1965 — Malaria eradicated

1970s

2000 — Polio eradicated

2000s

Vaccination Programs

1940s

1948 — Diphtheria toxins vaccination program implemented

1950s

1955 — DPT vaccination program implemented

1956 — BCG vaccination program implemented

1960s

1966 — OPV vaccination program implemented

1968 — Japanese encephalitis vaccination program implemented

1970s

1978 — Measles vaccination program implemented

1980s

1984 — Hepatitis B vaccination program implemented, reducing the child-carrying rate by 84%

1986 — Rubella vaccination program implemented

1990s

1992 — MMR vaccination program implemented

1995 — Hepatitis A vaccination program implemented, successfully eliminating outbreaks in mountainous areas

1998 — Free influenza vaccines provided for people over the age of 65 and in high risk groups; People under special care, or working in health care institutions also became eligible for free vaccination

2000s

2001 — Free influenza vaccines expanded to cover all people over the age of 65

2003 — The target groups for the free influenza vaccines expanded to workers of medical institutions, health centers, and livestock or poultry farms

2004 — The target groups for free influenza vaccines expanded to infants over 6 months and under 2 years of age

2010s

2007 — The target groups for free influenza vaccines expanded to first grade and second grade students

2020s

2007 TODAY ▸

January

January / 14

Dispatched a team to Kenya to help control the Rift Valley fever epidemic

January / 22-26

Held four training sessions for police officers participating in the drug harm reduction project

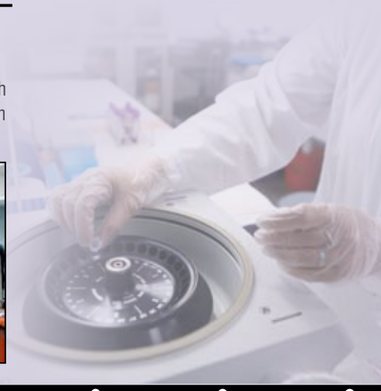
January / 25

Held the 2006 Accomplishment Presentation on Influenza Vaccine Research.

February

February / 6

Signed a “Cooperation Agreement on Communicable Disease Research and Education” with National Taiwan University



March

March / 21

Signed a memorandum with Korea’s International Tuberculosis Research Center (ITRC); its content includes exchange of information, laboratory techniques and specimens and joint research projects

March / 23

Held a press conference to promote World Tuberculosis Day 2007. The theme of the event was “TB anywhere is TB everywhere”

May

May / 7-8

Participated in the APEC Avian Flu and Influenza Prevention, Progress, and Preparation Review Conference

May / 30

Using the name ‘H5N1 influenza’ to describe the newly classified Category I Notifiable Infectious Disease

June

June / 11

CDC’s Travel Clinic officially opened, which provides health advice and vaccination services for international travelers

June / 27

Established the Global Outbreak Assistance Corps of Taiwan (GOACT) to pursue the strategy of “epidemic prevention before domestic outbreak; disease containment outside national borders”

July

July / 1

Announced that infectious pulmonary tuberculosis patients are banned from flights of over 8 hours duration, and multi-drug resistant (MDR) pulmonary tuberculosis patients are banned from all flights. Violators will be fined in accordance with the Communicable Disease Control Act

July / 11

Announced amendments to the HIV Infection Control and Patient Rights Protection Act; the Act has a total of 27 articles

July / 12

Held an HIV/AIDS Global Trends and Epidemiology Conference

July / 18

Announced amendments to the Communicable Disease Control Act; the Act has a total of 77 articles

September

September / 6-7

Held the Fourth Taiwan-Japan bilateral Conference on Disease Prevention with Japan’s National Institute of Infectious Diseases (NIID) in Tokyo

October

October / 1

Started to provide free influenza vaccines for people over 65, institutionalized patients, patients with rare diseases, infants over 6 months and under 2 years old, health care workers, people who work on livestock/poultry farms, and grade 1 and 2 students

October / 25-31

Held the “International Conference on Production of Freeze-dried BCG Vaccine”

November

November / 26-30

Hosted the Fourth TEPHINET Southeast Asia/Western Pacific Bi-Regional Scientific Conference in conjunction with TEPHINET (Training Programs in Epidemiology and Public Health Interventions Network)

April

March / 30

A celebration of the 10th anniversary of Highly Active Anti-Retroviral Therapy (HAART) use in Taiwan

May

August

August / 19-23

Participated in the 8th International Congress on AIDS in Asia and the Pacific Region and presented “Key Factors for Success of the Harm Reduction Program in Taiwan” to share our experiences

August / 21-24

Held the Third Asian Regional Dengue Research Network Meeting with the Pediatric Dengue Vaccine Institute, and the Novartis Institute for Tropical Diseases. The theme of the conference was “Dengue Fever: Research Progress in Vaccines, Diagnostics, and Therapeutics”

September

August / 28

Announced “Restrictions on Infectious Pulmonary Tuberculosis Patients Boarding International Flights Guidelines”, effective from September 1, 2007

December

2008 ▶

December / 1

After the specific groups have recieved the free influenza vaccines the influenza vaccine was open to all citizens.

Mobilization Plan for Halving TB Incidence in Ten Years

Mobilization Plan for Halving TB Incidence in Ten Years

Background

Introduction

Tuberculosis has always been the most dangerous communicable disease in Taiwan. Taiwan's GDP per capita has now reached USD13,000, but there are still about 15,000 new cases of tuberculosis every year, which is more threatening than all other communicable diseases combined.

Tuberculosis is not only a threat to people's lives and productivity, but can also adversely affect a nation's image and competitiveness. Health workers in Taiwan have been working hard to control tuberculosis for over half a century, and the prevalence of the disease has certainly been reduced. However, when compared with advanced countries, Taiwan is still decades behind and needs to accelerate reforms in order to catch up.

Taiwan has a dense and highly mobile population. However its highly developed nature has caused a distancing of personal relationships. The abundance of medical resources also means patients have many options when it comes to medical services. These two factors make the discovery and management of patients more difficult compared to rural societies. Recently, tuberculosis has once again begun to rise globally. The disease is also becoming more prevalent in Taiwan due to factors such as tourism, importation of foreign labor, high frequency of international travel, and AIDS-related complications. Therefore, to protect the health of the general public, we should use more active and aggressive methods when faced with new challenges in tuberculosis prevention.

Status and Trends of Tuberculosis in Taiwan

1. Incidence Rate

In 2006, 15,378 people were reported and confirmed to have tuberculosis, and the incidence rate was 67.38 per 100,000 people. It is by far the most common notifiable disease, with 70 % of notifiable illness cases being tuberculosis. On average in Taiwan, a new tuberculosis patient is discovered every 36 minutes.

The registration of tuberculosis patients was implemented in 1950s, but initially was limited to infectious patients whose sputum smears or cultures tested positive. The scope of the program eventually expanded, and from 1991, all tuberculosis patients were required to register. However,

reports from medical institutions often did not reflect the true number of patients. It was only after the Bureau of National Health Insurance adopted the policy of "No Report, No Reimbursement" in July of 1997 and Taiwan CDC started to conduct inspection on deaths by tuberculosis in 2001 that the number of tuberculosis patients reported by medical institutions dramatically increased. The difference between the data and the reality also started to lessen.

There are 2.2 times more male tuberculosis patients than female. Furthermore, the incidence rate of tuberculosis rises with age. Among all new patients, 52.2% are over 65 years of age.

New tuberculosis cases tend to appear in urban areas. In 2006, the cities or counties with the highest number of new tuberculosis patients were Taipei County (2,213 cases, 14.2%), Taipei City (1,253, 8.0%), Kaohsiung City (1,255, 8.0%) and Kaohsiung County (1,226, 7.9%). However, the incidence rate in the eastern part of Taiwan is higher than the west, and the south higher than the north. The incidence rate was highest in Hualien County in 2006 at 120.42 per 100,000 people. The incidence rates in Pingtung County and Taitung County also exceeded 100 persons per 100,000. In mountain regions, the incidence rate of tuberculosis is 265.34 per 100,000 people, which is 3.9 times higher (67.38 per 100,000) than non-mountainous regions.

2. Morbidity Status

Since it is required for infants and children to receive the Bacillus Calmette-Guerin vaccine (BCG) in Taiwan, it is difficult to determine the true morbidity rate of tuberculosis. Currently, 1st grade students who have not received the vaccine are required to receive a tuberculin skin test, so from the number of students tested positive morbidity can be estimated. However, since 98% of the children have received the vaccine in recent years, the sample size has been dwindling. Therefore, it has become difficult to estimate yearly morbidity with this method.

Statistics from 2006 showed that there were 1,900 students (0.69%) who did not receive the vaccination. 5.58% of these students tested positive through tuberculin skin test, so yearly morbidity was estimated to be 0.88% (PPD RT23 2TU).

Dr. Charles L. Daley (left 1), an expert on MDR tuberculosis from National Jewish Medical and Research Center in the US, was invited to Taiwan to share his experiences in caring for tuberculosis patients.

3. Mortality Rate

Tuberculosis claimed 832 lives in Taiwan in 2006, which is a mortality rate of 3.65 per 100,000 people. The disease also caused 0.6% of the total number of deaths, which makes it the 13th highest cause of death. The mortality rate of tuberculosis has dropped 98.7% from 1947 to 2006, and dropped 53.8% in the ten years between 1996 and 2006.

Taiwan CDC invited Dr. Peter Cegielskia (right 2), USCDC officer, member of the MDR-TB-Team Green Light Committee of the WHO's Stop TB Working Group to share their experience in the prevention and treatment of tuberculosis.

Among tuberculosis related deaths, 94.6% were caused by pulmonary tuberculosis, while the other 5.4% were caused by tuberculosis of other organs. Furthermore, the number of deaths amongst males was 2.7 times higher than that of females. The mortality rate of tuberculosis also rises with age, which can be seen from the fact that 81% (677) of the deaths were people over the age of 65. This shows that in Taiwan the demographic group threatened most by tuberculosis is the elderly.

Geographically speaking, the mortality and morbidity rates of tuberculosis are positively correlated. Furthermore, rates in eastern Taiwan are higher than in western parts, while the south is higher than the north. The rates are lower in cities as well. The mortality rate of tuberculosis was highest in Taitung County and Pingtung County, at 6.56 per 100,000 people. Hualien County followed closely at 6.33 per 100,000. In mountain regions, the mortality rate was 20.03 per 100,000, which is 5.5 times higher than non-mountain areas (3.65 per 100,000)

Compared to other countries, on average there are 15,000 new tuberculosis cases in Taiwan every year, which is 13 times higher than the US (67.38/5.1) and 2.7 times higher than Japan (67.38/24.8). The priority of our policies is to lower the incidence rate of tuberculosis, protect residents' health, and improve the quality of life.

Goals

1. To discover infected persons as early as possible. With early treatment, there is less chance for *M. tuberculosis* to spread.

2. To provide comprehensive medical treatment for patients. Early treatment can stop the TB bacteria from spreading.

3. To prevent the TB from spreading and infecting the general population.

Implementation

Improved Reporting and Surveillance

The National Tuberculosis Reporting and Management System collects and keeps track of information on a tuberculosis patient such as diagnosis, reports, registration, treatments, examination, management, and the people who have come in contact with the patient. It also provides the information required for case management and epidemic analysis. Also, the system has strengthened tuberculosis monitoring amongst high risk groups such as aborigines, teachers, students, medical workers, draft age men and soldiers, and in high risk areas such as correctional institutions and any other facilities with a high population density.

Established High Quality and Rapid Tuberculosis Testing Network

The tuberculosis testing network was established in October, 2001. In the early stages, its main goals were to establish a laboratory and testing network provide feedback, and to create a testing procedure. Currently, the emphasis of the network is on the certification and improvement of laboratories, monitoring and training of staff members, and organization of reports on in vitro susceptibilities of drugs for the laboratories. It also monitors the drug resistance of tuberculosis in different regions, evaluates the quality of case management, and intervenes when problems arise.

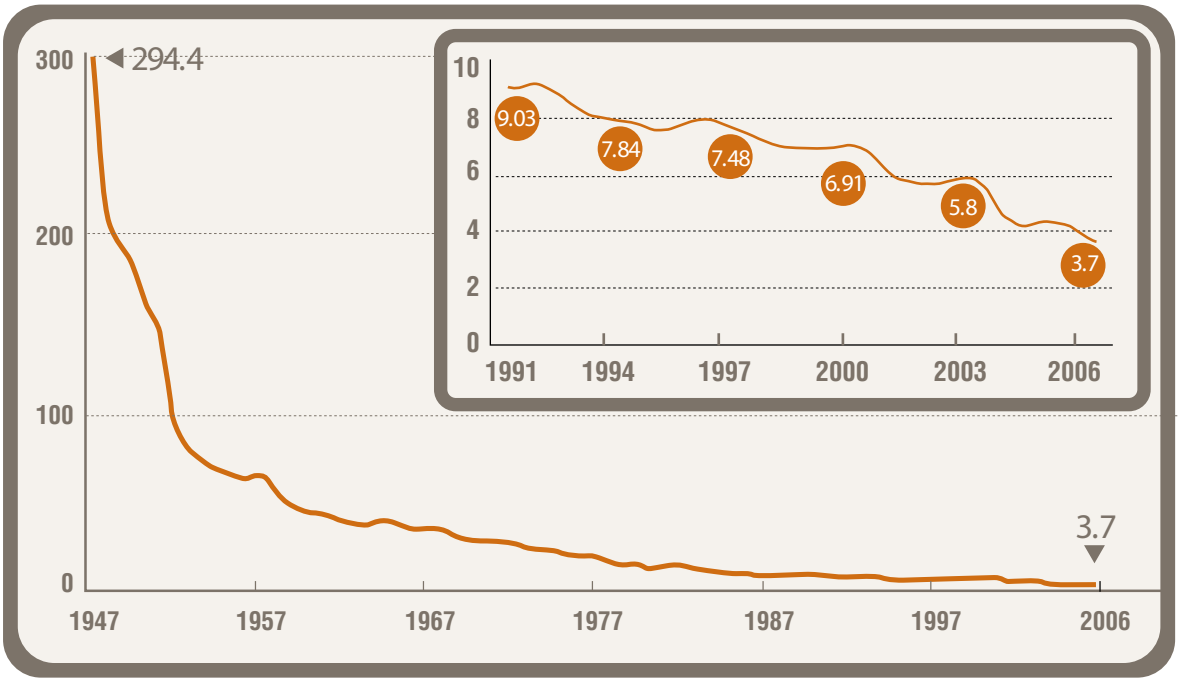


Figure1 Tuberculosis Mortality Trend in Taiwan 1947~2006

Directly Observed Treatment Short-Course (DOTS)

A plan to halve the number of tuberculosis patients in ten years was implemented in April, 2006. In December of 2007, according to statistics, 92.6% of patients whose sputum tested positive for tuberculosis bacteria were treated. Other than improved coverage, the quality of treatment was also greatly improved with constant supervision and reviews. In comparing the results of the 12 month treatment period of DOTS cases and non-DOTS cases, the results show that the treatment success rate for DOTS cases is 75.1%, which is much higher than those non-DOTS cases 51.6% ($P<0.001$) (see Figure 2). The cure rate for DOTS cases is 50.0% and the completed treatment rate is 25.1%. Both of these figures are higher than non-DOTS cases' cure rate of 29.7% and treatment complete rate of 21.8%. In other words, the treatment results are much better for the DOTS cases in comparison with non-DOTS cases. Due to the fact that the DOTS project started implementation in 2006, the follow up results of the smear-positive cases are compared with those of 2005 in order to understand the effect of DOTS on the treatment. The cure rate in 2006 was 42.8%, which is higher than the 26.8% in 2005. Although the treatment complete rate for 2006 is 24.0% and 37.2% for 2005, the overall treatment success rate in 2006 reached 66.8%, whereas that in 2005 was 63.9%, showing a 3 % difference. There was a large difference in the mortality rates as well. These statistics clearly show that the DOTS program has significant effects with regard to TB control.

The execution of a treatment program requires corresponding strategies. These strategies, especially the five key factors suggested by the World Health Organization, require constant evaluation and correction of mistakes in order to improve the quality and effects of treatment.

Improved the Quality of Tuberculosis Diagnosis and Treatment; Nosocomial Infection Control

To maintain and improve the quality of diagnosis and treatment, Taiwan CDC worked with related medical associations on the re-education of tuberculosis diagnosis and treatment. Taiwan CDC also worked with the Bureau of National Health Insurance on the prescription drug inspection system in order to strengthen the evaluation of nosocomial infection control. The program includes regular X-ray screening, education and training, examination of people who have contact with patients, quarantine of patients whose phlegm tests positive for tuberculosis, and monitoring of coughs. Furthermore, in 2005, tuberculosis examination became an item in the yearly nosocomial infection control evaluation program.

Established the "Multi-drug Resistant TB (MDR-TB) Medical Care System"

The "Multi-drug resistant TB (MDR-TB) medical care system" was established in May 2007. The system consists of five different medical teams which specialize in treating MDR-TB patients. The responsibilities of the Taiwan CDC are to provide resources and direct each team to provide treatment

according to the WHO clinical guide. After admission, the teams will actively treat each patient for two years, and community health workers will be providing personal care via the DOTS-plus program. It is the system's goal to provide continuous and comprehensive care. As of December, 2007, the system had registered 198 MDR-TB patients.

Taiwan CDC also worked with the Bureau of National Health Insurance on fluoroquinolone control and random clinical treatment prescription inspection. Taiwan CDC also works hard at controlling and improving laboratory quality and introducing second line tuberculosis drugs. Through this advanced medical team, we may give difficult-to-treat MDR-TB patients a chance of full recovery.

Exit Control of Tuberculosis Patients by Air Travel

The World Health Organization suggests passengers with infectious pulmonary tuberculosis or MDR tuberculosis should delay their travel plans until their conditions are no longer infectious. The Department of Health is responsible for notifying immigration authorities to prevent patients with untreated, infectious diseases from leaving the country, in accordance with the Communicable Disease Control Act.

The reasons for restricting tuberculosis patients from boarding international flights are to protect the health of other passengers and fulfill our responsibilities in terms of international public hygiene. Due to the completeness of our reporting and information systems, Taiwan is the first country in the world to actively restrict tuberculosis patients from leaving the country. Specifically, immigration officials at international airports are authorized to restrict (1) infectious pulmonary tuberculosis patients from traveling on flights exceeding 8 hours and (2) infectious MDR-TB patients from traveling altogether.

All tuberculosis patients are informed of the travel restrictions and should have full understanding of the situation and the restriction was fully implemented on September 1, 2007.

Quarantining of Infectious Pulmonary Tuberculosis Patients

Patients with infectious tuberculosis (especially patients whose smears tested positive for tuberculosis or patients with MDR-TB) can be forced into isolation for treatment if the physician determines that is the most favorable course of action or if the patient does not take their medicine regularly and refuses to enter into isolated wards willingly in accordance with the Communicable Disease Control Act. The patient will be informed of the forced quarantine.

Training, Research, and International Cooperation

Taiwan CDC has worked with other government agencies such as the Ministry of Foreign Affairs to plan various international projects. The goals of these projects are to improve tuberculosis prevention

and treatment capabilities of countries that require our assistance and in turn strengthen our diplomatic relations. Taiwan CDC has also sent representatives overseas to participate in conferences, acquire knowledge and experience with the goal of improving our own abilities in the fight against tuberculosis. Lastly, Taiwan CDC has invited many foreign experts and scholars to Taiwan to participate in scientific conferences in the hope of facilitating the exchange of knowledge and experience.

Future Prospects

To achieve year by year reduction of new tuberculosis cases.

By Year Five (2010), lower the incidence rate to 52 per 100,000 people.

By Year Ten (2015), lower the incidence rate to 34 per 100,000 people.

