Perseverance and will power

Great care

Try hard to create something

The beginning of a new epoeh

CDC

Center for Disease Control, Taiwan

2004 Annual Report

Highlights of activeities in 2003 and future prospects

Prevent communiacble diseases promptly and professionally

Mobilize all people for health promotion

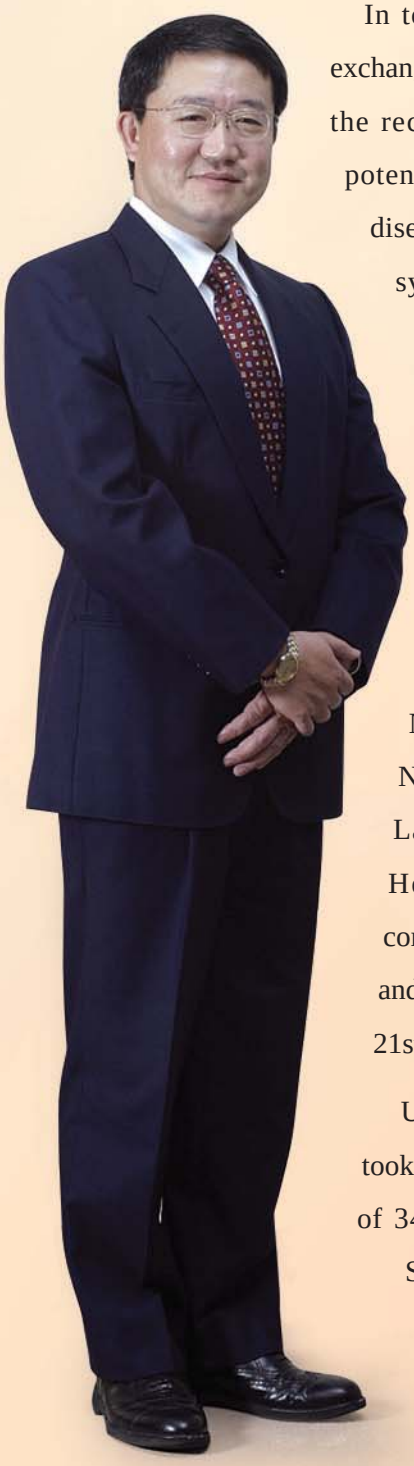
Center for Disease Control, Department of Health, Executive Yuan

October 2004

contents

contents

Message from the Director-General



In today's global environment, with frequently international exchange and travel, new diseases, including emerging diseases and the recurrence of indigenous communicable diseases have the potential to spread across the world. It greatly challenged our disease control capability as well as the access of contingency system. In coordination with the rapid development in high technology and the trend of internationalization, disease control must be more comprehensive, prompt, effective and international. The Center for Disease Control plays a critical role to combat the threat of communicable diseases.

In1999, Taiwan CDC was established by merging the Bureau of Communicable Disease Control (BCDC), the National Institute of Preventive Medicine (NIPM), the National Quarantine Service (NQS) under the Organization Law of the Center for Disease Control, the Department of Health, in order to deal with the changing patterns of communicable diseases, to consolidate disease control resources, and to establish a disease control system for the challenges of the 21st century.

Unfortunately, Severe Acute Respiratory Syndrome (SARS) took a devastating impact on Asia-Pacific nations in 2003. A total of 346 cases were recorded as confirmed SARS cases. Of the SARS patients, 73 died, of which 37 died directly from SARS, translating into a fatality rate of 10.7%. However, under the leadership of Taiwan CDC, Department of Health, the measures include issuing travel advisories, establishing monitoring stations at harbors and airports, quarantining

suspected patients, and nocosomial infection control were implemented. Through the government's effective prevention measures, which adopted across the world have proven to be effective against SARS, the outbreak has been successfully controlled. Disease control is like in a battle, in this case, Taiwan has made important progress in combating the terrifying and lethal disease.

However, the devastating SARS outbreaks impact Taiwan's health system in various aspects. Some most significant events are as following: change people's health behavior, to build a new concept of health community, to mobilize all people to promote health and actively participating in international conferences and activities, etc. Taiwan CDC also learned and re-built her organizational structure by creating special division of EID, nocosomial control and strengthen manpower in terms of recruiting more medical doctors and senior researchers with PhD training.

For the further challenges, CDC needs to take specific actions to fulfill every health target, such as: putting knowledge into action to improve people's health, utilizing new technologies to provide credible health information, protecting individuals against emerging infectious diseases including bioterrorism, and building strong partnerships with domestic and international partners to enhance the health environment for our people.