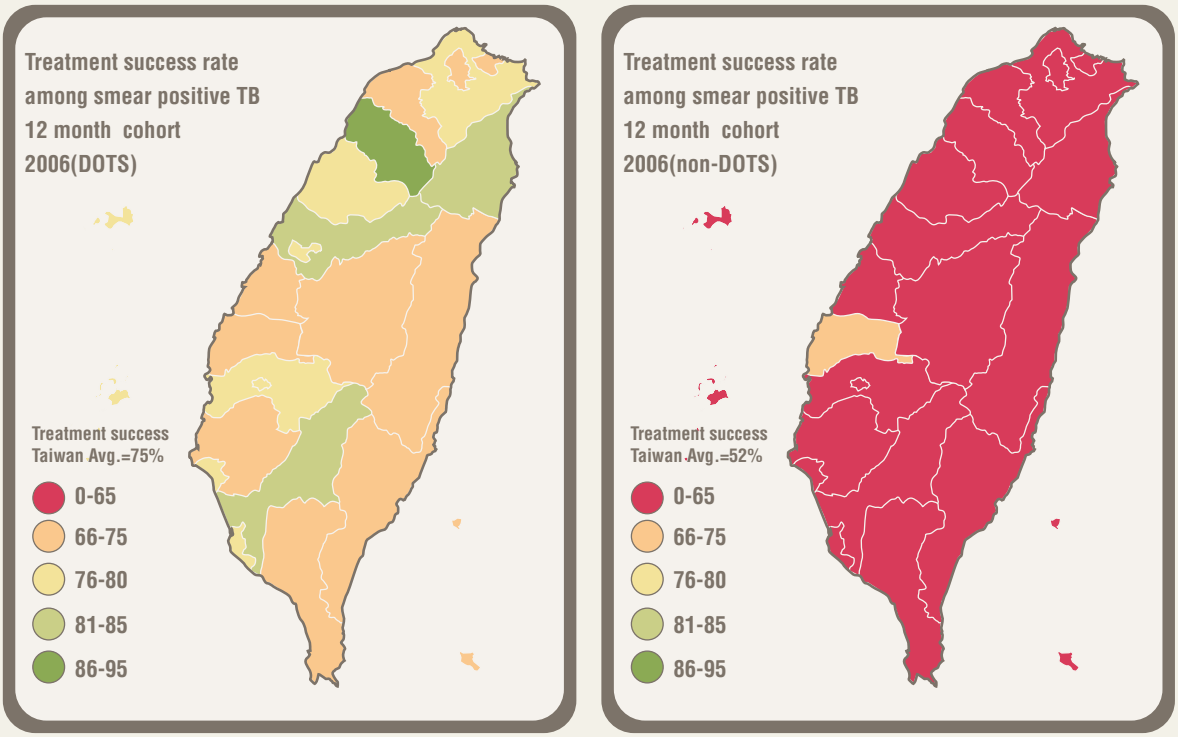


Figure 2 Comparison of Treatment Success Rates among DOTS and non-DOTS patients

National Communicable Disease Surveillance Systems

National Communicable Disease Surveillance Systems

Background

After the Taiwan CDC was reorganized in July 1999, the National Communicable Disease Surveillance Systems 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 on infectious diseases. The vision is to monitor the nation's health status and to detect outbreaks rapidly by integrating various infectious disease surveillance networks, and its missions are to: (1) Construct diversified disease surveillance systems; (2) Collect and monitor data for disease trend analysis, prediction and alert; (3) Provide analysis and assessment of global and indigenous infectious diseases regularly.

Goals – Establishing Multi-surveillance Systems

1. Notifiable Diseases Surveillance System

The first stage of the web-based version of the Notifiable Diseases Surveillance System was accomplished in July 2001, which enabled easier and more complete transmission of reported information. To strengthen the surveillance system, the second stage of the system was completed in September 2004. The third stage of the system was completed in September 2006, which effectively integrated the Notifiable Disease Surveillance System, Syndromic Surveillance System, and Symptom Surveillance System. The fourth stage of the system, to be established in June 2008, will accomplish a single reporting gateway and increase the systems user-friendliness.

2. Syndromic Surveillance System

Initiated as a pilot study from July 2000 to December 2001, it was then implemented as 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 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

The system was planned in 1989, and established in 1990. This system can be used to measure prevalence trends and treatment rates of influenza, and act as an important reference on preventative measures, vaccine strain selection, and health care. As of December, 2007, 654 doctors (526 in clinics, 128 in hospitals) have volunteered to become sentinels for the system, which covers about 70% of cities and towns in Taiwan. The medical issues being monitored by the system include influenza-like illness (ILI), enterovirus, and diarrhea. The system also collects information from stationary monitoring networks every week, analyzes regional and national epidemic trends, and provides reports to the sentinel doctors via newsletters and the Internet.

4. School-based Surveillance System

The system was implemented in 2001. As of December, 2007, 454 elementary schools (17% of all elementary schools) have joined the program, which covers grade 1 to grade 6 students (and kindergarten) in 87% of cities and towns. The medical issues being monitored include influenza-like illness (ILI), chickenpox, mumps, hand-foot-and-mouth disease (HFMD), herpangina, diarrhea, fever, and other notifiable diseases. The system collects information from schools every week, analyzes trends at the regional level and in each school, and regularly provides reports to participating schools, education authorities, and health authorities.

5. Symptom Surveillance System

In March 2003, Taiwan was hit by the global outbreak of severe acute respiratory syndrome (SARS) that sent panic across the nation and caused unprecedented damage to our economy. In December of the same year, Korea, Japan, and Vietnam reported outbreaks of avian flu. Furthermore, in Vietnam, Thailand, and Indonesia, cases of human deaths resulting from H5N1 virus infection have caused concerns, and a degree of panic, globally. To prevent the virus from finding its way into our nation, the Symptom Surveillance System has been put in place to facilitate early detection of SARS (discontinued in 2005), or of H5N1 infections to allow for prompt response and implementation of various epidemic-prevention measures. In addition, in 2006, several active surveillance systems were integrated. To date, the disease categories under surveillance include: persons-under-investigation for H5N1 influenza matching definition infections, clusters of influenza-like illness cases, fever of unknown etiology, diarrhea, cough persisting for more than three weeks, upper respiratory tract infection, and clusters of enterovirus infection cases.

6. Surveillance System for Populous Institutions

The system is aimed at early cluster detection of infectious diseases in organizations amongst inhabitants or workers. It applies to elderly hospices, long-term care facilities, apartments for the elderly, facilities for the disabled, protectories for children and juveniles, veterans' homes, prison, nursing homes, and day-care centers for mental recovery. If an individual or cluster respiratory disease case is found among 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 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

This center was established to provide the public with timely and complete consultation services.

Accomplishments

1. Notifiable Disease Surveillance System

In 2007, there were 5,237 notifiable disease cases that required reporting within 24 hours. 5,227 were reported on time, accounting for 99.8%. This is higher than the 2006 rate of 98.8%. In the same year, the average rate of completeness nationwide was 93.0%. This was also higher than the 2006 rate of 91.5%. The following table shows the confirmed case numbers of acute and chronic notifiable diseases in Taiwan in 2007. (Table 1&2)

Table 1 Number of Confirmed Cases of Acute Notifiable Diseases in Taiwan, 2007

Categories	Disease	Total	indigenous	imported
I	Smallpox	0	0	0
	Plague	0	0	0
	SARS	0	0	0
	Rabies	0	0	0
	Anthrax	0	0	0
	H5N1 Influenza	0	0	0
II	Diphtheria	0	0	0
	Typhoid Fever	34	15	19
	Dengue Fever	2179	2000	179
	Meningococcal Meningitis	20	20	0
	Paratyphoid Fever	6	3	3
	Poliomyelitis	0	0	0
	Acute Flaccid Paralysis	51	51	0
	Shigellosis	246	201	45
	Amoebiasis	140	80	60
	Malaria	13	0	13
	Measles	10	0	10
	Acute Viral Hepatitis type A	203	180	23
	EHEC (Enterohemorrhagic E. Coli) infection	0	0	0
	Hemorrhagic Fever with Renal Syndrome	1	0	1
	Hantavirus Pulmonary Syndrome	0	0	0
	Cholera	0	0	0
	Rubella	54	51	3
	Chikungunya	2	0	2
	Rubella	0	0	0
	Typhus	0	0	0

Table 1 Number of Confirmed Cases of Acute Notifiable Diseases in Taiwan, 2007

Categories	Disease	Total	indigenous	imported
III	Pertussis	41	41	0
	Tetanus	-	-	-
	Japanese Encephalitis	37	37	0
	Congential Rubella Syndrome Enterovirus Infection with Severe Complications	1	0	1
	Acute Viral Hepatitis type B	201	195	6
	Acute Viral Hepatitis type C	154	154	0
	Acute Viral Hepatitis type D	1	1	0
	Acute Viral Hepatitis type E	12	6	6
	Acute Viral Hepatitis Unspecified	10	10	0
	Mumps	11	7	4
	Legionellosis	56	53	3
	Haemophilus Influenza type b Infection	16	16	0
	NNT	0	0	0
	Enterovirus Infection with Severe Complications	12	11	1
	Scarlet fever	651	649	2
IV	Herpes virus B Infection	0	0	0
	Leptospirosis	10	10	0
	Melioidosis	4	4	0
	Botulism	2	2	0
	Invasive Streptococcus Pneumoniae Infection	169	169	0
	Q Fever	17	17	0
	Murine typhus	6	6	0
	Lyme disease	0	0	0
	Tularremia	0	0	0
	Scrub typhus	510	505	5
	Chickenpox	-	-	-
	Cat-scratch fever	1	1	0
	Toxoplasmosis	1	1	0
	Severe Complicated Influenza Cases	26	25	1
	Creutzfeldt-Jakob disease	0	0	0
V	Rift Valley Fever	0	0	0
	Ebola-Marburg Hemorrhagic Fever	0	0	0
	Yellow Fever	0	0	0
	Ebola Hemorrhagic Fever	0	0	0
	Lassa Fever	0	0	0

Note 1: Based on the "Category 4 and Category 5 Communicable Diseases Preventive and Control Measures" announced under Sue-So-Ji No. 096000892 on October 9, 2007.

Note 2: Data was re-downloaded on 2008/02/18 and the period was from 2007/01/01 to 2007/12/31.

Note 3: "-"represents no confirmed data of specimen collection.

Note 4: Data was analyzed by onset date.

Table 2 Number of Confirmed Cases of Chronic Notifiable Diseases in Taiwan, 2007

Categories	Disease	Confirmed Cases
III	Smear-positive tuberculosis	5734
	Other tuberculosis	8746
	Leprosy	12
	Syphilis	5795
	Gonorrhea	1442
Other	HIV infection	1976
	AIDS	1055

Note 1: Data was re-downloaded on 2008/02/18 and the period was from 2007/01/01 to 2007/12/31

Note 2: Data was analyzed by diagnosis date.

Note 3: Tuberculosis confirmed cases were included as statistical figures based on the date of report respectively.

2. Syndromic Surveillance System

In 2007, there were 421 reported syndromic cases, comprising 12 acute hemorrhagic fever syndrome cases, 182 acute respiratory syndrome cases, 139 acute neurological system syndrome cases, 88 acute jaundice syndrome cases based on onset date. The syndromic reporting was mostly from the northern region of Taiwan. Most patients were over 60 years of age and most reporting cases tend to increase with age. About 9.7% (41/421) of the reported cases were found to be positive in CDC laboratory tests. The positive rates were 25% (3/12) for acute hemorrhagic fever syndrome, 14.8% (27/182) for acute respiratory syndrome, 7.2% (10/139) for acute neurological system syndrome, 1.1% (1/88) for acute jaundice syndrome. Of the pathogens found, Legionellosis (10 cases) took the lead in acute respiratory syndrome cases, which was followed by Chlamydia pneumonia (9 cases). In acute neurological syndrome cases, Japanese encephalitis was the chief culprit (7 cases). As for acute jaundice syndrome cases, only one Leptospira was found.

3. Sentinel Surveillance System

The overall trends for ILI in 2007 did not show an obvious seasonal peak, but reached its highest prevalence in winter. 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 fall in the interval between winter and spring. Diarrhea epidemic is also not apparent over the whole year. (Figure 1).

4. School-based Surveillance System

The weekly data from 454 elementary schools showed that the overall trend of ILI in 2007 was more stable than that of previous years (Figure 2). However, it still reached a peak in winter. Furthermore, ILI trends shown in the sentinel surveillance system and the school-based surveillance system are similar (Figure 3).

5. Symptom Surveillance System

In 2007, 48 specimens were taken from patients being checked for human infection with influenza A (H5N1) in Taiwan. Of the specimens, 2 were influenza AH1 (+), and 18 were influenza AH3 (+).

6. Surveillance System for Populous Institutions

By the end of 2007, this surveillance system had 1,836 participating organizations. These institutions had 155,327 workers and inhabitants. In 2007, a total of 643 people were reported for suspected respiratory illness and 527 people for showing gastrointestinal symptoms (Figure 4).

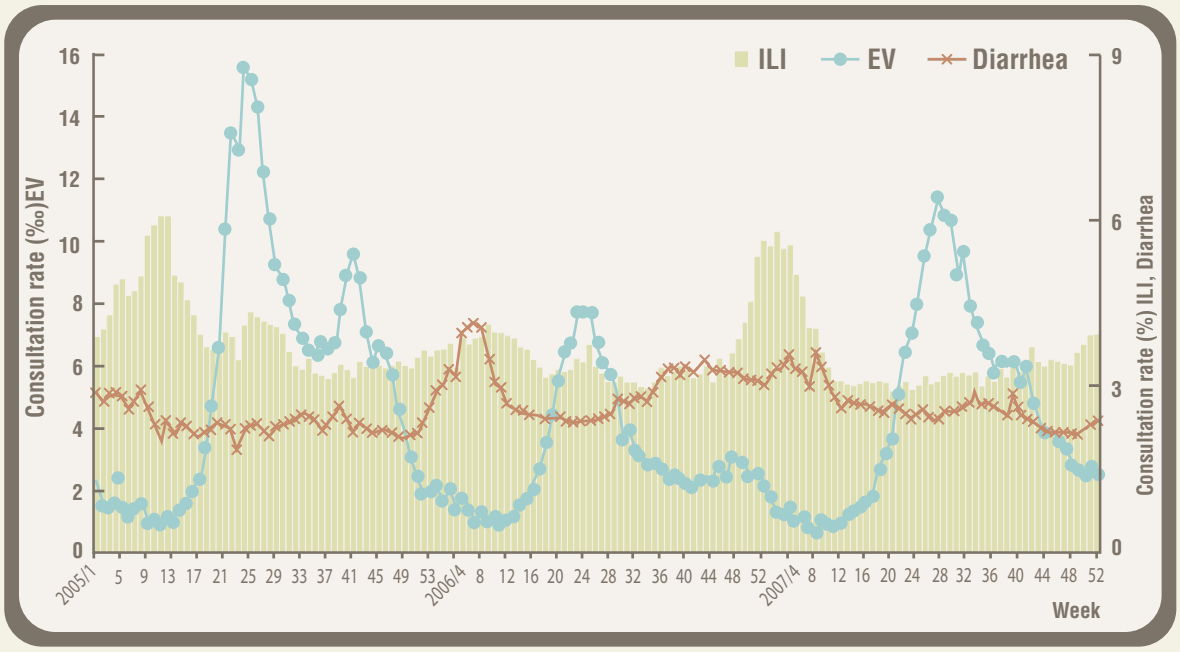
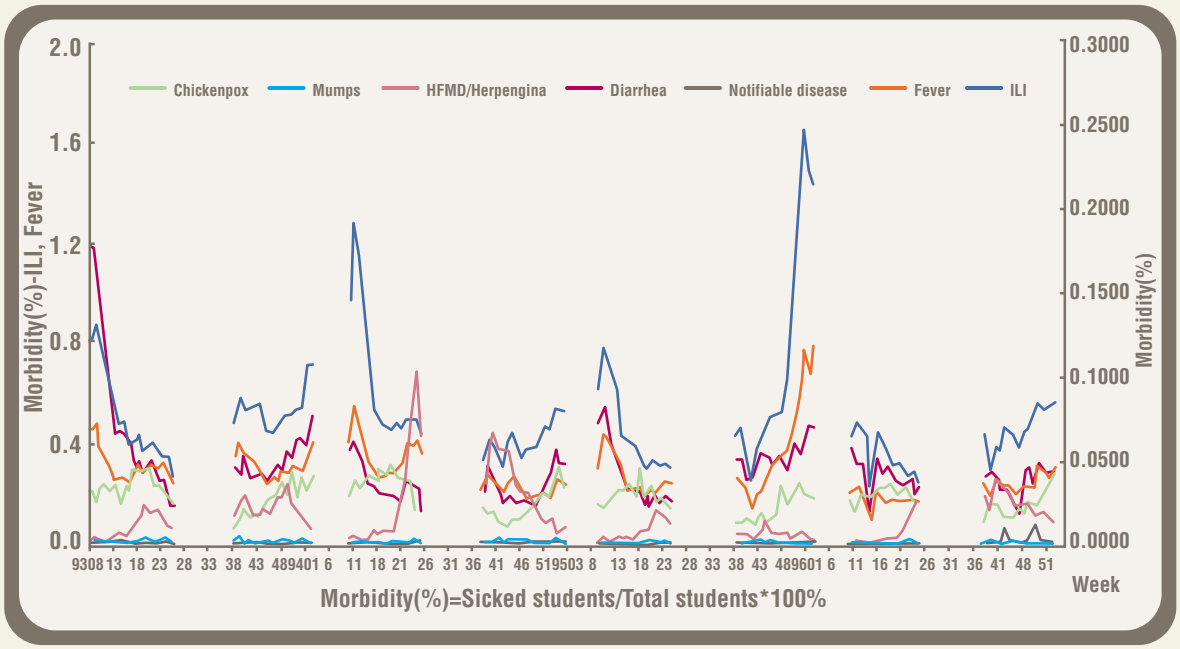
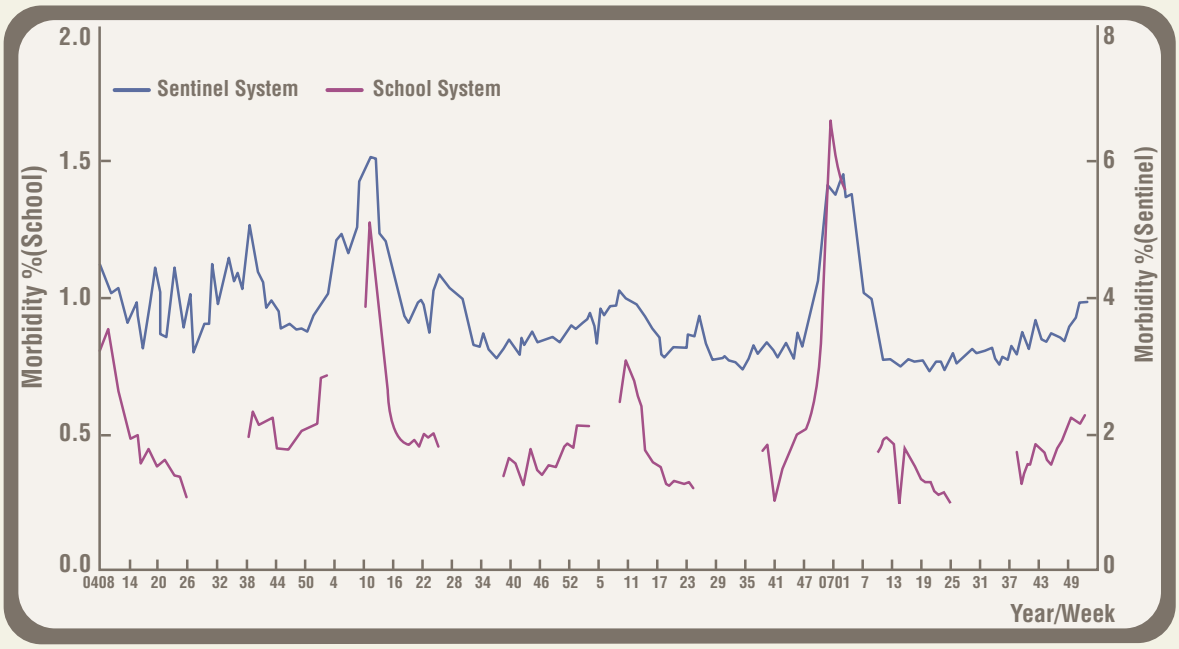


Figure 1 Weekly consultation rate of ILI, EV and diarrhea cases reported from clinic sentinel sites in Taiwan, 2005.1.1-2007.12.31



Note : 1. morbidity(%) = sick students / total weekly attendance x100%
Note : 2. Left-hand Y axis is for flu-like illness and fever, and right-hand Y axis is for other diseases.

Figure 2 The Morbidity of Disease Reported by Sentinel Schools in Taiwan (2004.02.15-2007.12.29)



Note: 1. Morbidity % (school) = # of sick students/total # of students x 100 %
Note: 2. Morbidity % (sentinel) = # of ILI patients/total # of patients x 100%

Figure 3 Comparison of Trends in ILI shown in Sentinel Surveillance System and the School Surveillance system

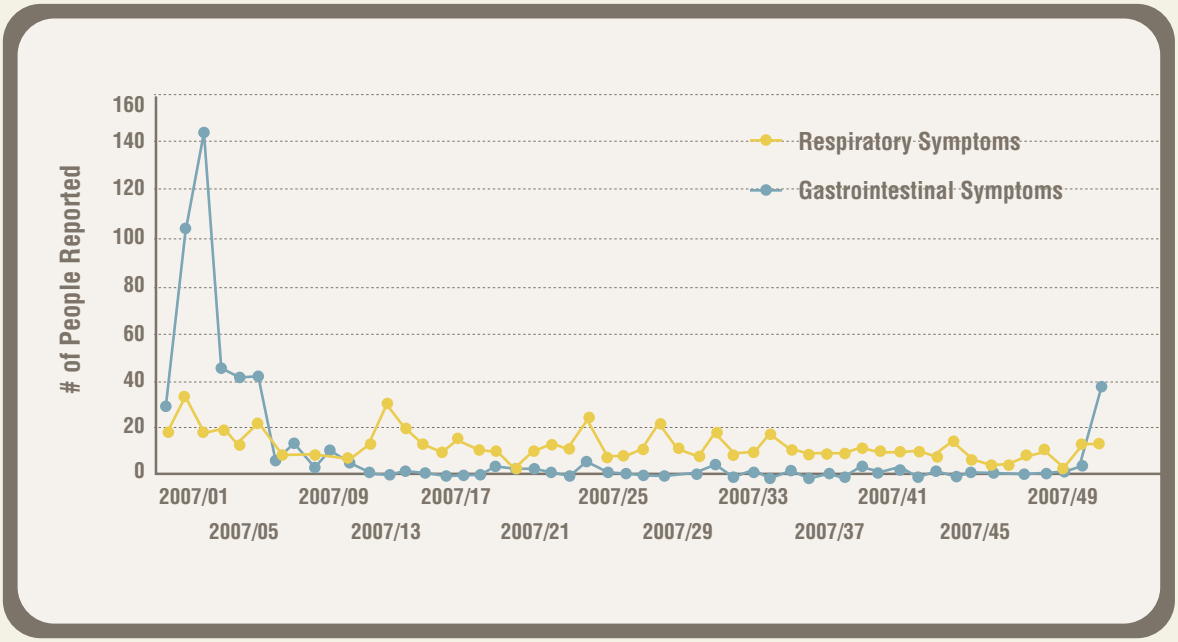


Figure 4 Weekly Report Person-Time of Respiratory & Gastrointestinal Symptoms in Populous Insitutions

Future Prospects – Enhancing the effectiveness of various surveillance systems

1. Establishing Support 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 try to develop a disease prediction model that can estimate the distribution of the predicted diseases.

b. An Emerging Infectious Disease Hospitalization and Management System was completed in July 2005. The new system is flexible, allowing adjusting of diseases categories and extension of variable fields for keeping daily hospitalization records whenever required.

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

d. 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 for communicable disease reporting, consultation, education, and for information of communicable disease policies. The Taiwan CDC assigned full-time personnel to answer calls and take caller messages. The center has become a communications platform.

2. Reporting via the Internet

To make surveillance operations more effective, the Taiwan CDC established several web pages on its systems for users to upload information.

3. Systems Integration

To integrate 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 Syndromic 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 visibility, the contents of the Weekly Reports are also posted on the Internet. Weekly Reports include the Sentinel Surveillance Weekly Report, the School-based Surveillance Weekly Report, and the Influenza Express.

b. To understand effectiveness of surveillance material, the Taiwan CDC, in collaboration with academia, conducts research projects every year.

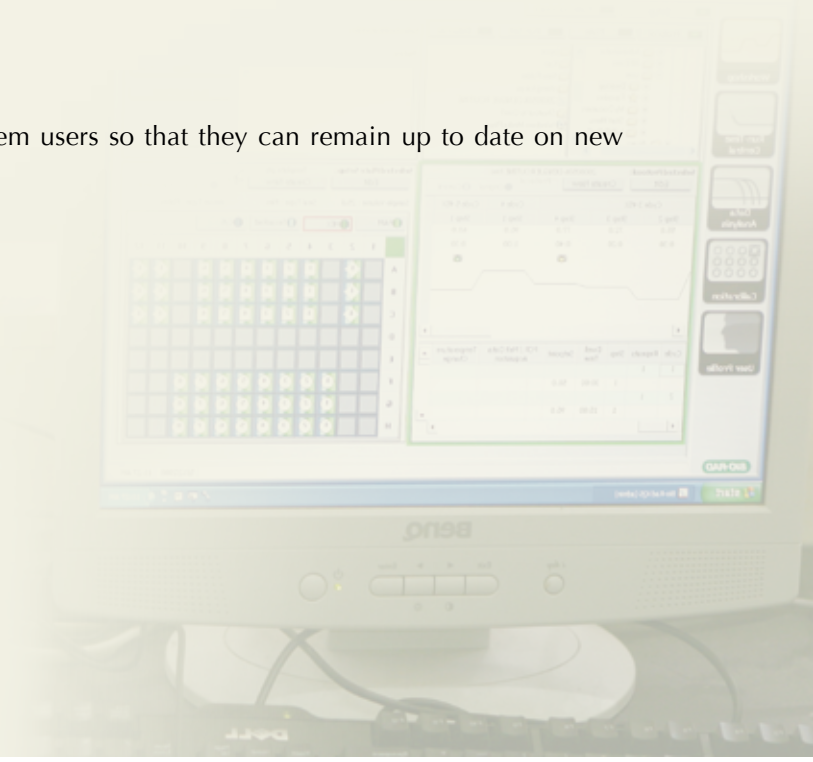
c. The hardware, software, and database developments that have brought other new users to the Geographic Information System (GIS) partly explain this diffusion into the public health sphere. Like the close relationship between pathogens, geographical factors, and the distribution and spread of infectious disease cases that contain geographical information were integrated based on location. GIS was frequently used to analyze 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 to analyze temporal and geographic trends in disease outbreaks. Proceeding to the next step, it will help us to estimate the risk and spread of infectious diseases. 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. Information Sharing

A daily updated information of international epidemics is generated and forwarded to related authorities. The collection, evaluation and dissemination of information to the public, local health departments, as well as governing authorities and information sharing are the keys to the success of this task.

6. Training and Education

Every year, Taiwan CDC offers training to system users so that they can remain up to date on new information about epidemic surveillance.



Important Communicable Diseases Prevention and Control

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 through broken skin or mucus membranes. 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 2007, the number of HIV patients had risen to 15,651 (15,011 of which were Taiwanese nationals, 1,870 HIV patients have died). New HIV infections surged in 2005 to 3389, a 123% increase over the previous year. Faced with this serious situation, Taiwan CDC has dedicated a tremendous amount of effort and resources to AIDS control and prevention programs, including a harm reduction program in 2005. The reported number of HIV infections in 2006 was 2930. This was the first trend reversal since 1984. Towards the end of 2007, we have effectively reduced the number of HIV infections (Figure 1).

In terms of age, the largest number of infections in 2007 was in the 20-29 age group which accounted for 703 or 36.27% of all cases. The second largest group was the 30-39 age group, numbering 676 or 34.88% of all cases (see Table 1). An analysis of risk factors shows that in 2007, the highest percentage of HIV infections was a result of sexual relations: men having sex with men (MSM), which accounted for 38.2% of all cases. The second largest percentage of infections was intravenous drug users (IDUs), accounting for 36.8%. Heterosexual encounters accounted for 21.2% (see Figure 2). Of Taiwanese nationals infected by HIV in 2007, 1,757 or 90.7% were males and 181 or 9.3% were females. The ratio of infected males to female was 9.8:1.

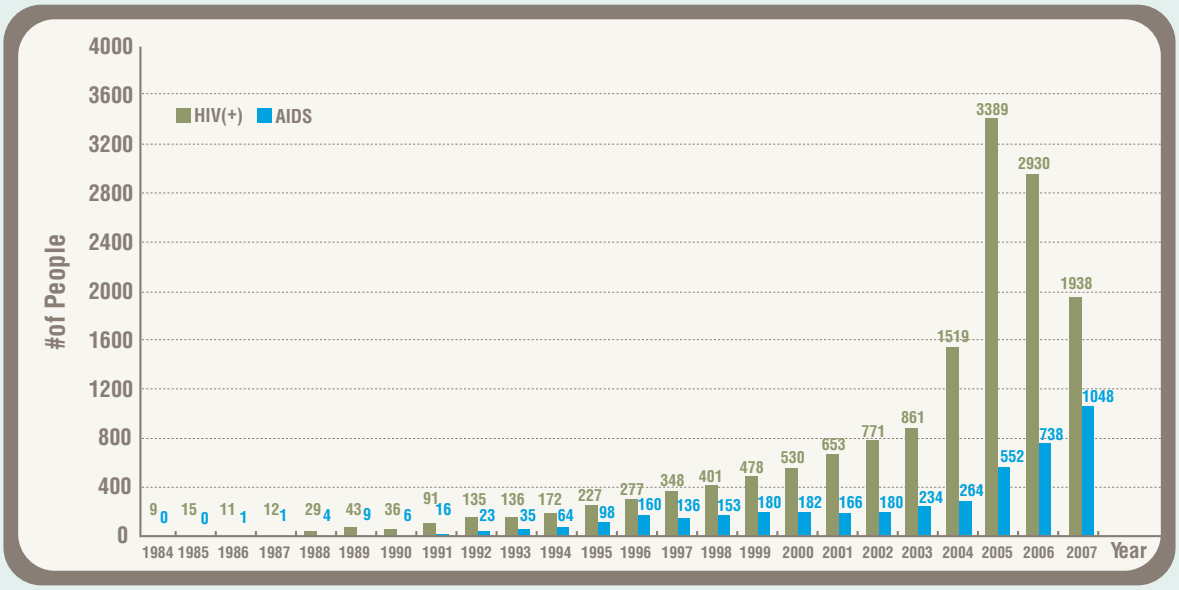


Figure 1 Reported Cases of HIV/AIDS by Year of Diagnosis in Taiwan 1984-2007

Table 1 Age Distribution of HIV Patients in Taiwan 2006/2007/1984-2007

	2006		2007		1984-2007	
Age	Cases	Percentage	Cases	Percentage	Cases	Percentage
0-9	8	0.27%	3	0.15%	37	0.25%
10-19	41	1.40%	40	2.06%	443	2.95%
20-29	1046	35.70%	703	36.27%	5,698	37.96%
30-39	1115	38.05%	676	34.88%	5,317	35.42%
40-49	546	18.63%	363	18.73%	2,315	15.42%
50-59	135	4.61%	110	5.68%	785	5.23%
60-69	26	0.89%	36	1.86%	276	1.84%
70-79	11	0.38%	5	0.26%	109	0.73%
Over 80	2	0.07%	2	0.10%	16	0.11%
Unknown	0	0.00%	0	0.00%	15	0.10%
Total	2,930	100.00%	1938	100.00%	15,011	100.00%

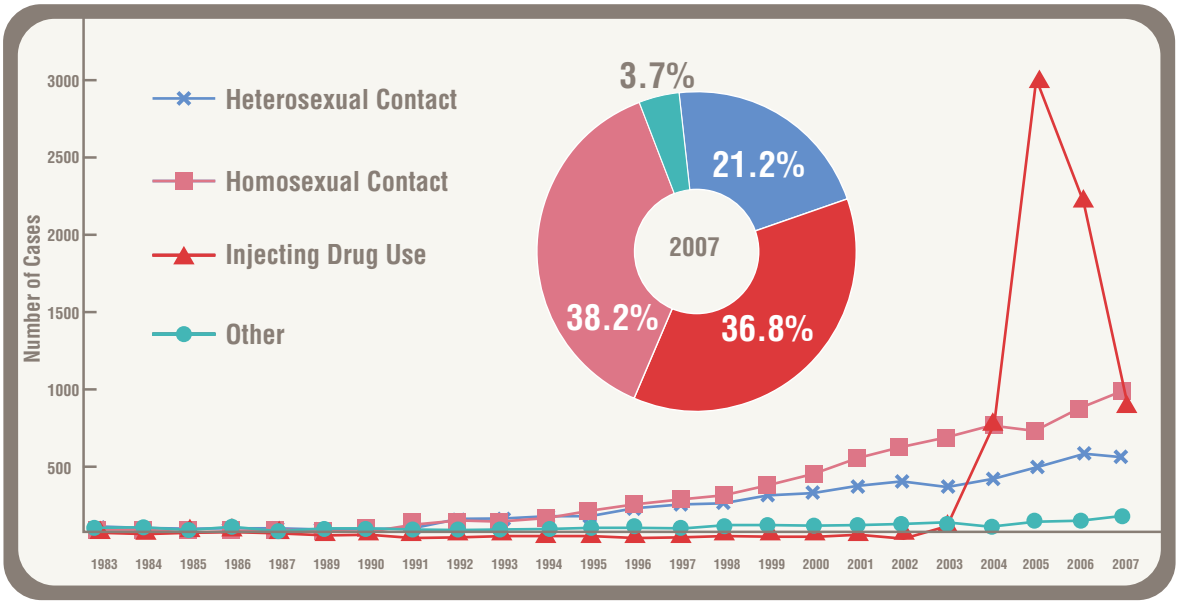


Figure 2 Statistics on Risk Factors of HIV Infections in Taiwan 1984-2007

Goals

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 the Control Committee was chaired by the Health Minister (Figure 3). 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 infection 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

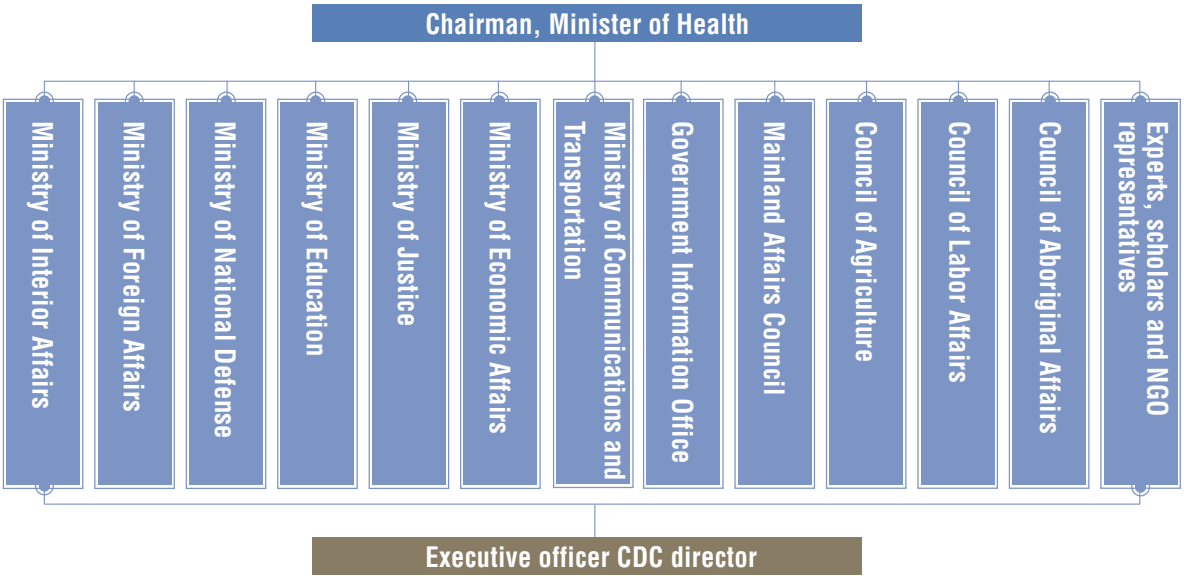
A. Resist sexual temptation. B. Be faithful to your sexual partner. C. Use condoms when having sex. N: Use clean needles. N: Improve negotiation skills. The purpose of condoms is to prevent infection through sexual contact. The purpose of clean needles and other penetrative instruments is to prevent 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. The theme of the 2007 World AIDS Day was “Stop AIDS, Keep the Promise - Take the Lead”, which emphasizes the fact that stopping AIDS requires everyone’s individual efforts. Whether at home, in school, or in any groups, every person should exert their influence and make everyone a part of the anti-AIDS campaign. In order to spread the message, Taiwan CDC and Taipei 101 joined forces and placed a giant ribbon on the exterior wall of the skyscraper. It is hoped that with the passion and love signified by the symbol, we can show our determination in caring for HIV infections and AIDS patients and preventing HIV/AIDS.

Figure 3 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 went nation-wide in July 2006 and was strengthened in 2007. The programs implemented include “Needle-Syringe Programming (NSP)”, “Drug Substitution Treatment”, “Information, Education and Communication (IEC)”.

5. Provide HIV patients with 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.

Accomplishments

1. The Executive Yuan DOH AIDS Control and Prevention Committee held two cross-ministerial meetings in 2007.
2. To ensure the dignity and rights of People Living with HIV / AIDS (PLWHA), the AIDS Prevention and Control Act was revised in 2007.
3. To increase disease surveillance, Taiwan began to screen blood donors in 1988, draftees in 1989, prison inmates in 1990, and foreign laborers in 1991. Since 1977, ten hospitals have provided anonymous HIV blood-screening services, screening 7,906 people in 2007, with 237 found HIV positive, accounting for 3.0% 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 66 positive cases amongst women screened (15 of them were foreign nationals).
4. The Taiwan government has provided HIV/AIDS patients with free medical treatment since 1988 and free highly active antiretroviral therapies (HARRT) since 1997. At the end of January 2008, 36 designated hospitals and 5 designated hospitals for IDUs provided free treatment to HIV/AIDS patients. Nations around the world encourage HIV patients to return to their homes and communities. If HIV patients take their medication according to the prescribed schedule, their immunization systems can be maintained at a certain level, allowing them to avoid coming down with AIDS. They 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.
5. In the area of scientific research and development, Taiwan CDC conducted 7 projects in 2007 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.

▲ 2007 World AIDS Day

Future Prospects

▲ A Decade of Success with HAART

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$1.29 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 (1915, 1931, and 1942). 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, Tainan 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 rose rapidly starting in mid-June. The epidemic originated near the border of 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 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.

In 2006, there were 965 indigenous cases of dengue fever, including 19 cases of dengue hemorrhagic fever (DHF), which caused four deaths.

In 2007, there were 2,000 indigenous cases of dengue fever, including 11 cases of dengue hemorrhagic fever (DHF), but no deaths resulted. The cases were concentrated mainly in the South, including Tainan City, Tainan County, Kaohsiung City and Kaohsiung County. Other cases in Taoyuan County, Taichung County, Nantou County, Pingtung County, Yunlin County, Changhua County, Miaoli County, HsinChu County, Yilan Conuty, Taipei County and Taipei City were infections carried from Southern Taiwan.

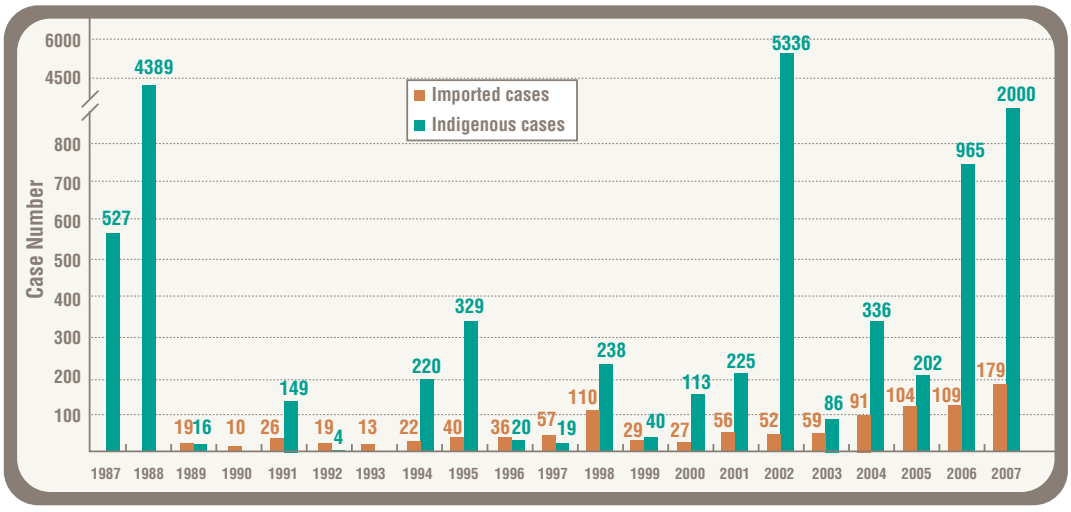


Figure Numbers of confirmed dengue fever cases reported from 1987 to 2007

Goals

Control dengue fever in Taiwan by thoroughly cleaning up 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 up 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 and training of 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 hemorrhagic fever (DHF) diagnosis and treatment and organize continuing education for medical personnel to raise healthcare quality and lower mortality rates.

Accomplishments

In Southern Taiwan, 2,000 people were infected with dengue fever in 2007. As a result of the joint efforts between 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.

1. Primary Prevention

a. Continuation of body-temperature monitoring at international airports. In 2007, 75 cases of imported dengue fever were detected, accounting for 41.9% of the total number of 179 imported cases (Table 1). This measure effectively limited the importation of the disease.

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

c. Production of 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, 2007

	Serotype					
Country of Infection	1	2	3	4	ND	Total
Vietnam	18	10	2	-	25	55
Indonesia	8	10	8	2	20	48
Philippines	3	6	7	1	5	22
Thailand	4	-	-	2	3	9
Cambodia	2	1	1	-	8	12
Malaysia	3	3	1	-	1	8
Bangladesh	-	-	1	-	-	1
India	-	-	-	-	1	1
Myanmar	1	-	2	-	5	8
Singapore	0	3	0	0	0	3
Laos	0	0	0	0	1	1
Solomon Islands	0	0	0	1	1	2
China	6	0	0	0	3	9
Total	45	33	22	6	73	179

d. The first edition of the Guidelines for Dengue Control were published for the various health organizations in their fight against the epidemic.

e. 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 subsidiaries and organized volunteer teams to exterminate mosquitoes.

f. Engaged scholars and experts in insecticide efficiency and resistance studies of dengue fever vectors. The findings were referenced in procurement of insecticides.

g. The Central Trust of China processed joint supply contracts for the centralized purchase of pesticides for special environments.

h. 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 mosquitoes). 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.

2. Secondary Prevention

a. 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.

b. To understand shifts in insecticide resistance of vectors after indigenous dengue fever broke out in Southern Taiwan in 2007 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.

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 the 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.



Enteroviruses

Background

Enteroviruses belong to a group of small RNA viruses, including polioviruses, Coxsackie A viruses, Coxsackie B viruses, echoviruses, and other enteroviruses (EV68~). EV71 has a significantly higher pathogenicity among known enteroviruses, especially in respect to neurological complications. Enteroviruses are 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 Centers for Disease Control, the number of outpatients infected with enteroviruses 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. Human 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, enteroviruses will continue to exist and pose a threat to human health for the foreseeable future.

The peak season for enterovirus infections in temperate regions is summer. According to various surveys, trends in enterovirus infections suggest that children under the age of 5 are more prone to critical complications and death from enterovirus infections. The major symptoms of enterovirus infection are herpangina and hand-foot-and-mouth disease (HFMD). Enterovirus 71 is the most commonly seen type of enteroviral pathogen in Taiwan. In 2007, 12 severe cases were confirmed, three deaths resulted.