Meanwhile, as a member of international community, Taiwan will play an active role to contribute to a healthier world. Working with international partners and reinforce international relationship to accomplish our missions is important for us. I personally believe we can make it and do the better than ever.

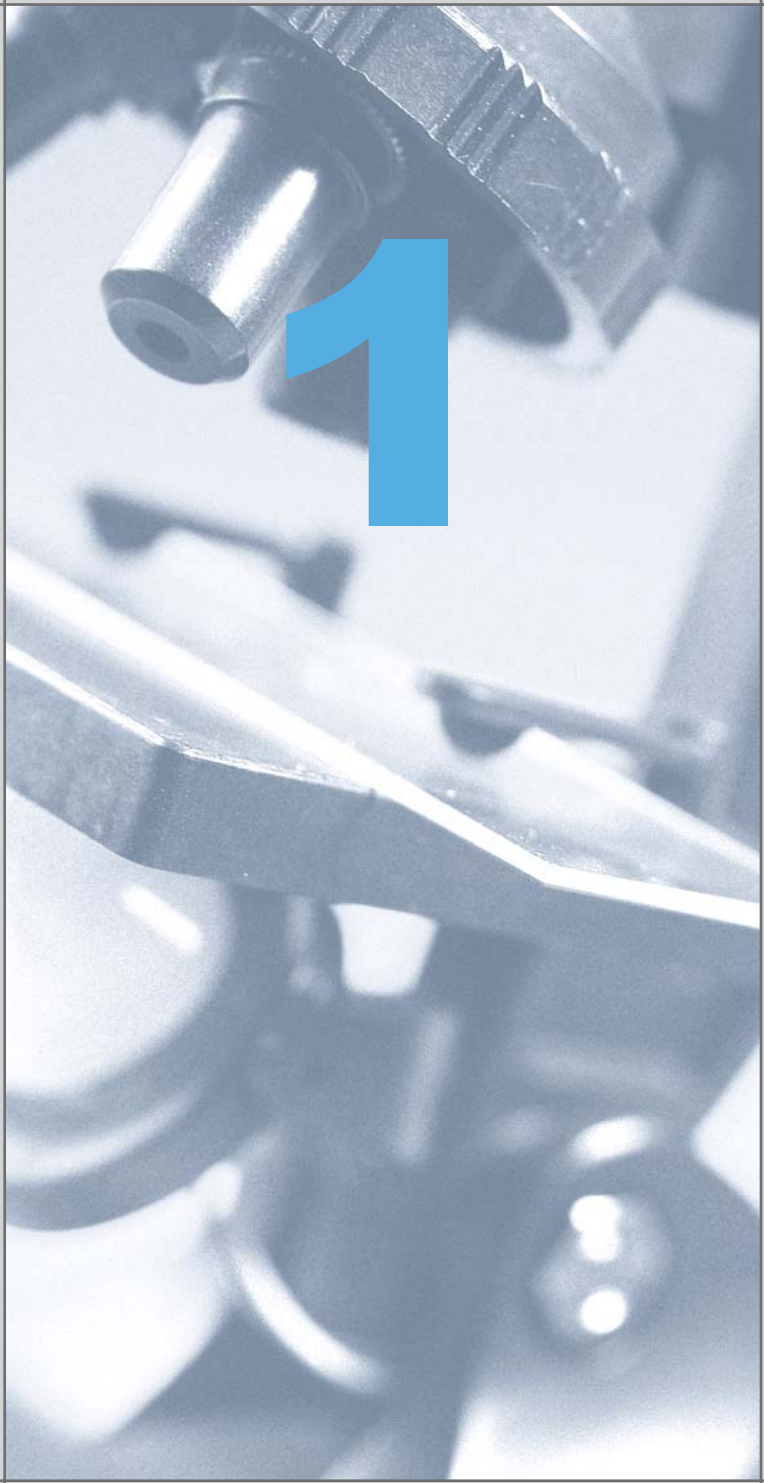
CDC Annual Report 2004 provides readers an overview of CDC's major events and achievements of the past year. Finally, I hope you will enjoy of reading this report and continually support us by any of your recommendation.

Steve, Hsu-Sung Kuo MD, MPH,PhD

Director-General

Center for Disease Control

Overview



1

General Information on Communicable Disease

General Information On Communicable Diseases

Background

From ancient times to the present, humans have constantly faced the threat of disease. Fortunately, there was once a group of predecessors who combated communicable diseases constantly in Taiwan. Due to their efforts, numerous indigenous communicable diseases such as plague, smallpox, rabies and malaria (refer to Table1) have been successfully eradicated in Taiwan during 1948 to 1965.