Goals

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 raise the academic standard in the field of enterovirus studies.
5. Develop an enterovirus 71 prototype vaccine.

Strategies

1. Enhance the Capabilities of Case Surveys

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

2. Augment Health Education — Knowledge Reduces Fear

The Taiwan CDC consolidates government and public resources to educate the general public, medical personnel, educational organizations, and the media about the basics of enteroviruses through a variety of channel. For instance, the following disease prevention information is presented to the public: (1) general cleanliness and frequent hand washing can boost one's health; (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 infections. 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 enact enterovirus prevention policies in case the medical system breaks down. Additionally, coordinating the actions of 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 enteroviruses to both the health of individuals and society.

Accomplishments

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 infections have become a seasonal epidemic in Taiwan.

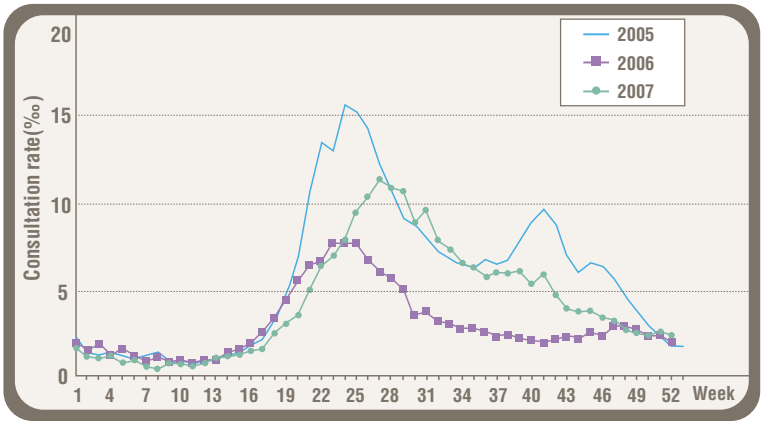


Figure 1 Weekly consultation rate of Enterovirus infections reported from clinic sentinel sites in Taiwan, 2005-2007

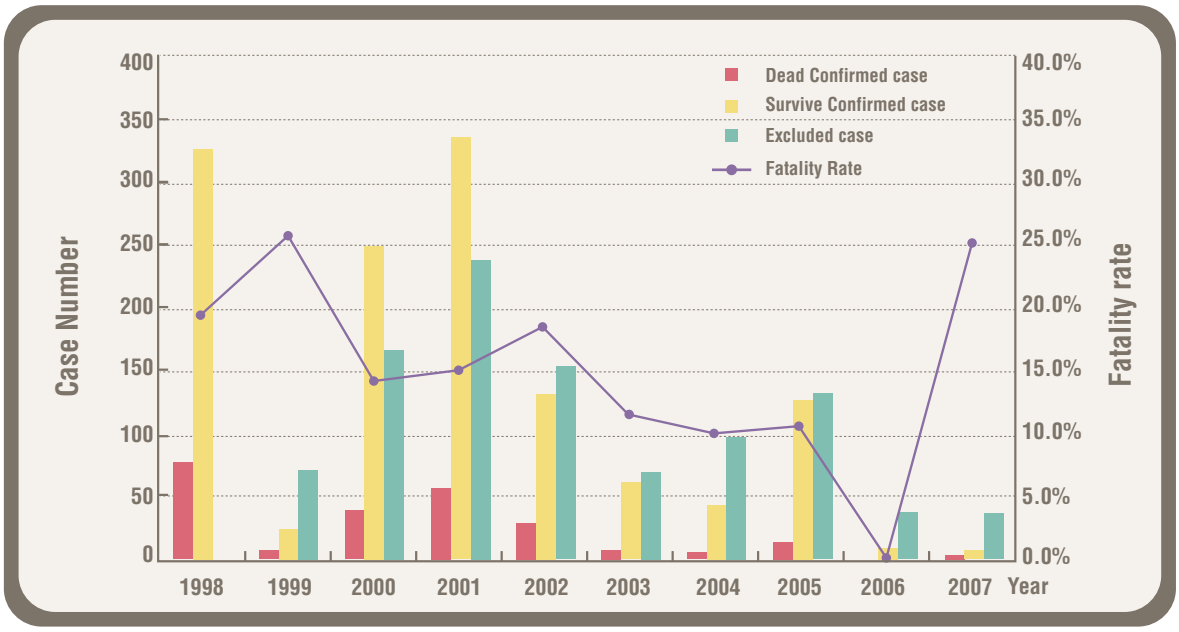


Figure 2 The annual fatality rate from severe cases in Taiwan.

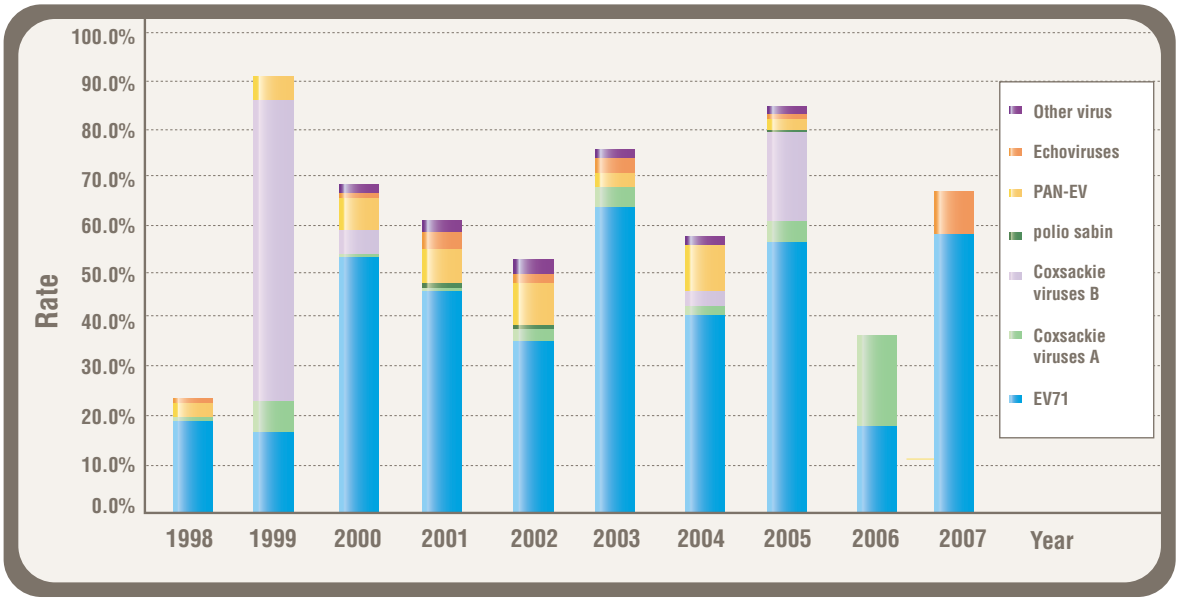


Figure 3 EV71 is the major causative pathogen of severe cases in Taiwan.

2. Health Education

a. Red banners hung in schools notify about enteroviruses. 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 environmental 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 to 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.

Influenza Pandemic Preparedness

Background

The next influenza pandemic threat most likely comes from the outbreak of highly pathogenic avian influenza, caused by the H5N1 virus. From 2003 to 2005, the virus has spread from South-East Asia to Central Asia, Europe, the Eastern Mediterranean and Africa. Accompanied by the outbreaks in poultry, human cases of H5N1 are increasing; thus the viruses could become more adaptive to the human body or could exchange their genetic material, hence forming the pandemic virus. By the end of 2007, according to data reported to WHO, there have been more than 300 confirmed human cases of H5N1 (in 14 countries) and among them more than 200 deaths.

Goals

1. Avoid the occurrence of any domestic human case of H5N1 during pandemic alert period.
2. Prevent the further transmission from imported human cases of H5N1 during pandemic alert period.
3. Reduce the health impact and maintain social functions and economic activities during pandemic period.
4. Recover social psychology and economic development during postpandemic period.

Strategies

The "4 major strategies and 5 lines of defense" plan are the main framework for pandemic preparedness.

Four Major Strategies

Strategy I – Early Detection

Surveillance systems have been built up to (1) detect any unusual cluster of influenza-like illness, (2) discover abnormal clinical manifestations in flu cases, and (3) understand flu virus activities.

Strategy II – Interruption of Transmission

Several non-pharmaceutical public health interventions, such as personal hygiene practices, isolation of patients, quarantine of contacts and social distancing have been formulated to interrupt the transmission of pandemic flu virus.

Strategy III – Antivirals

Neuraminidase inhibitor antivirals have been stockpiled to contain the avian flu virus or pandemic flu virus at early stage of pandemic. Furthermore, the antivirals are expected to reduce morbidity and mortality during pandemic period.

Strategy IV – Influenza Vaccine

In order to maintain essential social functions and protect high-risk groups, the pre-pandemic flu vaccines have been stockpiled and the capacity of flu vaccine manufacturing are under development.

Five Lines of Defense

First Line of Defense – Containment Abroad

In order to assist in containing the pandemic virus as early as possible, Taiwan CDC tries to actively participate in the global collaboration plan and track the newest international epidemic situation.

Second Line of Defense – Border Control

Should the virus' transmission ability continue to increase, quarantine inspection reinforcement at airports and seaports is a major method of protecting citizen's health. Health monitoring and management of incoming passengers will be gradually upgraded depending on the international epidemic situation.

Third Line of Defense – Community Epidemic Control

During pandemic phase, community epidemic controls will become the major tool used to lessen the pandemic's impact. 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.

Fourth Line of Defense – Maintaining Normal Medical System Functions

"Infectious Diseases Control Medical Network" has been established to prevent patients with other diseases from being deprived of necessary medical resources and to provide more extensive care to large numbers of pandemic flu patients. In addition, local governments need to set up large-scale care facilities.

Fifth Line of Defense – Individual and Family Protection

During pandemic phase, people should be instructed to stay home and then reduce unnecessary social interaction. In addition, any person with a mild illness should be encouraged to recuperate at home. Therefore, higher levels of personal and household hygiene will be requested during a pandemic.

Accomplishments

1. Three hierarchical plans have been developed: the National Influenza Pandemic Preparedness Plan, the Strategy Plan for Execution of Influenza Pandemic Response, and the Influenza Pandemic Response Plan. These plans have been revised regularly.

2. A three-tier administrative hierarchy has been established for pandemic response: the Office of the President, Executive Yuan and the Department of Health.

3. The current neuraminidase inhibitors stockpile has been maintained at a coverage rate of at least 10% of the population.

4. 190,000 H5N1 pre-pandemic vaccines have been prepared to be used on medical and health workers.

5. Central and local governments have conducted 22 exercises for pandemic responses.

6. In order to objectively assess Taiwan's readiness of pandemic preparedness, Dr. Richard Coker has been authorized to review Taiwan's preparedness plan. The overall score was assessed to be 70%, which was well above the median of the previously-evaluated 28 countries and indicates a high level of preparedness.

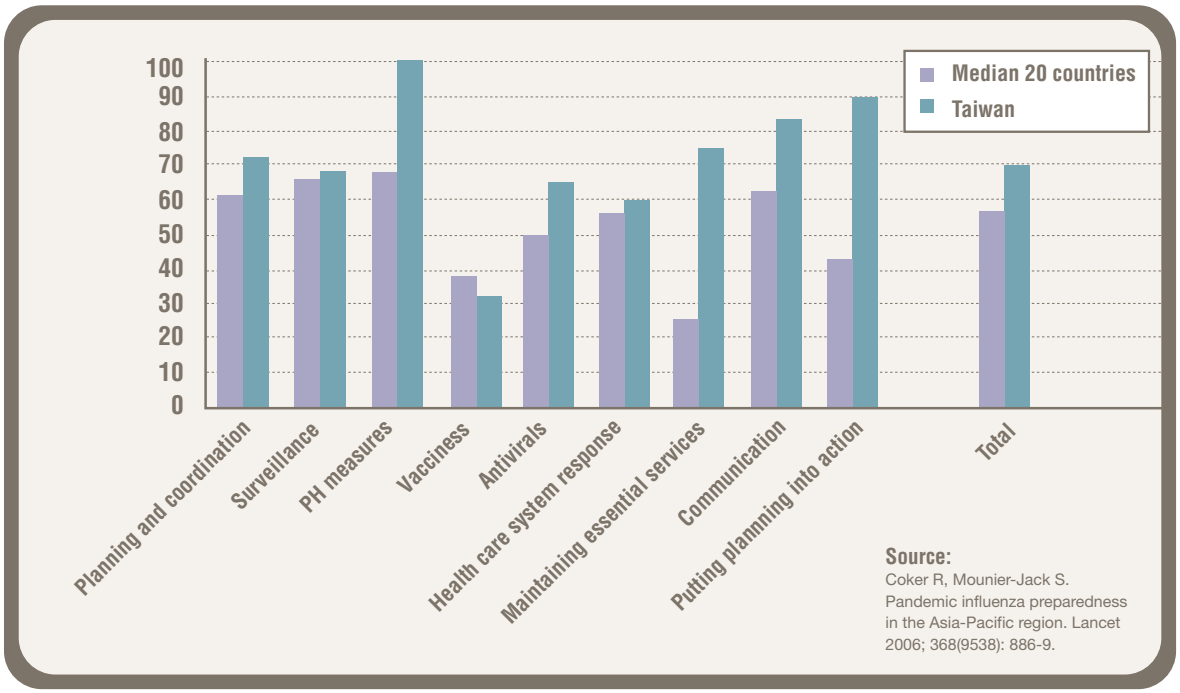


Figure Taiwan scores by area in % of maximum score for completeness

Future Prospects

Based on the past experiences of influenza pandemics, it will cause high morbidity, excess mortality, and social and economic disruption, so the efforts for preparedness should not be limited in health aspects. In addition to all central and local governments, the private sector and even individuals should also be involved. How to encourage every partner to be well-prepared will be the major challenge for us.

Emergency Preparedness & Response

National Health Command Center (NHCC)

Background

In 2003, SARS became a global epidemic that severely tested Taiwan's capabilities for medical crisis management. In response, the government here 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, the Biological Pathogen Center, the Counter Bio-terrorism Command Center and the 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 the NHCC hinges upon state of the art technology and urgent integration of medical information, as well as a complete command system blueprint. To work toward this goal, the NHCC planning team established a set of standard operating procedures (SOP) that incorporate elements of the US Incident Command System and the SARS Command System SOPs.

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. The WHO International Health Regulations (IHR 2005) was officially implemented on June 15, 2007. In order to establish a unified communication channel with international organizations and ensure that public health emergencies are reported and responded to as quickly as possible, the NHCC is now responsible for the operation of the IHR Focal Point.

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 and Lounge. This organizational design stimulates effective coordination and operations.

Facility Designs (Technology on the Frontlines)

Epidemic prevention attains maximum effectiveness when assisted by information technology. Using cutting edge technology and an advanced communications network, the NHCC plays a vital role in 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 the NHCC's 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 a war against an epidemic. Hence, an important goal of the NHCC is to set up a smooth information exchange system 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), Realtime Outbreak and Disease Surveillance (RODS), National Epidemic Decision Support System (NEDSS) 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.

Accomplishments

2005	2006	2007
》South Asian earthquake/tsunami aid (01.05-01.28)	》Individual traveling to Australia suspected of being infected with avian influenza while in transit through Taiwan (01.04-01.05)	》Incident of registered MDR-TB patient boarding international flight (07.25-07.30)
》Cerebrospinal meningitis outbreak in China (02.02-02.10)	》Boy suspected of being infected with avian influenza on his return to Jinmen Island (03.01-03.02)	
》Enterovirus outbreak (06.02-09.25)	》Dengue fever outbreak in Kaohsiung (10.02-12.22)	
》"Unknown disease" outbreak in Sichuan (07.23-08.21)		
》Melioidosis outbreak (07.30-08.17)		

Future Prospects

In the 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.

PPE Stockpile & Management Information System (MIS)

Background

During the SARS crisis of Spring 2003, there was a shortage of personal protective equipment (PPE) in Taiwan. However, as the epidemic ended, large quantities of PPE were left behind to be managed. Understanding the importance of the logistics management on PPE supply chain, Taiwan CDC then took charge of the task in Autumn 2003.

Goals

The task was to provide sufficient quantities of PPE to ensure protection of the front-line health care workers and the public if there is a public health emergency, such as pandemic flu. The primary work included establishing a safe stockpile, and developing logistics and distribution strategies for the PPE.

In 2007, Taiwan CDC made notable progress on many stockpile plans. For reasons of risk management and logistical flexibility, we set up five separate warehouses for storage of the central government's stockpile. We also concluded many inter-entity supply contracts of related items, such as N95 respirators, surgical masks, procedure masks and PAPRs (Powered Air Purifying Respirators). Our strategy included the following four main aspects:

1. Establishment of a Safe PPE Stockpile

To estimate the potential demand of PPE at a national level, we used FluAid2.0 and FluSurge1.0 software developed by the USCDC, to predict the curve of infections under the scenario of an influenza pandemic, with an attack rate of 25% to 35%. According to the estimation result of PPE demand, and the survey of PPE supply, three levels of safe stockpiles were established. The central government's stockpile is for epidemic control and emergency dispatch. Local government stockpiles are for local public health and epidemic control needs, and medical facilities' stockpile is for control of nosocomial infections. Table 1 shows the safe stockpiles and the distribution list.

Table 1 Safe and Current Stockpiles of PPE, 2007

Items \ Levels	Safety stockpile				
	Central government	Local government	Medical facilities	Total	Current stockpile*
N95 respirators	500,000	500,000	1,000,000	2,000,000	3,078,000
Surgical mask	1,750,000	1,750,000	3,500,000	7,000,000	10,950,000
Procedure mask	75,000,000	-	-	75,000,000	5,753,000
Protective Apparel	200,000	200,000	400,000	800,000	4,263,000

*Data was downloaded from MIS on 2007/12/31

2. Information Management and Monitoring

To grasp real-time data about dynamic changes in PPE stockpiles, we established a Management Information System (MIS) to provide accurate and complete information for decision making. Updated information of 927 PPE stockpiles from 534 hospitals, 378 local health agencies, 20 CDC offices, and

other government agencies were regularly posted on the website. According to a recent survey, the average number of visits per day to 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: conventional PPE, antivenom, anti-virus drugs, vector control pesticides, sampling materials and methadone.

3. Ensure Swift Delivery

All the central government's PPE are kept in air-conditioned warehouses in five separate locations, and are dispatched by a professional logistics company. All PPE goods ordered to be deployed anyplace in Taiwan island will be delivered within 24 hours, and it will take no more than two days for off-shore islands.

4. Long-term Planning

In the next five-year long-term plan from FY2009 to FY2013, Taiwan CDC is going to develop call options contracts and vendor managed inventory (VMI) for the PPE supply chain management, to ensure that our PPE stock is rotated and kept within potency shelf-life limits. At the same time, Taiwan CDC will also try to coordinate the PPE supply chain in Southeast Asia, for the purpose of regional preparedness of PPE in the future.

Field Epidemiology Training Program (FETP)

Background

The Field Epidemiology Training Program (FETP) is designed to train professional epidemiologists out of different health related fields. It is similar to the training program provided by the Epidemic Intelligence Service (EIS), Centers for Disease Control and Prevention of the United States (USCDC). The FETP was established in 1984 and has collaborated with the USCDC. Its main purposes are to train persons who have basic public health concepts to independently conduct surveys and participate in the investigation and control of disease outbreaks. The program emphasizes the importance of hands-on experience in field investigation and analysis of practical cases. Originally, the FETP was supervised by the Bureau of Communicable Disease Control (BCDC) of the Department of Health. For more effective cooperation with other public health agencies, the FETP merged into the National Institute of Preventive Medicine (NIPM) in 1988. Having gone through the nationwide enterovirus outbreak in 1998, the FETP, along with BCDC, NIPM, and Disease Surveillance and Quarantine Service, were reorganized into the Centers for Disease Control in 2000. The three major functions of the FETP are described in the following sections.

▲FETP consultant, Dr. Michael Malison, shares his working and teaching experiences with all trainees.

Goals

1. Discipline of Epidemiology Professionals

Each year, 8–12 trainees with a variety of educational backgrounds such as medicine, dentistry, veterinary medicine, nursing, and other health related fields are recruited for the two-year training. At the beginning is an eight week training period when the trainees are taught fundamental courses including epidemiology, biostatistics, public health ethics and law, evaluation of surveillance systems, scientific writing, and prevention effectiveness. After completing this basic discipline, each trainee participates in different outbreak investigations. In the second year of training, the trainees conduct their own long-term research projects. These projects focus on current health problems in Taiwan. Currently, a total of 18 classes, 115 graduates, have successfully finished their training. Each graduate receives a certificate and becomes an FETP consultant. In addition, another 2 classes, 14 trainees, are currently undergoing basic training.

2. Field Epidemiology Investigation and Long-Term Research Projects

In the past, the FETP trainees have investigated 248 disease outbreaks and completed 120 long-term research projects. Corresponding papers regarding these outbreak investigations and projects were published in major national and international journals. Among these, several outstanding papers are listed as follows: Measles outbreak in an elementary school in Chimei Island, Penghu County; Outbreak of paralytic shellfish poisoning in the Kaohsiung area; Acute hemorrhagic conjunctivitis in Taipei City; Suicide trends in the Taiwan area in the last ten years; An analysis of traffic injuries in Taiwan in relation to alcohol use and economic losses; Outbreak of type A botulism due to commercially preserved peanuts in Changhwa County; A school waterborne outbreak involving both Shigella sonnei and Entamoeba histolytica; Investigation of the pathogenic factors of sauropus androgynus poisoning; A nosocomial outbreak of malaria associated with contaminated catheters and contrast medium of a computed tomographic scanner; An epidemic of enterovirus 71 infection in Taiwan; Outbreak of Stevens-Johnson syndrome/toxic epidermal necrolysis associated with mebendazole and metronidazole use among Filipino laborers in Taiwan.; Outbreak of beriberi among illegal mainland Chinese immigrants at a detention center in Taiwan; The public health response to the Chi-Chi earthquake in Taiwan, 1999; Transmission of SARS on aircraft; Hydrogen peroxide poisoning associated with eating spaghetti among school children in northern Taiwan.

3. Collaboration with National and International Training Institutions

Faculty members from various universities and research institutions are appointed to teach the trainees on a regular basis. Distinguished scholars or experienced public administrators are also invited to advise on trainees' long-term research projects. Furthermore, visiting specialists from the USCDC provide technical consultation for the trainees regarding their field investigations.

Results of some field investigation or long-term research projects have been presented at the annual conference held by the Taiwan Public Health Association, the Chinese Society of Immunology, Infectious

Diseases Society of Taiwan, the USCDC, the International Clinical Epidemiological Network (INCLEN), and the Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET). By attending these conferences, trainees can share their experience of practical field-based or 'learning-by-doing' approaches to public health with field-trained epidemiologists from other countries.

Accomplishments

In 2007, three medical officers were trained in the Field Epidemiology Training program. In the same year, 15 outbreak investigations were completed. These investigations include "Shigellosis outbreak in a day care center in Taipei County", "Shigellosis in Jen-Ai Township, Nantou County", "Shigellosis outbreak at Bei-Tun Elementary School", Taichung, "MDR-TB in a Nepalese passenger who transited through Taiwan", "Taiwanese student from Kaohsiung aboard a flight from the United States to Taiwan", "Norovirus outbreak among residents at a psychiatric center, Bali, Taipei County", "Novovirus outbreak at one veterans hospital, Yilan County", "Rubella outbreak among Filipino workers at a construction company, Taoyuan County", "Rubella outbreak among Thai workers at a construction company, Miaoli County", "An Outbreak Investigation of Unknown Cause Respiratory or GI Symptoms at a Secondary School Located in Hualien City", "First Sapovirus Outbreak in Taiwan", "Coxsackie A24 Conjunctivitis at Ba-Do Junior High School, Keelung", "Varicella outbreak among Filipino workers at a hard disk trace company, Hsinchu", "Enterovirus outbreak at one mother-baby care center in Hsinchu County", "Investigation of a suspected avian influenza pneumonia patient, Penghu County", and "Sudden death of baby and infant at a mother-baby care center, Kaohsiung".

In addition, FETP hosted the Fourth TEPHINET Southeast Asia/Western Pacific Bi-Regional Scientific Conference at the Taipei Grand Hotel from November 26 to 30, 2007. A total of 306 persons attended the conference including persons from Argentina, Australia, Austria, Cambodia, China, India, Indonesia, Kenya, Korea, Lebanon, Malaysia, Philippines, Singapore, Taiwan, Thailand United Kingdom, United States, and Vietnam. There were 61 oral and 98 poster presentations at the conference.

Future Prospects

In the future, the FETP will strengthen its connections and interactions with other similar training programs nationally and internationally. It also plans to establish cooperative programs with academic and research institutions around the world. Finally, it intends to strengthen its coordination among FETP graduates and trainees. Through these efforts, the program trainees not only can refresh and advance their knowledge in the field of epidemiology but also make better contributions to people's health in Taiwan.

Nosocomial Infection Control

Background

After the Severe Acute Respiratory Syndrome (SARS) outbreak in 2003, Taiwan CDC had established a dedicated nosocomial infection control unit to fulfill the purposes of protecting patients and health care workers, reducing nosocomial infection, and improving infection control mechanisms. This unit has constituted several nosocomial infection control tasks, including the program of annual inspection of nosocomial infection control measures in hospitals, not only based on the reference materials published by WHO and US CDC but also in accordance with the characteristics of the local environment and health care facilities.

Goals

1. To fulfill WHO's patient safety policy, planning effective intervention programs for infection control to reduce instances of nosocomial infections and to lower the proportions of antimicrobial resistance.

2. To integrate the procedures and the standards for inspection of nosocomial infection control into those for hospital accreditation and to set up quality standards for nosocomial infection control, in order to simplify the process of data preparation and to improve willingness of hospitals to cooperate with the inspection program.

3. To establish nosocomial infection surveillance indexes that recognized internationally to evaluate epidemiology trends in local hospitals and to serve as an important reference for policy-making.

Accomplishments

1. Compilation of Infection Control Guidelines

Taiwan CDC has completed various infection control guidelines based on academic literature worldwide, guidelines of the US and Europe, and recommendations of local medical professionals. These guidelines were reviewed by the healthcare infection control practices advisory committee, and were placed on Taiwan CDC's website, accessible to all medical institutions. Contents added or amended in 2007 including: guidelines for isolation precautions in healthcare settings, WHO interim infection control guidelines on avian influenza, including influenza A (H5N1) in humans for health care facilities, guidelines for hand hygiene, management of multidrug-resistant organisms in healthcare settings, infection control guidelines for invasive procedures, guidelines for infection control in infants and neonatal care centers, and guidelines for norovirus infection control.

2. Inspection of Implementation of Nosocomial Infection Control Measures

In order to encourage medical institutions to establish an effective nosocomial infection control system, reduce nosocomial infection and ensure the quality of medical services, Taiwan CDC has established the "Regulations Governing Inspection of the Implementation of Infection Control Measures in Medical Care Institutions" in accordance with Article 32 of the Communicable Disease Control Act. Ever since

2005, Taiwan CDC has been regularly conducting nosocomial infection control inspections at medical institutions nationwide. Furthermore, meetings are also regularly held to discuss amendments to the inspection items. Also, since 2007, in accordance with the new hospital accreditation system, rating for each inspection item is divided into five different levels according to the completeness of work. After implementation, the percentage of medical care institutions that met the standards has increased significantly. Until 2007, out of 507 hospitals reviewed, only three failed inspection. In other words, 99.41% of hospitals reviewed were able to meet requirements.

	2005	2006	2007
Initial Inspection			
Number of Hospitals Inspected	522	524	507
Number of Hospitals Failed	89	25	20
Passing Rate	82.95%	95.23%	96.06%
Year-End Inspection			
Number of Hospitals Inspected	535	521	507
Number of Hospitals Failed	39	7	3
Passing Rate	92.71%	98.66%	99.41%

3. Nosocomial Infection Control Regional Assistance Plan and Medical Service Quality Improvement Plan

Taiwan CDC has commissioned the Nosocomial Infection Control Society of Taiwan to implement a Nosocomial Infection Control Regional Assistance Plan and Medical Service Quality Improvement Plan, which aims to improve nosocomial infection control in medium and small scale regional and district hospitals with the help of experts. The society provided assistance to 265 hospitals in 2007, published six volumes of the Infection Control Journal, and held 60 training sessions on infection control to improve the professional expertise of clinical and health workers. Taiwan CDC is also in the process of establishing a long-term comprehensive infection control quality improvement plan to help hospitals improve their infection control capabilities.

4. Surveillance of Nosocomial Infection

In order to monitor nosocomial infections more effectively, Taiwan CDC in 2001 completed the Nosocomial Infection Reporting System. Furthermore, in order to improve the functionality and practicality of the system, it began extensive upgrades at the end of 2005. The new system officially went online on January 1, 2007, and was renamed the Taiwan Nosocomial Infections Surveillance System (TNIS). Hospitals voluntarily reported detailed information on patients who acquired infection in hospitals, including demographic and hospitalization information, status of infections, related risk factors, and the results of microbiological detection, via on-line entry or through the electronic data interchange platform. Thus, the system collects the nosocomial infection status of hospitals around the country and the distribution of antimicrobial-resistant strains in these hospitals. It also provides the statistical functions so that hospitals could analyze their own nosocomial infection data and generate standardized graphics and tables. Currently, 325 hospitals have completed their 2007 case reports and about 50 hospitals are in the process of establishing information exchange modules. Furthermore, Taiwan CDC regularly produces reports for hospitals around the country in the hope that the hospitals may improve their nosocomial infection control quality and protect the health of their staff and patients via self-monitoring and inter-hospital comparisons.

5. Promotion of Hand Hygiene

The most effective way to control nosocomial infections is to keep hands clean. Therefore, one of Taiwan CDC's most important tasks is the promotion of hand hygiene. Taiwan CDC has not only issued hand hygiene guidelines and various promotional materials, but has also commissioned the Taiwan Joint Commission on Hospital Accreditation to conduct the 2007 Hand Hygiene Promotional Project. By holding conferences and quality control circle competitions, the project provides a learning and information exchange platform for the hospitals, and a way to improve hand hygiene among medical professionals. The project has held four hand hygiene promotional conferences in different regions, with 471 participants. Furthermore, it also held a quality control circle competition with the purpose of improving the hand hygiene of staff in hospitals. 58 hospitals of various sizes competed in the event, and one first place, three second place, and 11 third place awards were given out after evaluation by experts. Information about the conferences and the competition has been put on the website of the Taiwan Joint Commission on Hospital Accreditation, and can be downloaded by any organizations to use as a reference. (http://www.tjcha.org.tw/S_english.asp?catid=2)

Future Prospects

1. Continue to promote the "Program of Nosocomial Infection Control Inspection and Quality Improvement", integrate the procedures and the standards for inspection of nosocomial infection control into those for hospital accreditation, and establish a fair nosocomial infection inspection mechanism. It is hoped that results of inspections can be included in the new hospital accreditation system.

2. Continue to develop nosocomial infection control policies, and amend Taiwan's infection control guidelines in accordance with the recommendations published by WHO or other advanced countries; gathering infection control policies, related laws, and outcome of implementation in other countries as references for policy making.

3. Continue to encourage hospitals to enroll in the Taiwan Nosocomial Infection Surveillance System, provide hospitals with quarterly reports of national nosocomial infection surveillance data analysis, in hopes of improving quality of infection control and monitoring trends of antimicrobial resistance.

4. Analyze the usage of surgical antibiotic prophylaxis in hospitals and examine the relationship between the status of antibiotics usage and the distribution of antimicrobial-resistant strains, use the information as a reference for antibiotic management policies.

5. Continue to promote hand hygiene among healthcare workers and patients' family members in order to ensure the safety of medical workers and patients.

International Health

International Ports Quarantine Activities

Background

Being situated in a subtropical zone, Taiwan is vulnerable to the invasion of various tropical diseases. This is especially true because of our thriving international tourism and trade. To ensure quarantine, the government has set up quarantine offices at airports (Taoyuan and Kaohsiung-Siaogang), seaports (Keelung, Kaohsiung, Taichung, Hualien, Suao, Mailiao, Heping), and the two terminals (Kinmen and Matsu) of the "Mini-Three-Links" with China. This prevents the import of diseases and protects the public's health. The planning and supervision of quarantine work at these airports and seaports is the responsibility of the Taiwan CDC Second Division.

To meet International Health Regulations (2005) (IHR (2005)) 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 quarantine units to take all necessary quarantine measures against inbound ships, aircraft, their crews, passengers, and cargos for national security and public health protection.

Goals

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

2. Streamlining and standardizing process operations: Calling for timely revision and standardization of the operational process by reacting to the latest epidemic information while benefiting from historical precedence.

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

Accomplishments and Strategies

1. One-stop information service

Establishing a one-stop information system for all information regarding quarantine operations. This includes quarantine operations for aircraft, ship quarantine, ship sanitation certificates, vaccinations, fee collection, online check and statistics, etc.

2. Standardization of Operational Process

Introducing ISO 9001 international quality standard to standardize the process of ship quarantine by review at international seaports.

3. Aircraft and Ships Quarantine

a. Quarantine by review: Any craft destined for a Taiwan port is required to report the state of its sanitation and the passengers' 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 confirming there is no danger of importing a disease. The procedure is intended to shorten the time of any quarantine.

b. On-board quarantine: There are five possible scenarios for on-board quarantine: (1) an inbound ship or aircraft has not applied for quarantine, (2) it has applied but failed to meet the quarantine requirements, (3) it has reported a passenger/crew member suspected of suffering from a communicable disease, (4) there is abnormal death of animals, and (5) there is a suspected patient or death on an aircraft. In these cases, quarantine officers may board the ship or aircraft to quarantine it. The following table shows the state of quarantine in 2007:

Table1 Statistics on quarantine work at international ports in 2007

Quarantine Unit	Ships	Passengers	Aircraft	Passengers	Cargo Planes	Tonnage of Cargo
1st Branch Office (Keelung)	7,119	84,088	1			
1st Branch Office (Suao)	556					
1st Branch Office (Kinmen)	4,612	725,337				
1st Branch Office (Matsu)	863	53,163				
2nd Branch Office (Taoyuan)			65,960	10,402,586	14,076	4,310,864
3rd Branch Office (Taichung)	5,662	48	1,365	101,798		
3rd Branch Office (Mailiao)	3,146	5				
5th Branch Office (Kaohsiung)	16,093	2,538				
5th Branch Office (Siaogang)			14,705	1,552,918	498	154,948
6th Branch Office (Hualien)	978	2,079	18	1,451	1	105
Total	39,029	867,258	82,049	12,058,753	14,575	4,465,917

4. 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. Depending 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 12,926,011 passengers arriving in Taiwan last year, only 15,607 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 consulting purposes. Last year, using data from completed forms and body temperature scans, the Taiwan CDC found 75 cases of dengue fever, 24 cases of shigellosis, 3 cases of Chikungunya, 1 case of measles, and 33 cases, 9 cases and 1 case in terms of Vibrio parahaemolyticus, Salmonella and Staphylococcus aureus.

5. Control of Disease Vectors in Ports

The purpose is to control the vector density (i.e., any infectious disease carrier such as rats, mosquitoes, etc.) 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 "Mini-Three-Links" terminals with the Mainland) was performed. The rats caught were examined for parasites to understand the variety and quantity of the parasites. Furthermore, the rats' blood serum 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 an epidemic. Therefore, it is necessary to understand the variety and quantity of mosquitoes. Controlling the population can prevent an epidemic. The following methods have been adopted:

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

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

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

(4) Organizing international port sanitation 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.

6. Other Measures of Sanitation Control

a. Shipboard Sanitation Control:

To prevent the spread of disease on ships on international routes, the Taiwan CDC imposes control

of such ships in accordance with the WHO International Health Regulations and the Regulations Governing Quarantine at Ports.

(1) Before 15 June, 2007, deratting for ships (or deratting exemption):

The Deratting Certificate/Deratting Exemption Certificate held by a ship is 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 getting another certificate. If no sign of rats is found, a Deratting Exemption Certificate will be issued.

(2) From 15 June, 2007, sanitation control for ships (or sanitation control exemption):

IHR (2005) entered into force on 15 June, 2007. Among the provisions that apply to conveyances is a new Ship Sanitation Control Exemption Certificate/Ship Sanitation Control Certificate. These certificates will replace the Deratting Certificate/Deratting Exemption Certificate issued under IHR (1969) and must be renewed at least every six months so ship sanitation control inspections need to be undertaken at six-month intervals.

(3) To prevent rats from running to the shore along the mooring cable, a rat guard must be hung on the cable. If a ship is found as having failed to do so, immediate correction is required and the failure is put on record for quarantine reference when it next calls at the port.

b. In coordination with the "Mini-Three-Links" from the Mainland to Kinmen and Matsu, the Taiwan CDC has installed quarantine units on these two offshore islands.

c. The quarantine for illegal Mainland immigrants caught at various fishing ports is entrusted to the local health authority.

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

Future Prospects

1. Increase manpower and equipment, strengthen quarantine function, and perform quarantine conscientiously to stop the import of disease.

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

3. Improve the eradication of vectors on ships, and rat and mosquito population monitoring in port areas to avoid the spread of communicable diseases.

4. Assess and establish the capacities of international ports to improve defense against the import of diseases, increase the handling capacity for emergency cases to more effectively screen suspected diseases, stop their spread and simultaneously conform to the core capacity requirements of designated ports under IHR (2005).

Global Outbreak Assistance Corps of Taiwan (GOACT)

Background

As public health and medical science advances, many infectious diseases have become less of a threat. However, as the frequency of international travel rises and the environment changes, scientists are noting increased threat of emerging and re-emerging infectious diseases. Whenever an epidemic occurs, the whole world needs to be on the alert.

In order to construct a global disease prevention system, the World Health Organization's Global Outbreak Alert and Response Network (GOARN) has dispatched 400 experts to more than 40 countries worldwide to deal with various diseases. Furthermore, the USCDC sends medical teams to deal with outbreaks all over the world from its headquarters in Atlanta, and has stationed 200 experts in 40 countries to provide technical assistance in controlling diseases. In 1982, 1984, and 2003, during the outbreaks of polio, enterovirus, and SARS in Taiwan, the USCDC immediately dispatched experts to provide assistance.

▲The establishment ceremony of GOACT on June 27, 2007; Dr. Sheng-mou Hou, Minister of Health, personally oversaw the flag presentation; Dr. Bin-sheng Ho, director of GOACT, and the GOACT members in their oath-taking ceremony.

▲GOACT's member and Counselor Chia of the Ministry of Foreign Affairs, meeting with Kenya's Minister of Health, Dr. Charity Ngilu.

▲GOACT's member working in the USCDC laboratory.

▲GOACT's member providing training in spraying of insecticide at the District Public Health Office.

▲ Rift Valley fever control in January, 2007

In order to gain a preemptive advantage in the fight against disease, Taiwan CDC has established the Global Outbreak Assistance Corps of Taiwan (GOACT). The team likens disease prevention to war, and is always ready to fight on behalf of other countries to prevent diseases from invading Taiwan.

Goals

With their professional expertise and experience, GOACT participates in disease prevention operations worldwide, providing assistance and guidance, and improves Taiwan's disease prevention capabilities. During overseas operations, Taiwan's medical team can learn more about diseases and gain more experience in disease prevention, and in turn reduce the threat of disease to Taiwan's residents. Furthermore, by participating in operations with other nations, Taiwan will be one step closer to the goals of preventing epidemics and stopping disease at the border, protecting the health of Taiwan residents, and becoming a permanent part of global disease outbreak defenses.

Accomplishments

After more than two years of preparation, GOACT was officially established in June, 2007. The team consists of epidemiologists, laboratory scientists, physicians, and vector control specialists.

Even before its official establishment, members of GOACT had actively participated in international relief operations, including tsunami relief in Thailand in 2005, Rift Valley fever control in Kenya in 2007, and dengue fever control in Paraguay in 2007.

To ensure completion of their missions, Taiwan CDC has provided all the required resources, modern communication equipment and mobile labs. All training sessions were completed by December, 2007, which included international disease prevention and equipment operation. The team members also received all necessary vaccinations. Lastly, Taiwan CDC has created a set of regulations regarding the team's rights and responsibilities, outlined member requirements, mission statements, and administrative and health management tasks.

Future Prospects

With professional expertise and state-of-the-art equipment, GOACT is able to quickly acquire all important information and emerge victorious in any battle against disease. Diseases do not stop at national borders all by themselves. With the high frequency of international travel, an epidemic from the other side of the world may spread around the globe in a single day. In order to avoid a repeat of the SARS epidemic, which was an imported epidemic, GOACT will engage in operations wherever required to fulfill its responsibilities as a member of international society. By participating in international operations, the establishment of GOACT will surely become a milestone in Taiwan's history of disease prevention.

▲ GOACT training sessions in December, 2007, which included the sharing of experiences about international operations and equipment operation.

Travel Clinic

Background

In recent years, the frequency of international travel has been rising. However, travel not only can potentially be detrimental to the health of a traveler; it can also have an impact on public health. Currently, other countries might still harbor diseases that are rare or have been eradicated in Taiwan. Therefore, if travelers do not have proper personal protection, it is possible that they might contract a disease. To protect the health of Taiwan residents, Taiwan CDC transformed the International Vaccination Office into the Travel Clinic on June 11, 2007 to provide prospective travelers with the following services:

1. Pre-departure health education: since every country has different diseases and different hygiene conditions, it is necessary to offer health education that is based on the region's special characteristics. The clinicians at the Travel Clinic provide travelers with advice on disease prevention based on the latest information released by WHO and the US CDC and the traveler's travel plans (time, purpose, season).

2. Recommendations for vaccination and prophylactic medicine: some regions have endemic diseases which can be prevented through vaccination, such as hepatitis A; others, like malaria, can be prevented by using prophylaxis. Only with the right preparations can travelers enjoy a worry-free and healthy journey.

3. Travel advice: the Travel Clinic provides travel-related health advice, or refers travelers to other hospitals for in-depth physical examinations.

Goals

With the high frequency of international travel for pleasure and business, travel medicine has become an important issue for health organizations worldwide. The purpose of travel medicine is to provide integrated health and medical services to prepare travelers for their journeys and follow-up on their health upon their return. It also includes the training of medical professionals and research of travel-related issues. Analysis of data collected at the Travel Clinic may serve as the basis for future policy.

Accomplishments

From the clinic's establishment in June, 2007 to January, 2008, it has provided its services to more than 2,300 travelers. The clinic had given 53 cholera vaccines, 1,550 meningococcal meningitis vaccines, and 1,704 yellow fever vaccines. The clinic's clients include tourists, students, foreigners, and members of technical support teams and diplomatic personnel going to Africa and Central and South America.

▲ Alternative military service draftees who are going to Africa and Central and South America receiving vaccination and health education at the Travel Clinic.

▲ Opening ceremony of the Training Center for Travel Medicine on January 25, 2008.

Because Taiwan CDC is not a medical institution, the Travel Clinic can only provide limited services. For in-depth personal health evaluation, drug dispensing, and treatment of patients returning to Taiwan, CDC's capabilities are rather limited. Furthermore, for patients with chronic diseases such as cardiovascular diseases, diabetes mellitus, or chronic obstructive pulmonary disease, Taiwan CDC would have to refer them to other hospitals. Therefore, Taiwan CDC and the National Taiwan University Hospital joined forces to establish the Training Center for Travel Medicine in January, 2008, to provide comprehensive health consultation and medical services.

Future Prospects

The original Travel Clinic will be expanded to a Training Center for Travel Medicine. Other than National Taiwan University Hospital, Taiwan CDC will also work with Mackay Memorial Hospital in Taipei, Li Shin Hospital at Taoyuan International Airport, Taichung Hospital, National Cheng Kung University Hospital, Kaohsiung Municipal Shiao-Kang Hospital, Kaohsiung Municipal United Hospital's Meishuguan District Branch, and the Hualien Hospital to provide travel medicine services. The mission of the Training Center for Travel Medicine includes integrated health consultation, follow-up of returning travelers, and travel medicine related research and training. It will also be responsible for training doctors in the field of travel medicine.

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 (NIIS) in 2001. The objective is to utilize the Internet to consolidate all immunization data scattered between the 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 (immunization)vaccine inoculation and management operations.

Current State of Immunization

In an effort to prevent outbreaks and to curb the spread of various communicable diseases, the government provides routine infant immunization (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 Taiwan. In 2007, more than 4,000 hospitals and clinics participated in the flu immunization program (including vaccination for children).

Figure 1 Current Immunization Schedule in Taiwan

Vaccine \ Age	>24 hrs	2-5 days	1 month	2 months	4 months	6 months	9 months	12 months	15 months	18 months	24 months	27 months	30 months	6 years	>65 years
BCG	1st														
Hepatitis B		1st	2nd			3rd									
Diphtheria, Tetanus, Pertussis				1st	2nd	3rd				4th				Td	
Polio				1st	2nd	3rd				4th				5th	
Varicella								1st							
Measles, Mumps, Rubella¤								← 1st →						2nd	
Japanese Encephalitis**									1st 2nd			3rd		4th	
Influenza¤						← yearly →									yearly
Hepatitis A#											1st		2nd		

** two weeks interval between dose 1 to dose 2

¤ Influenza Vaccination Trial Plan began for students in grade 1 and 2 in October, 2007. Whether to implement the plan on all elementary school students will depend on the results of the trial.

In selected aboriginal areas.

Goals 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 change of address, 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, elimination of the need for separate data storage, lower referral consolidation expense, and cost effectiveness.

Accomplishments

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

2. Contracted hospitals no longer have to deliver the disk containing vaccination data to health offices. Instead they could simply upload the data over the Internet. Currently 870 contracted hospitals are able to deliver its data in this method.

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 the efficiency by which relevant authorities directly manage 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 Prospects

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

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

Immunization reminders are sent via mobile phone, text message, and email to make the NIIS database as complete and effective as possible. This is to be linked to the Communicable Disease Information System to be 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's health and medical operations will be internationalized. The 21st century requires for health and medical information to be disseminated via the Internet.

Expanded Immunization Program (EPI)

Background

Vaccination is one of the most cost-effective strategies in the fight against disease. Since 1948, the government of Taiwan has provided free-of-charge child 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 available to Taiwanese children, as a result, the aforementioned communicable diseases have been brought under control and in some cases eradicated.

The international health community is constantly increasing funding and manpower in order to develop new and combination vaccines and vaccines with longer efficacy. Various governments are also making full use of their resources to provide effective and safe mandatory vaccines, introduce new vaccines, promote policies on immunization and vaccination, establish a stable, comprehensive vaccine supply system, and improve immunization coverage. In other words, the ultimate goals of vaccination are to achieve maximum benefit and effectiveness of the vaccine and to protect the health of citizens through effective immunization and vaccination strategies.

Strategies

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

2. Increase 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 the EPI program.

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

Goals

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 supplementary plan.

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

4. Promote e-management of immunization programs to increase the efficiency of information management and analysis, improve service capabilities, integrate information on immunization, accelerate resource sharing, and enhance our efficiency to be on a par with other advanced nations.

Future Prospects

1. Build up a safe vaccine supply system and increase immunization coverage of all vaccinations by implementing 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 vaccine 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 accordance with the list of new priority vaccines from the Advisory Committee on Immunization Practices (ACIP), Taiwan CDC is in the process of drafting a plan to include them in the mandatory immunization policy with the goals of maximizing the vaccines' benefits and effectiveness and protecting citizens' health. The new vaccination items include:

   a. Tdap vaccines will in place of the routine use of Td vaccines for the first grade students.

   b. Pneumococcal conjugate vaccine (PCV) for children under 5 years old who is in high-risk group.

   c. Combination vaccine (5-in-1 or 6-in-1) for routine children immunization.

   d. Pneumococcal conjugate vaccine (PCV) for routine children immunization.

   e. Pneumococcal polysaccharide vaccine (PPV) for elderly person aged over 65 years old.

Hepatitis Immunization Program

Background

From 1982 to 2007, five five-year plans have been completed under the Hepatitis Control Program. The sixth five-year-plan began in 2008 and will end in 2012. 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.

Goals 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-old in Hepatitis A immunization in aboriginal regions; reduce the acute Hepatitis A incidence rate in aboriginal regions to 5 per 100,000 people; improve quality control for hepatitis diagnosis; and raise the hepatitis diagnostic accuracy rate to at least 90%.

Accomplishments:

1. Immunization

Hepatitis A

Confirmed cases of acute viral Hepatitis A in aboriginal regions were reduced from 183 in 1995 to 1 in 2007 and the incidence rate was lowered from 90.74 out of 100,000 people in 1995 to 0.5 out of 100,000 in 2007 (Figure 1).

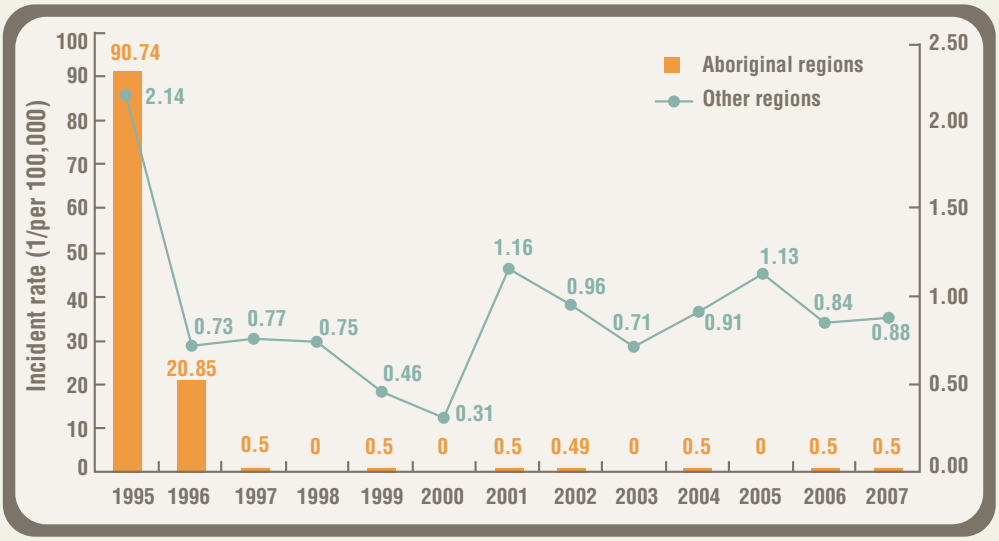


Figure 1 Incidence rate of Hepatitis A in aboriginal and other regions, 1995- 2007

Hepatitis B

1. This study shows that yearly carrier rates have declined significantly and steadily from 10.5% in 1989 to 0.8 % in 2007 (Figure 2).

2. The coverage rates of second and third doses of HBV for babies born in 2006 are 97.66% and 95.69%, respectively.

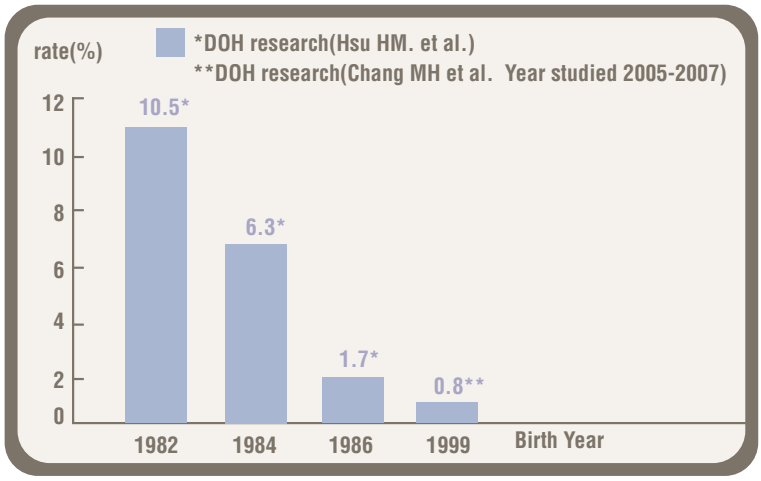


Figure 2 Hepatitis B carrier rate (HBsAg) at age six in Taiwan

3. A review of the vaccination records of new elementary school students shows that Hepatitis B vaccination rates are 99.6% for the second dose and 99.39% 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, anti-HBs, HBeAg and anti-HBe specificity rate has reached 92-100% in 2007.

3. Hepatitis Study and Research

A 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 a 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 hepatoma, the Bureau of National Health Insurance began promoting an "Enforce Hepatitis B and C Trial Treatment Program." Between October 2003 and December 2007, the program treated 28,665 and 15,835 Hepatitis B and C patients, respectively.

Future Prospects

To promote public awareness about hepatitis risk factors, increase the immunization coverage rate, improve hepatitis diagnosis and treatment research to reduce incidence rates and mortality rates 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, four cases of congenital rubella syndrome have been confirmed, three in 2001 and one in 2007 (three of the patients have mothers of foreign descent).

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.

Goals

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.

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.

Augment Lab Examination Capabilities

In addition to using the traditional serum methods to identify 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.

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.

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.

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.

Accomplishments

1. In 2007, 58 AFP cases under the age of 15 were reported and investigated. Investigations were completed within 48 hours for 100% of them. Clinical data showed none of them were polio cases.

2. In 2007, 85 measles cases were reported. The investigation rate was 100% and the sampling rate was 100%. Eight of the cases were confirmed to be measles.

3. Three suspected CRS cases were reported in 2007. Investigations and complete samplings were made. Only One case was confirmed.

4. One case of suspected neonatal tetanus was reported in 2007. None of the cases involving babies not born in hospital were tracked down.

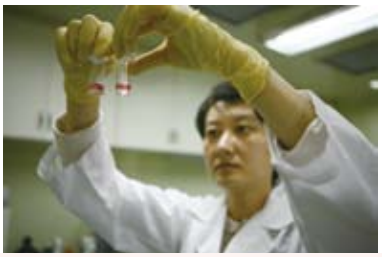
5. Since 2002, foreign (and mainland Chinese) female spouses have been required to obtain an updated rubella/immunization certificate.

Future Prospects

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, Development and Manufacture





Center for Research and Diagnostics

Background

In 2007, the Center had 173 employees. The number of diagnostic specimens received and processed was 161,385. Facing the challenge of 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, the Center's laboratories took proficiency tests (CAP) regularly, to assure the quality and accuracy of their diagnostics. The Center is divided into ten laboratories and four 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, Quality Assurance Section and Biosafety Section.

Goals

The primary objectives of the Center are to conduct research into more efficient and comprehensive diagnostic methods, to perform laboratory-based epidemiological studies, and to study 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.

Accomplishments

National Influenza Center (NIC)

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

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

2. Carefully monitored new types of flu virus and viral antigen variation trends, and provided references to vaccine strain selection.

3. Prepared antibodies against local flu virus strains to facilitate the monitoring of virus diagnoses and typing.

4. Published a periodical entitled Influenza Express in both Chinese and English during every flu season.

5. Provided a platform for exchanges with other NICs across the world.

PulseNet Taiwan

PulseNet Taiwan, a national molecular subtyping system for surveillance of bacterial infectious diseases was established for early detection of infection clusters by comparison of DNA fingerprints of bacterial isolates. The system can be applied in food safety surveillance systems for early detection of foodborne disease outbreaks, and can serve as a platform for academic study and disease surveillance between Taiwan and international public health institutes.

Viral Enteric and Emerging Diseases Laboratory

1. HIV-1 genotyping and drug-resistant surveillance among different risk groups such as IDUs, MSM and heterosexual group.

2. Molecular epidemiology study of EV71 infections and investigation on host cross-protection between different sub-genotypes of EV71 infections.

3. Strengthened links between laboratory diagnostic results with epidemiological investigations so as to impact infectious disease prevention.

4. Established primers bank for viral emerging diseases such as Rift Valley fever, Lassa fever, and Ebola viruses.

5. Executed acute flaccid paralysis surveillance system to comply with the WHO Global Polio Eradication Initiative.

6. Serological study of severe cases caused by enterovirus infections and development of antiserum for enterovirus characterization.

7. Quality assurance program for serological detection of HIV-1, and Hepatitis B/C virus infections amongst teaching hospitals and medical laboratories.

8. Expanded the virus diarrhea surveillance system to include norovirus, astrovirus and adenovirus 40 & 41 infections.

9. Established HIV-1, Enterovirus 71, Hepatitis B/C virus and Rotavirus genomic sequences database.

10. Cooperated with teaching hospitals, scholars, life science research institutes, and international public health research institutes such as CDC in USA and NIID in Japan in the prevention of emerging infectious diseases.

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 influenza virus evolution 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 WHO Collaborating Influenza Centers and delivered current influenza virus isolates of Taiwan to aid in surveillance, epidemiology and control of influenza.

5. Investigated the genotypes of Measles viruses and Rubella viruses in Taiwan.

6. Used 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 multiplex diagnostic technology, a microarray method, to detect unknown infections.

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, West Nile fever, chikungunya, 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 importation of Dengue virus and other Arboviruses.

5. Conducted seroepidemiologic and molecular epidemiologic studies of Dengue virus infection in southern Taiwan.

6. Conducted seroepidemiologic study of hantavirus infection in Lien-Chiang County, Taiwan.

7. Built genomic databases for Dengue virus, Japanese encephalitis virus and Orientia tsutsugamushi.

8. Conducted international cooperation program with Japanese NIID for a joint project on "Characterization of Dengue Viruses Prevalent in Taiwan and Other Mosquito-borne Viruses Prevalent in Asia."

Bacterial Respiratory Diseases Laboratory

1. Performed routine diagnoses and identification of Bordetella pertussis, Neisseria meningitides, Streptococcus pyogenes, invasive Streptococcus pneumoniae, Legionella spp., invasive Haemophilus influenzae type b, and Bacillus anthracis by conventional and/or molecular methods.

2. Identified respiratory bacterial pathogens using electron microscopy.

3. Conducted outbreak investigations for respiratory bacterial pathogens.

4. Developed real-time PCR detection methods for respiratory bacterial pathogens.

5. Molecular genotyping of Legionella spp., Bordetella pertussis, and Streptococcus pyogenes that caused scarlet fever in northern Taiwan.

6. Monitor serotypes and antimicrobial susceptibility for Invasive Streptococcus pneumoniae starting on October 15, 2007.

7. Participated in CAP tests and internal quality assurance program.

Bacterial Enteric and Emerging Diseases Laboratory

1. Conducted 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. Deployed bacterial diarrhea surveillance system and its epidemiological study.

3. Established nationwide and international reference laboratory.

4. Established genomic databases for Burkholdera pseudomallei by molecular genotyping (PFGE and MLVA).

5. Participated in outbreak investigation.

6. Developed real-time PCR detection for emerging bacterial Leptospira interrogans and Borrelia spp..

7. Surveillance for Leptospira interrogans and Borrelia spp. from ectoparasites and field rodents in Taiwan.

8. Initiated international collaboration.

Mycobacterial Diseases Laboratory

1. Provided diagnosis and identification services.
   a. Standardized conventional and molecular diagnosis methods.
   b. Developed and evaluated new molecular diagnosis and genotyping methods.
   c. Provided species identification and confirmation services.

2. Strengthened internal laboratory quality assurance systems.

3. Involved in outbreak and pseudo-outbreak investigations of cases from schools, hospitals, long-term care facilities, etc.

4. Conducted molecular epidemiological studies.
   a. Analyzed population structure of Mycobacterium tuberculosis strains in Taiwan.
   b. Investigated transmission of multiple-drug resistant Mycobacterium tuberculosis isolates.

5. Established 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.

6. Maintained a mycobacteria strain banking system.

7. Implemented the laboratory external quality assessment program.
   a. Conducted AFB-smear, identification, and drug susceptibility rechecking.
   b. Provided proficient testing for drug susceptibility.
   c. Carried out on-site evaluation of clinical laboratories.

8. Provided technical training and education.

9. Maintained mycobacterial laboratory surveillance system
   a. Surveillance of drug-resistant Mycobacterium tuberculosis isolates.
   b. Surveillance of Mycobacterium bovis in Taiwan.
   c. Surveillance of Mycobacterium bovis-BCG complications in Taiwan.

10. Carried out international collaborative activities.
    a. Signed a MOU with Korea-International Tuberculosis Research Center.
    b. Analyzed genomic data with Japan-Research Institute of Tuberculosis of Japan Anti-Tuberculosis Association and Pasteur Institute of France.
    c. Initiated PETTS-Taiwan program with US-Centers for Disease Control and Prevention.
    d. Prepared collaborative genotyping project with UK-Health Protection Agency.

Parasitic Diseases Laboratory

1. Applied a molecular diagnostics system for routine enteric amebiasis examination of reported patients and alien workers.
2. Continued the molecular epidemiology project of amebic infection for high-risk groups, such as institutional psychiatric patients.
3. Applied a molecular surveillance system for malaria through microscopic examination.
4. Organized two amebiasis and two malaria laboratory training short courses for lab workers from local health departments and hospitals. Taught the workers how to prepare health examinations for patients and alien workers.
5. Attended CAP tests (Parasitology and Blood Parasite Surveys) for professional evaluation.
6. Applied a serological diagnostic system for routine toxoplasmosis examination of reported patients.

Mycotic Diseases Laboratory

1. Conducted 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. Developed quantitative and real-time diagnostic systems to diagnose fungal and special pathogens.
3. Molecular epidemiology studies of Candida spp. by Multilocus sequence typing (MLST) and pulse-field gel electrophoresis (PFGE).
4. Conducted epidemiology studies for C. pneumoniae and M. pneumoniae infections.
5. Molecular typing of Chlamydia trachomatis infections in Taiwan by MOMP genotyping.
6. Developed antibody and antigen assay for C. trachomatis.
7. Molecular epidemiology study of Neisseria gonorrhoeae by multiple antigen sequence typing (MAST).
8. Established novel multiplex beads array platform to rapidly detect clinically important fungi, Chlamydia trachomatis and important nosocomial pathogens.
9. Built a PFGE fingerprint as well as an MLST database of Candida spp. in Taiwan.

10. Participated in the CAP tests (Yeast and Mycology Surveys) for proficiency evaluation.
11. Collaborated through international exchange of typing data.

Vector Biology Laboratory

1. Isolated rickettsiae from ticks and mites collected from rodents.
2. Detected pathogens in unengorged larvae of trombiculid mites.
3. Conducted routine mosquito surveillance for Dengue fever and malaria.
4. Conducted routine diagnostic services for mosquito infection of arboviruses and conducted mosquito species identification by microscope.
5. Developed diagnostic methods to understand mosquito blood sources.
6. Established genomic databases of Aedes aegypti for commonly used insecticides.
7. Conducted technology research on chemical vector control.
8. Evaluated the efficacy of emergent vector control.

Future Prospects

1. Develop a multiplex detection system.
2. Develop a rapid detection method for identification of vaccine derived poliovirus or OPV in the era of polio eradication.
3. Establish an internationally recognized flavivirus reference laboratory.
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 bead array or microarray system to improve diagnostic and genotyping capability.
7. Establish a genotype databank and participate in global surveillance.
8. Establish collaboration programs with renowned international research institutes.
9. Isolate rickettsiae from ticks and mites collected from rodents.
10. Assess habitat relations of Trombiculid mites and explore environmental factors leading to geographical variation in scrub typhus cases in Taiwan.

Laboratory Biosafety

After the 2003 laboratory-acquired infection (LAI) of SARS, Taiwan CDC and a few other organizations have been working together hard, trying to setup a Taiwanese laboratory biosafety management system. On September 26, 2005, a piece of legislation called "Regulations Governing Management of Infectious Biological Materials and Collection of Specimens from Patients of Communicable Diseases" was promulgated, and officially took effect from March 26, 2006. It was the first set of regulations in Taiwan to govern the biosafety of infectious biological materials and laboratories. Since the 2003 laboratory SARS incident, two more LAIs have occurred. The first was an incident of dengue fever infection taking place in April 2004, and the other a bacillary dysentery infection in August 2006. Fortunately, with Taiwan CDC's timely help, neither incident caused any fatalities or escalated in scope. Before 2006, it was not mandatory in Taiwan for any organizations that used or possessed infectious biological materials of RG2 or above to establish a biosafety management unit. The only exception was when an academic research institution applied for funding from the National Science Council of Taiwan, the latter would require the receiver of funds to establish a biosafety committee, which is responsible for supervising, managing, and reviewing the safety of DNA recombinant experiments, in accordance with the Guidelines for Research Involving Recombinant DNA Molecules. However, the new set of Regulations Governing Management of Infectious Biological Materials and Collection of Specimens from Patients of Communicable Diseases stipulates that any institutions dealing with RG2 infectious biological materials or above and having over five staff members need to establish a biosafety committee. A smaller laboratory with fewer than five staff members, however, needs to assign an individual to manage biosafety issues on the premises. By the end of 2007, 291 laboratories have established their own biosafety committees, 62 others have designated a biosafety staff, and all of them have completed the registration process with Taiwan CDC.

Once the Regulations Governing Management of Infectious Biological Materials and Collection of Specimens from Patients of Communicable Diseases came into force, RG2 infectious biological materials or above can only be used, added to, or destroyed with the consent of the biosafety committee or the biosafety staff. Furthermore, such materials can only be shared or deposited with a counterpart with the consent of the biosafety committees or the biosafety staff of both parties. RG3 infectious biological materials or above can only be used after Taiwan CDC has been notified first. In 2007, Taiwan CDC granted permission for the use of infectious biological materials in 57 application cases. This showed that the management of RG2 infectious biological materials in Taiwan is becoming more effective. In the future, incidents of laboratories trading infectious biological materials in private are less likely going to happen.

The SARS LAI of 2003, which took place in the only BSL-4 laboratory in Taiwan, forced Taiwan CDC to re-examine the importance of laboratory safety management in BSL-3 laboratories or above. Before 2003, there were only three BSL-3 laboratories and one BSL-4 laboratory. However, in order to enable the government to protect its citizens against SARS or other emerging infectious diseases, and to enable various academic research institutions to strengthen safety measures in their experiments involving highly infectious pathogens, the total number of BSL-3 laboratories grew to 21 in 2007, and 16 of them are currently running under the permission of Taiwan CDC. Every year, Taiwan CDC will inspect all

BSL-3 and above laboratories at least once, and will order any shortcomings to be fixed within a two-month period once detected. And since any notified deficiencies will be reexamined more closely during the follow-up inspection visits, it is hoped that this routine will force the laboratory to raise their biosafety standards and vigilance.

Establishment and Application of Pathogen Genome Sequence Database in Taiwan

In this project, we have been working to establish genomic database units of major pathogens for phylogenetic analyses since 2003. In addition, we have also made use of relevant genomic data to speculate on possible pathogens of on-going disease outbreaks and conducted surveillance on exogenous and newly emerged pathogens. These tasks have helped in tracking down the variation of pathogens, and provided reliable molecular epidemiological information as an invaluable reference for in-lab diagnostic technique improvements and effective disease control policy formulation. Furthermore, the accumulated genomic sequence database will be vital for future development of new vaccines against infectious diseases and possible diagnostic agents or tools.

Up to now, we have finished the construction of several genomic database units and analysis models aiming at HIV, enterovirus, influenza virus, dengue virus, hepatitis virus, Mycobacterium tuberculosis, adenovirus, rotavirus, Japanese encephalitis virus, rickettsia, group A beta-hemolytic Streptococcus, Legionella pneumophila, Neisseria meningitides, Salmonella, Shigella, Bordetella pertussis, Helicobacter pylori, insecticide-resistant mosquitoes, bacterial nosocomial infections, bacterial and fungous sexually transmitted diseases parasites, Burkholderia pseudomallei, and Leptospira interrogans. The resulting genomic sequence data helped us to identify and verify various pathogens. In addition, we have connected the process of PCR, sequencing, sequence comparison, and results analysis to the web site of the genome database,and have set up a complete web site for online service and administration of any CDC genome-sequencing laboratory.

For typing and differentiating newly emerging pathogens from re-emerging infectious pathogens, it's essential to develop a method that is both sensitive and rapid enough. One modern solution is the so-called "gene chip." In this project, using previously published or custom designed primers and probes, we are now able to detect thousands of pathogens simultaneously. This approach can greatly shorten time for disease diagnosis and make disease control tasks more effective and easier.

In order to further improve the detective ability of the gene chip, we are planning to improve the probes, expanding the scope of detectable pathogens, especially for newly emerging and re-emerging pathogens. In addition, we will set up gene chip diagnostic standard procedures, including re-confirming processes by PCR or real-time PCR. Meanwhile, by connecting up with information obtained from the existing notification system, we will try to deal with some particular infectious pathogens that are indefinable during outbreaks. It should be a great help in cutting down the magnitude of the impact on public health caused by rare or previously unknown diseases.

Manufacturing of Serum and Vaccines

Biological Products Manufacturing

1. In 2007, a total of 2,437,683 biological products were manufactured, including vaccines, toxoids, antitoxins, and serums. Furthermore, 106,081 cholera vaccines, 1,203 anti-Bungarus Multicinctus and anti-cobra freeze-dried injection serums, 2,545 anti- Trimeresurus mucrosquamatus and anti-Trimeresurus stejnegeri freeze-dried injection serums, 346 anti-Agkistrodon acutus freeze-dried injection serums, 249 tetanus freeze-dried injection vaccines, 5 diphtheria freeze-dried injection vaccines, 653,040 BCG vaccines, 929,720 (40 doses) tetanus toxoids, 12,942 (6 doses) tetanus toxoids, 344,240 (40 doses) adsorbed tetanus-diphtheria combined toxoids, 99,144 (6 doses) adsorbed tetanus-diphtheria combined toxoids, and 378,678 (6 doses) adsorbed diphtheria-tetanus combined toxoids were also produced.

2. Completed two batches of antivenin serum testing extract, four batches of finished products, and 12 batches of source plasma; completed 15 batches of semi-finished BCG vaccines and 5 batches of finished product; completed 4 batches of cholera testing extract and 3 batches of finished product; completed 2 batches of diphtheria-tetanus testing extract and 3 batches of finished product and 2 batches of tetanus toxoid finished product; 68 samples of pure water and 16 samples of pharmaceutical ingredients were tested.

3. In 2007, 16,788 mice, 412 guinea pigs, 47 rabbits, and 18 ferrets were reared and provided for experimental use. Horses were used to produce antivenin serums, and a total of 313 liters of serum were produced in 2007.

Development of Biological Products

1. Influenza Research and Development Plan
   a. Five predominant circulating strains of influenza viruses were used in a ferret immunization project. The serums produced were then used in the serotyping of the new isolates from Taiwan.
   b. Completed a user manual for the Influenza Virus Bioinformatics System (IVBS), and the system's functions and database were made available to CDC's staff.
   c. Established 12 and 8-plasmid reverse genetics system and successfully created three vaccine seed strains.
   d. The H5N1 HA DNA vaccine can induce complete protection against a lethal dose of NIBRG-14, a H5N1 strain of avian flu. It can also cross protect against H5N1 avian flu viruses of different clades.
   e. Among 20 glycolipids that were chosen, C1, C13, C14, C17, C26 and 7DW8-5 had better adjuvant effect than the traditional adjuvant alum.

f. Completed a draft of Points to consider in the pandemic influenza vaccine for approval application, and it was announced by the Department of Health as Guidelines of pandemic influenza vaccine for approval application.

2. Production of an IgY Antibody from Duck Eggs
   The research of antivenin IgY antibody continues. The IgY antibody, is an anti-daborla ruseilli siamensis venom, mainly produced by duck eggs. After four weeks from the first immunization, the potency of the IgY antibody is over 60IU/ml, and at the 25th week its potency still remains over 130IU/ml.

Domestic Vaccination Research System

1. In order to develop the vaccination industry, improve the foundation of vaccination research, and control emerging infectious diseases, the 5-year Plan of Vaccination Development (and Mass Production Techniques) Project was implemented in 2006. The purposes of the project are the integration of Taiwan's limited resources and manpower, the establishment of a national vaccine development team, the apportionment of funds to the four major vaccines: influenza, enterovirus 71, Japanese encephalitis, and MenB recombinant subunit vaccine, the promotion of disease prevention infrastructures and vaccine production capabilities, and the reinforcement of Taiwan's ability to deal with worldwide epidemics and local infectious diseases.

2. Established an emergency influenza vaccine production line, cell culture production technology, optimal conditions for scale-up production, and other related documents. The production of a small amount of vaccines began in June 2006, and since the fourth quarter of that year trial batches of 60 liters have been produced in order to supply the pre-clinical trail beginning in first quarter of 2007.

▲ Held the 2006 Accomplishment Presentation on Influenza Vanccine Research.

▲ Streptococcus Pneumoniae Vaccine Donation Ceremony.

Health Marketing

Health Marketing

Background

In order for the general public to become more knowledgeable about communicable diseases, understand related policies, and support Taiwan CDC's actions, a health marketing program has been created. It is hoped that through a series of interactive events, Taiwan CDC can promote disease prevention.

Goals

To strengthen communication between the government and the public on the risks of communicable diseases, improve the timely co-operation between these organizations and make everyone a part of the battle against epidemics.

Accomplishments

1. Themed Press Conferences

The purpose of these press conferences is to create awareness of Taiwan CDC's major policies and achievements. By holding conferences on a specific issue, Taiwan CDC hopes to attract the attention of the mass media, and in turn spread its message to every household in the nation.

In 2007, Taiwan CDC held the following major press conferences on disease prevention policies:

a. MDR TB Medical Care System Press Conference

Ever since the WHO published its Guideline for the Programmatic Management of Drug-Resistant Tuberculosis, Taiwan has become a world leader in the establishment of an MDR TB medical care system. On March 29, 2007, Taiwan CDC invited five MDR TB medical care teams to establish the MDR TB Medical Care System. It was another big step towards our goal of reducing the number of TB patients by half in ten years.

b. Prevention and Treatment of Enterovirus Press Conference

For children, the best way to avoid the threat of enteroviruses is by washing their hands. To promote this concept, Taiwan CDC held a press conference on May 3 at the Affiliated Kindergarten of Taipei Municipal University of Education. At the event Minister Hou, chief of the Department of Health, taught five kindergarten children the five steps of hand washing: wet, rub, rinse, clean, and wipe. This process, if lasting for more than 20 seconds, can effectively reduce the amount of germs on the hands. During the first week of school, another press conference was held at the Affiliated Kindergarten at Tungmen Elementary School. At the event, Taiwan CDC's Deputy Director Dr. Jih-Haw Chou taught the children about the five steps and the 20-second rule, which is the same duration as singing "Happy Birthday" twice, and how washing hands can stop the enterovirus. The events have successfully created awareness of the virus amongst the general public.

c. Infectious TB patients must postpone commercial air travel

In order to protect the health of residents, from July 1, 2007, all infectious pulmonary tuberculosis patients are banned from taking international flights exceeding 8 hours in length, and MDR pulmonary tuberculosis patients are banned from all flights. Violators will be fined from NT$10,000 to NT$150,000 in accordance with Article 66 of the Communicable Disease Control Act.

d. Influenza Vaccination Press Conference

The number of influenza vaccines is limited. To encourage qualified persons, especially those over 65 years old, to receive their free vaccines, Taiwan CDC has invited celebrity David Tao to be the spokesman for influenza prevention. The timeless Mr. Tao, with his healthy image, urges everyone to

b. Prevention and Treatment of Enterovirus Press Conference

c. Infectious TB patients must postpone commercial air travel

d. Influenza Vaccination Press Conference

a. World TB Day

spread love, pass on the message and receive their free vaccination. With everyone doing their part, all elderly persons can have a healthy, worry-free winter.

2. Important Annual Events

a. World TB Day

On March 23, one day before World Tuberculosis Day, Taiwan CDC invited a fully recovered patient and a DOTS health worker to share their experiences. The recovered patient was a homeless person, but thanks to health workers' constant care and delivery of medicine, he was able to overcome the disease in six months.

b. World AIDS Day

To encourage AIDS research, provide support for AIDS patients, prevent and treat AIDS, and make the world care about the issue, the World Health Organization has designated December 1 of every year World AIDS Day. In order to contribute to the worldwide anti-AIDS effort, Taiwan CDC and Taipei 101 joined forces and placed a giant ribbon on the exterior of the skyscraper. It is hoped that with the care and love signified by the symbol, we can show our determination in caring for AIDS patients and stopping AIDS altogether. The themes of 2007 World AIDS Day were "Stop AIDS, Keep the Promise" and "Take the Lead", which emphasizes the fact that stopping AIDS requires everyone's individual efforts. Whether at home, in school, or in groups, every person should do their bit in the fight against AIDS. Yankee's pitcher Chien-Ming Wang, Mayday, Minister Hou of the Department

b. World AIDS Day

c. Disease Prevention Awards

of Health, CDC's Director Kuo, and Taipei 101's Chairwomen Diana Chen were all at the event to light up the red ribbon. Chien-Ming Wang also made donations to the Taiwan AIDS Society, Taiwan Foundation of Rare Disorders, and the Taiwan Fund for Children and Families on the spot, hoping to contribute to AIDS research and fulfilling his commitment to take care of the disadvantaged.

c. Disease Prevention Awards

In line with Article 73 of the Communicable Disease Control Act, Taiwan CDC has presented awards to 52 individuals or groups for their contributions to policy implementation, disease prevention, treatment, and services. The annual ceremony took place on December 11, 2007, during which the winners shared their experiences and thoughts.

3. Multichannel Marketing

In order to promote Taiwan CDC's cause to different groups, we are constantly looking for new marketing channels. In 2007, CDC not only continued to improve marketing via traditional channels such as the print media and TV, but also developed interactive marketing on the Internet. Taiwan CDC's marketing channels include:

a. Internet

The Internet's influence is far-reaching and powerful, and it has become an important marketing channel for Taiwan's media. In 2007, Taiwan CDC has focused on the Internet as a marketing

a. Internet

b. International Travel Fair

channel. Taiwan CDC has held events such as the tuberculosis creative video competition, developed a dengue fever online game, and created Flash animation to promote enterovirus and influenza prevention. CDC's Internet marketing strategies have been a success because they are able to introduce the concepts of disease prevention and treatment to many people, and initiated much discussions and feedback on the Internet.

b. International Travel Fair

Many people relax by traveling overseas, but tend to ignore their health during their travels. Therefore, during the 2007 Taipei International Travel Fair, Taiwan CDC promoted the importance of avoiding illness while traveling by inviting exhibition goers for a cup of coffee at their booth. With brochures, posters and fun games, Taiwan CDC was able to show would-be travelers how to avoid getting sick when traveling overseas.

c. Exhibitions and Concerts

To commemorate Taiwan being SARS free for four years, Taiwan CDC invited the medical professionals who fought the disease and held a concert in their honor at an MRT station. An exhibition detailing the SARS event 4 years ago also took place.

d. Creative Promotional Materials

To promote concepts of disease prevention, Taiwan CDC has created many creative, stylish and useful promotional materials.

c. Exhibitaions and Concerts

d. Creative Promotional Materials

e. Media and Other Promotion Channels

e. Media and Other Promotion Channels

When announcing disease prevention measures, new communicable diseases, or important dates, Taiwan CDC sends out press releases to both the print media and the electronic media along with advertising with posters, fliers and advertisements on the MRT to improve people's knowledge on a subject.

4. CDC Exhibition Center

In order to promote the concepts of disease prevention and treatment, Taiwan CDC established the first small CDC Exhibition Center in Taiwan in its first floor. It shows visitors the history of disease prevention and treatment with words, pictures, videos, and interactive computer programs, and is a great place for kindergarten and elementary schools to have field trips. The center is an effective example of the CDC providing its educational resources to the general public.

The first CDC Exhibition Center was widely acclaimed. Therefore, in 2005, Taiwan CDC established the "Disease Prevention and Treatment" exhibition area at the National Taiwan Science Education Center. It is hoped that by having an exhibition area in an existing exhibition center, more people will be able to learn about the prevention and treatment of diseases.

The CDC Exhibition Center at the CDC's headquaters

The National Taiwan Science Education Center in Shilin

In 2007, Taiwan CDC worked with the National Science and Technology Museum and established the first disease prevention exhibition hall in southern Taiwan, which displays information on dengue fever, enterovirus, AIDS, tuberculosis, and H5N1 influenza. The exhibition hall has over 9,000 square feet of floor space. With "Disease Prevention Boot Camp" as its central theme, visitors become soldiers who must face different challenges in a war against disease, and in the process they can learn about diseases in a situational, interactive manner. Many new exhibition technologies will be used in the exhibition hall, such as augmented reality technology imported from New Zealand. This technology combines real objects with virtual objects drawn by computers to create an illusion that seems real. The exhibition is scheduled to be opened in July, 2008, and it will be the largest disease prevention and treatment exhibition center in Taiwan.

5. Public-Private Partnership

Taiwan CDC has sought to work with private companies or foundations that are also involved in disease prevention in order to maximize resource efficiency, creativity, and marketing opportunities and to improve awareness on related issues.

Future Prospects

In the future, Taiwan CDC will continue to promote disease prevention, develop new marketing channels, and improve communication on infectious disease risks in order to protect the health of Taiwan's citizens.

The National Science and Technology Museum in Kaohsiung

International Cooperation

International Cooperation

Background

Communicable diseases know no national boundaries. In today's world, globalization facilitates the spread and transmission of communicable diseases. Building a responsive worldwide disease surveillance and prevention network is of critical importance in protecting the health of the people of Taiwan. As the highest authority of communicable disease control in Taiwan, Taiwan CDC is responsible for cooperation with international partners and for providing adequate disease-control resources to needy countries to enhance the quality of life for all.

In recent years, Taiwan CDC has made a lot of efforts to globalize its public health initiatives. These include increasing cooperation in infectious disease prevention with advanced institutes, assisting allies to raise the capacity of infectious disease control, vigorously participating in international conferences, and exchanging advanced technology with other countries. As a result, there have been many impressive achievements in infectious disease control.

Goals

Actively participating in international public health programs and conferences, strengthening bilateral and multilateral relationships with other countries, partaking in global humanitarian relief activities, building up more channels for exchanging information and technology in order to promote Taiwan CDC's capacity in communicable disease control and prevention and to achieve the ultimate goal of rejoining the global public health system.

Accomplishments

International Events in 2007

1. 196 guests from 34 different countries visited Taiwan CDC.

2. Participated in WHO training sessions on international strategies to stop influenza pandemics, attended 6 APEC conferences and 29 international conferences. 141staff in total went overseas for conferences or training

3. Published 94 papers in international journals, including 51 SCI papers

International Conferences

1. Taiwan CDC, NOVARTIS Institute for Tropical Diseases, and the Pediatric Dengue Vaccine Initiative jointly held the Third Asian Regional Dengue Research Network Meeting on August 22-24, 2007. A total of 140 people from 21 countries and 240 people from Taiwan participated in the event.

2. Taiwan CDC and Training Programs in Epidemiology and Public Health Interventions Network held the Fourth TEPHINET Southeast Asia/Western Pacific Bi-Regional Scientific Conference on November 26-30, 2007. A total of 340 people from 18 different countries participated in the event.

Promotion of Bilateral or Multilateral Cooperation

1. Signed three bilateral cooperation memorandums, and sent personnel to ECDC EPIET for training in epidemiology.

2. Continued to conduct Arrangement No. 2 (the MRSA program) in the Cooperative Program in Public Health and Preventive Medicine with US CDC and planned Arrangement No. 3 (a TB Prevention Project); sent personnel to the EIS training program.

3. Held the Fourth Taiwan-Japan bilateral conference on disease prevention in Tokyo with the National Institute of Infectious Diseases, Japan. The theme of the conference was influenza prevention and biosafety. 10 experts from Taiwan participated in the event; continued to conduct two cooperation projects on bacillary dysentery and dengue fever.

4. Director Kuo was invited to Canada to meet with Dr. David Butler-Jones, director of the Public Health Agency, to discuss the possibilities of bilateral cooperation, which include the establishment of a real time communications system, information exchange, and training programs.

5. Invited experts from the US to Taiwan for on-site inspection and discussions on tuberculosis prevention.

6. Joined the International Society of Infectious Diseases (ISID) and the International Harm Reduction Association (IHRA).

Participating in International Aid Efforts

1. January 14 – February 5, 2007: Dispatched a team to Kenya to help control the Rift Valley Fever epidemic.

2.March 11-21, 2007: Dispatched a team to Paraguay to help control the dengue fever epidemic and donate resources to help eradicate mosquitoes.

3. March 17-31, 2007: Dispatched a team to Nicaragua to provide free mobile medical services.

4. June 18-24, 2007: Dispatched a team to the Gorgas Memorial Institute in Panama to help establish biosafety facilities.

Future Prospects

In view of increasing international interchange and transport, the issue of global cooperation has become more vital than ever in the fight against disease. Taiwan CDC will do its best to strengthen cooperation with other countries as well as international healthcare institutes. Encouraged by the accomplishments of training and educational programs, Taiwan CDC will cooperate in setting up a global surveillance network for the prevention and control of communicable diseases with other countries. In addition, training personnel specializing in international public health and emerging infectious disease prevention, and seeking full involvement in international communicable disease prevention projects will be the next targets of Taiwan CDC. Future efforts are detailed as follow:

1. To actively participate in conferences or other events organized by international institutes and forums, including WHO or APEC.

2. Exchange information with WHO, its regional offices, and other nations via the IHR Focal Point.

3. Continue to establish bilateral or multilateral cooperation projects with other countries.

Publications Share Cutting-edge Research and Recommendations

Periodicals and Books

Chinese Language Texts

01
A Journey Towards Excellence: The 2006 Dengue Fever Prevention Project

02
Communicable Disease Control Workbook (CD)

03
Nosocomial Invasive Infection Control Guidelines

04
H5N1 Medical Workers Handbook

05
Disease Prevention Specimen Handbook

06
Endless Love: Stories of DOTS Workers

07
2007 Dengue Fever Prevention Guidelines

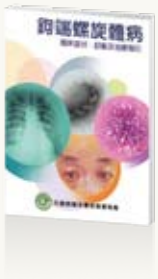
08
Step by Step: Stories of Dengue Fever Prevention, 2006

09
Guidelines for Legionella Control

10
Disease Prevention Live Show: A Compilation of Disease Prevention Promotional Materials Part 1 (CD)

11
Taiwan Tuberculosis Control Report

12
Statistics of Communicable Diseases and Surveillance Report, Republic of China 2006



13
Leptospirosis Symptoms, Diagnosis, and Treatment Guideline (Chinese language & CD)

14
CDC Surveillance Guidelines

15
Guideline of Communicable Disease Notifying

English Language Texts

16
CDC Annual Report 2007

17
Taiwan Tuberculosis Control Report 2007

18
Statistics of Communicable Diseases and Surveillance Report, Republic of China 2006

Major SCI publications:

1. Chen, Yi-Ming; Arthur Kuo; Steve Hsu-Sung. HIV-1 in Taiwan. Lancet. 369(9562):623-5, 2007 Feb 24.

2. Chang, Chia-Hung; Chang, Yu-Chung; Underwood, Anthony; Chiou, Chien-Shun; Kao, Cheng-Yan. VNTRDB: A Bacterial Variable Number Tandem Repeat Locus Database. Nucleic Acids Research. 35(Database issue): D416-21, 2007 Jan.

3. Hung, Chien-Ching; Hung, Min-Nan; Hsueh, Po-Ren; Chang, Sui-Yuan; Chen, Mao-Yuan; Hsieh, Szu-Min; Sheng, Wang-Huei; Sun, Hsin-Yun; Huang, Yu-Tsung; Lo, Yi-Chun; Hsiao, Chin-Fu; Chang, Shan-Chwen. Risk of recurrent nontyphoid Salmonella bacteremia in HIV-infected patients in the era of highly active antiretroviral therapy and an increasing trend of fluoroquinolone resistance. Clinical Infectious Diseases. 45(5):e60-7, 2007 Sep 1.

4. Hsun-Pi Su, Chen-Ying Chou, Shin-Chan Tzeng, Tien-Lin, Ferng, Ya-Lei Chen, Yao-Shen, Chen, and Tung-Ching Chung. Possible Typhoon-related Melioidosis Epidemic, Taiwan, 2005. Emerging Infectious Diseases 13(11):1795-1796. 2007.

5. Pei-Chun Chan, Li-Min Huang,Yi-Chun Wu, Hsiang-Lin Yang, I-Shou Chang, Chun-Yi Lu, Ping-Ing Lee, Chin-Yun Lee, Luan-Yin Chang. The Tuberculosis in Children and Adolescents, Taiwan, 1996–2003. Emerging Infectious Diseases 13(9):1361-1363. 2007.

6. Chen, Kow-Tong. Chang, Hsiao-Ling. Wang, Shan-Tair. Cheng, Yan-Tzong. Yang, Jyh-Yuan. Epidemiologic features of hand-foot-mouth disease and herpangina caused by enterovirus 71 in Taiwan, 1998-2005. Pediatrics. 120(2):e244-52, 2007 Aug.

7. Hu, Wensi S. Yao, Shu-Man. Fung, Chang-Phone. Hsieh,Yi-Ping. Liu, Chang-Pan. Lin, Jing-Fang. An OXA-66/OXA-51-Like Carbapenemaseand Possibly an Efflux Pump Are Associated with Resistance to Imipenem in Acinetobacter baumannii. Antimicrobial Agents andChemotherapy.51(11):3844-52, 2007 Nov.

8. Kuo, Hsin-Wei. Tsai, Shang-Shyue. Tiao, Mao-Meng. Yang, Chun-Yuh. Epidemiological features of CKD in Taiwan. American Journal of Kidney Diseases. 49(1):46-55, 2007 Jan.

9. Odds, Frank C. Bougnoux, Marie-Elisabeth. Shaw, Duncan J. Bain, Judith M. Davidson, Amanda D. Diogo, Dorothee. Jacobsen, Mette D. Lecomte, Maud. Li, Shu-Ying. Tavanti, Arianna. Maiden, Martin C J. Gow, Neil A R. d'Enfert, Christophe. Molecular Phylogenetics of Candida albicans. Eukaryotic Cell. 6(6):1041-52, 2007 Jun.

10. Wang, Tsung-Hsi. Wei, Kuo-Chen. Hsiung, Chao Agnes. Maloney, Susan A. Eidex, Rachel Barwick. Posey, Drew L. Chou, Wei-Hui. Shih, Wen-Yi. Kuo, Hsu-Sung. Optimizing severe acute respiratory syndrome response strategies: lessons learned from quarantine. American Journal of Public Health. 97 Suppl 1:S98-S100, 2007 Apr.

11. Wu, Jhy-Wen. Tsai, Tung-Hu. Effect of silibinin on the pharmacokinetics of pyrazinamide and pyrazinoic Acid in rats. Drug Metabolism & Disposition. 35(9):1603-10, 2007 Sep.

12. Su, Hsun-Pi. Yang, Hsiao-Wei. Chen, Ya-Lei. Ferng, Tien-Lin. Chou, Yu-Ling. Chung, Tung-Ching. Chen, Chang-Hsun. Chiang, Chuen-Sheue. Kuan, Mei-Mei. Lin, Hsi-Hsun. Chen, Yao-Shen. Prevalence of Melioidosis in the Er-Ren River Basin, Taiwan: Implications for Transmission. Journal of Clinical Microbiology. 45(8):2599-603, 2007 Aug.

13. Lin, Chi-Yang. Chen, Yee-Chun. Lo, Hsiu-Jung. Chen, Kuo-Wei. Li, Shu-Ying. Assessment of Candida glabrata Strain Relatedness by Pulsed-Field Gel Electrophoresis and Multilocus Sequence Typing. Journal of Clinical Microbiology. 45(8):2452-9, 2007 Aug.

14. Liang SY. Watanabe H. Terajima J. Li CC. Liao JC. Tung SK. Chiou CS. Multilocus Variable-Number Tandem- Repeat Analysis for Molecular Typing of Shigella sonnei. Journal of Clinical Microbiology. 45(11): 3574-80, 2007 Nov.

15. Yang, Ji-Rong. Wu, Fang-Tzy. Tsai, Jin-Lai. Mu, Jung-Jung. Lin, Ling-Fen. Chen, Kuang-Lo. Kuo, Steve Hsu-Sung. Chiang, Chuen-Sheue. Wu. Comparison between O Serotyping Method and Multiplex Real-Time PCR To Identify Diarrheagenic Escherichia coli in Taiwan. Journal of Clinical Microbiology. 45(11):3620-5, 2007 Nov.

16. Chin, Pei-Ju. Chiu, Chen-Che. Jou, Ruwen. Identification of Beijing Lineage Mycobacterium tuberculosis with Combined Mycobacterial Interspersed Repetitive Unit Loci 26, 31, and ETR-A. Journal of Clinical Microbiology. 45(3):1022-3, 2007 Mar.

17. Kung, S-H. Wang, S-F. Huang, C-W. Hsu, C-C. Liu, H-F. Yang, J-Y. Genetic and antigenic analyses of enterovirus 71 isolates in Taiwan during 1998-2005. Clinical Microbiology & Infection. 13(8):782-7, 2007 Aug.

18. Tsai, P Y. Hsu, M C. Huang, C T. Li, S Y. Human antibody and antigen response to INCA antibody of chlamydia trachomatis. International Journal of Immunopathology & Pharmacology. 20(1):156-61, 2007 Jan-Mar.

19. Lin, Jih-Hui. Chiu, Shu-Chun. Shaw, Michael W. Lin, Yung-Cheng. Lee, Cheng-Hao. Chen, Hour-Yung. Klimov, Alexander. Characterization of the epidemic influenza B viruses isolated during 2004-2005 season in Taiwan. Virus Research. 124(1-2):204-11, 2007 Mar.

20. Tseng, Fan-Chen. Huang, Han-Chin. Chi, Chia-Yu. Lin, Tsuey-Li. Liu, Ching-Chuan. Jian, Jhih-Wei. Hsu, Li-Ching. Wu, Ho-Sheng. Yang, Jyh-Yuan. Chang, Ya-Wen. Wang, Hsuan-Chen. Hsu, Yun-Wei. Su, Ih-Jen. Wang, Jen-Ren. for CDC-Taiwan Virology Reference Laboratories and Sentinel Physician Network. Epidemiological survey of enterovirus infections occurring in Taiwan between 2000 and 2005: Analysis of sentinel physician surveillance data. Journal of Medical Virology.79(12):1850-60, 2007 Dec.

21. Peng SY, Wu KC, Wang JJ, Chuang JH, Peng SK, Lai YH. Predicting postoperative nausea and vomiting with the application of an artificial neural network. British Journal of Anaesthesia 98(1):60-5, 2007 Jan.

22. Wong, Hin-chung. Liu, Shu-Hui. Chiou, Chien-Shun. Nishibuchi, Mitsuaki. Lee, Bok-Kwon. Suthienkul, Orasa. Nair, Gopinath Balakrish. Kaysner, Charles A. Taniguchi, Hatsumi. A pulsed-field gel electrophoresis typing scheme for Vibrio parahaemolyticus isolates from fifteen countries. International Journal of Food Microbiology. 114(3):280-7, 2007 Mar 20.

23. Yu, Mei-Ching. Li, Lan-Hui. Li, Shu-Ying. Tang, Li-Hui. Tai, Yu. Chen, Kow-Tong. Molecular epidemiology of genital chlamydial infection among male patients attending an STD clinic in Taipei, Taiwan. Sexually Transmitted Diseases. 34(8):570-3, 2007 Aug.

24. Chou, Hsiao-Hui. Chiou, Chien-Shun. Chen, Kuo-Wei. Li, Shu-Ying. Suitable restriction enzymes for pulsed-field gel electrophoresis analysis of Candida tropicalis. Diagnostic Microbiology & Infectious Disease. 57(4):451-4, 2007 Apr.

25. Chen, Ying-Yan. Huang, Chung-Ter. Yao, Shu-Man. Chang, Yi-Ching. Shen, Pei-Wun. Chou, Chen-Ying. Li, Shu-Ying. Molecular epidemiology of group A streptococcus causing scarlet fever in northern Taiwan, 2001-2002. Diagnostic Microbiology & Infectious Disease. 58(3):289-95, 2007 Jul.

26. Chou, Hsiao-Hui. Lo, Hsiu- Jung. Chen, Kuo-Wei. Liao, Mei-Hui. Li, Shu-Ying. Multilocus sequence typing of Candida tropicalis shows clonal cluster enriched in isolates with resistance or trailing growth of fluconazole. Diagnostic Microbiology & Infectious Disease.58(4):427-33, 2007 Aug.

27. Wei, Hsiao-Lun. Wang, You-Wen. Li, Chun-Chin. Tung, Sheng Kai. Chiou, Chien-Shun. Epidemiology and evolution of genotype and antimicrobial resistance of an imported Shigella sonnei clone circulating in central Taiwan. Diagnostic Microbiology & Infectious Disease. 58(4):469-75, 2007 Aug.

28. Chen, Shou-Chien. Chang, Hsiao-Ling. Yan, Tsong-Rong. Cheng, Yan-Tzong. Chen, Kow-Tong. An eight-year study of epidemiologicfeatures of enterovirus 71 infection in Taiwan. American Journal of Tropical Medicine & Hygiene. 77(1):188-91, 2007 Jul.

29. Huang, Jyh-Hsiung. Liao, Tsai-Ling. Chang, Shu-Fen. Su, Chien-Ling. Chien, Li-Jung. Kuo, Yu-Chung. Yang, Cheng-Fen. Lin, Chien-Chou.Shu, Pei-Yun. Laboratory-based Dengue Surveillance in Taiwan, 2005: A Molecular Epidemiologic Study. American Journal of Tropical Medicine & Hygiene.77(5):903-9, 2007 Nov.

30. Yip PS, Hsieh YH, Xu Y, Lam KF, King CC, Chang HL. Assessment of Intervention Measures for the 2003 SARS Epidemic un Taiwan by Use of a Back-Projection Method. Infection Control and Hospital Epidemiology. 28(5):525-30,2007.

31. Chan, Pei-Chun. Huang, Li-Min. Lin, Hui-Chi. Chang, Luan-Yin. Chen, Mei-Ling. Lu, Chun-Yi. Lee, Ping-Ing. Chen, Jung-Min. Lee, Chin-Yun.Pan, Hui-Jui. Wang, Jann-Tay. Chang, Shan-Chwen. Chen. Control of an Outbreak of Pandrug-Resistant Acinetobacter baumannii Colonization and Infection in a Neonatal Intensive Care Unit. Infection Control &Hospital Epidemiology.28(4):423-9, 2007 Apr.

32. Fuh-Yuan Shih, Muh-Yong Yen, Jiunn-Shyan Wu, Fang-Kuei Chang, Lih-Wen Lin, Mei-Shang Ho, Chao A. Hsiung, Ih-Jen Su, Melissa A. Marx,Howard Sobel, Chwan-Chuen King. Challenges Faced by HospitalHealthcare Workers in Using a Syndrome-Based Surveillance SystemDuring the 2003 Outbreak of Severe Acute Respiratory Syndrome in Taiwan. Infection Control and Hospital Epidemiology. 28 (3), p. 354-357. 2007.

33. Hung, Min-Nan. Hsueh, Po-Ren. Chang, Hou-Tai. Lee, Wen-Sen. Chou, Ming-Yuan.Chen, Ing-Shen. Wang, Jen-Hsien. Lin, Chen-Fu. Shyr, Jainn-Ming. Ko, Wen-Chien. Wu, Jiunn-Jong. Liu, Yung-Ching. Huang, Wen-Kuei. Teng, Lee-Jene. Liu, Cheng-Yi. In vitro activities of various piperacillin and sulbactam combinations against bacterial pathogens isolated from Intensive Care Units in Taiwan: SMART 2004 programme data. International Journal of Antimicrobial Agents.29(2):145-52, 2007 Feb.

34. Wang, Jang-Shiun. Li, Shu-Ying. Yang, Yun-Liang. Chou,Hsiao-Hui. Lo, Hsiu-Jung. Association between fluconazole susceptibility and genetic relatedness among Candida tropicalis isolates in Taiwan. Journal of Medical Microbiology. 56(Pt 5):650-3, 2007 May.

35. Lin, Yu-Chi. Yao, Shu-Man. Yan, Jer-Jea. Chen, Ying-Yan. Chiang, Chuen-Sheue. Wu, Ho-Sheng. Li, Shu-Ying. Epidemiological shift in the prevalence of pertussis in Taiwan: implications for pertussis vaccination. Journal of Medical Microbiology. 2007 Apr;56(Pt 4):533-7.

36. Wu, Jhy-Wen. Lin, Lie-Chwen. Hung, Shih-Chieh. Chi, Chin-Wen. Tsai, Tung-Hu. Analysis of silibinin in rat plasma and bile for hepatobiliary excretion and oral bioavailability application. Journal of Pharmaceutical and Biomedical Analysis.45(4):635-41, 2007 Nov 30.

37. Chang, Lun-Hsien. Hsu, Err-Lieh. Teng, Hwa-Jen. Ho, Chau-Mei. Differential survival of Aedes aegypti and Aedes albopictus (Diptera: Culicidae) larvae exposed to low temperatures in Taiwan. Journal of Medical Entomology. 44(2):205-10, 2007 Mar.

38. Yang, Chun-Yuh. Chen, Chih-Cheng. Chen, Chi-Yu. Kuo, Hsin-Wei. Air pollution and hospital admissions for asthma in a subtropical city: taipei, taiwan. Journal of Toxicology & Environmental Health Part A. 70(2):111-7, 2007 Jan 15.

39. Tsai, Kun-Hsien. Huang, Chin-Gi. Wang, Lian-Chen. Yu, Yi-Wen. Wu, Wen-Jer. Chen, Wei-June. Molecular evidence for the endosymbiont Wolbachia in a nonfilaroid nematode, Angiostrongylus cantonensis. Journal of Biomedical Science.14(5):607-15, 2007 Sep.

40. Hsu, Min-Chih. Lin, Tsun-Mei. Huang, Chung-Ter. Liao, Mei-Hui. Li, Shu-Ying. Chlamydia pneumoniae Respiratory Infections in Taiwan. Microbiology & Immunology. 51(5):539-42, 2007.

41. Chang, Chi-Ming. Lin, Wen-Chou. Kuo, Hsu-Sung. Yen,Ming-Fang. Chen, Tony Hsiu-Hsi. Estimation and prediction system formulti-state disease process: application to analysis of organized screening regime. Journal of Evaluation in Clinical Practice. 13(6): 867-81, 2007 Dec.

42. Weng, Hui-Ching. Yuan, Ben-Chih. Su, Yu-Tsun. Perng, Daw-Shyong. Chen, Wen-Hsu. Lin, Li-Jen. Chi, Shu-Ching. Chou, Chao-Hung. Effectiveness of a nurse-led management programme for paediatric asthma in Taiwan. Journal of Paediatrics & Child Health. 43(3):134-8, 2007 Mar.

43. Teng, H J. Chen, T J. Tsai, S F. Lin, C P. Chiou, H Y. Lin, M C.Yang, S Y. Lee, Y W. Kang, C C. Hsu, H C. Chang, N T. Emergency Vector Control in a DENV-2 Outbreak in 2002 in Pingtung City, Pingtung County, Taiwan. Japanese Journal of Infectious Diseases.60(5):271-9, 2007 Sep.

44. Wu, Yin-Wen. Hsu, Err-Lieh. Lin, Ting-Hsiang. Huang, Jyh-Hsiung. Chang, She-Fen. Pai, Hsiu-Hua. Seaport as a source of hantavirus: a study on isolated isles. International Journal of Environmental Health Research. 17(1):25-32, 2007 Feb.

45. Chan, Pei-Chun. Wang, Chung-Yi. Wu, Ping-Sheng. Chang, Po-Young. Yang, Tsao-Ton. Chiang, Yu-Ping. Kao, Chuan-Liang. Chang, Luan-Yin. Lu, Chun-Yi. Lee. Detection of Human Metapneumovirus in Hospitalized Children with Acute Respiratory Tract Infection Using Realtime RT-PCR in a Hospital in Northern Taiwan. Journal of the Formosan Medical Association. 106(1):16-24, 2007 Jan.

46. Su, Wei-Ju. Chen, Huey-Ling. Lai, Hong-Shiee. Ni, Yen-Hsuan. Chang, Mei-Hwei. Pancreaticobiliary Anomalies is the Leading Cause of Childhood Recurrent Pancreatitis. Journal of the Formosan Medical Association. 106(2):119-25, 2007 Feb.

47. Lee, Jen-Jyh. Wu, Rong-Lun. Lee, Yeong-Sheng. Wu, Yi-Chun. Chiang, Chen-Yuan. Treatment outcome of pulmonary tuberculosis in eastern taiwan - experience at a medical center. Journal of the Formosan Medical Association. 106(1):25-30, 2007 Jan.

48. Huang, Wei-Lun. Jou, Ruwen. Yeh, Pen-Fang. Huang, Angela. Team, Outbreak Investigation. Laboratory investigation of a nosocomial transmission of tuberculosis at a district general hospital. Journal of the Formosan Medical Association. 106(7):520-7, 2007 Jul.

49. Yang, Chih-Yun. Jou, Ruwen. Chuang, Pei-Chun. Chang, Jenn-Tyang. Lee, Jen-Jyh. Huang, Ruay-Ming. Transmission of Mycobacterium tuberculosis in a family proved by genotyping. Journal of the Formosan Medical Association. 106(10):808-14, 2007 Oct.

50. Wu, Yi-Chun. Hsu, Gwo-Jong. Chuang, Kenneth Yin-Ching. Lin, Ruey-Shiung. Intervals before tuberculosis diagnosis and isolation at a regional hospital in Taiwan. Journal of the Formosan Medical Association. 106(12):1007-12, 2007 Dec.

51.Huang, Han-Yu. Jou, Ruwen. Chiang, Chen-Yuan. Liu, Wen-Chien. Chiu, Hsien-Jane. Lee, Jen-Jyh. Nosocomial transmission of tuberculosis in two hospitals for mentally handicapped patients. Journal of the Formosan Medical Association. 106(12):999-1006, 2007 Dec.

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