To combat communicable diseases is mutable and challengeable. Therefore, on July 1, 1999, under the Department of Health, the Center for Disease Control was established, effectively merging the Bureau of Communicable Disease Control (BCDC), the National Quarantine Service (NQS) and the National Institute of Preventive Medicine (NIPM) in an attempt to combine the disease control resources and to act upon disease control more effectively. CDC has since been in total charge of national communicable disease prevention.

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

To deal with the challenges of the 21st century disease control, the restructured disease prevention unit (a.k.a the Center for Disease Control) has its main focus on communicable disease control and its secondary aims on disease surveillance and quarantine research. CDC is under Director-General, Vice Directors and Secretary-General and it is organized into Division of Quarantine and Intervention Activities, Division of AIDS and STD, Division of Immunization, Division of Surveillance and Investigation, Division of Tuberculosis, Division of Laboratory Research and Development, Division of Laboratory Resources Management, Vaccine Center, Division of Planning and Coordination, Emerging Infectious Disease, Information Technology Team and Branch Offices (refer to Table2).

Currently, there are 772 employees of at the Center for Disease Control, Department of Health. The personnel average age is 44.27 and the employees of age 49 and under constitute 70% of the total number of workers. In addition, 75% of the staff has a bachelor degree while 22% of the center has a graduate degree (refer to Figure 1, 2). With a team that combines credibility, vitality, and innovation,

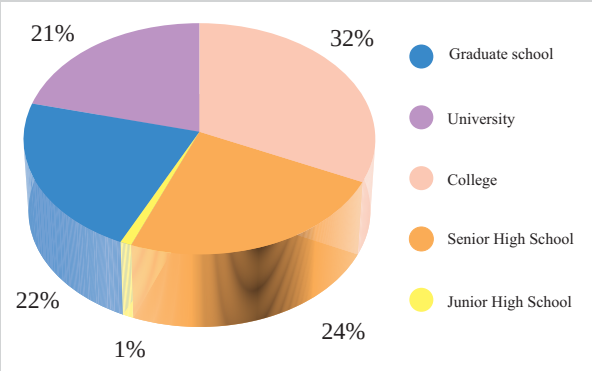


Figure.1 Employee Statistics Types of Degree

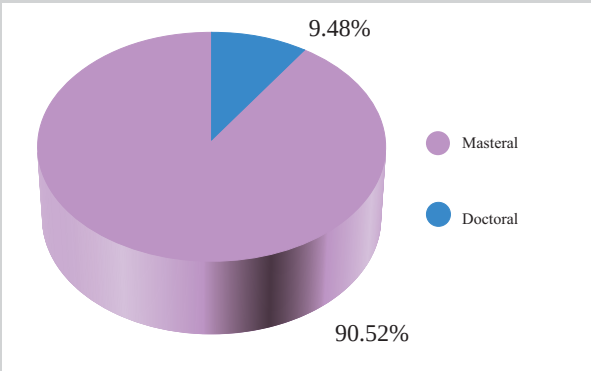


Figure.2 Employee Statistics Graduate Degree

CDC provides professional disease preventive precautions, an up-to-date disease surveillance system, a foremost technological research and lively health education promotion. CDC is creating an environment free of the threat infectious disease for all of Taiwan!

Recent Accomplishment

Communicable Disease Prevention

Over the past few years, the CDC has been taking extra precautions on infectious diseases, such as enteroviruses, bacillary dysentery, dengue fever, AIDS and tuberculosis.

In 1998, an epidemic outbreak of enteroviruses caused an island-wide panic in Taiwan. In response to the outbreak, the Department of Health set up an enteroviurs surveillance system and epidemic-prevention organizations. Thereafter, CDC has promoted a national hand washing campaign in an attempt to increase the people's awareness to enteroviruses.

In light of the high bacillic dysentery incidence among the Taiwanese Aborigines, CDC has embarked on a program that called on local schools, local churches, social workers and regional leaders to work together in pursuit to terminate the disease. The bacillic dysentery incidence control in mountainous areas has since shown improvement.

As for the surveillance of dengue fever, CDC reinforced the reporting system by physicians and public general in order to effectively monitor the spread of vectors as well as to control the number of vectors. In addition, physical temperature monitoring for the incoming passengers in the airport, tracing and visiting for the passengers who are from Southeast Asia are preceded to well control the situation.

For AIDS control, CDC has launched different campaigns on safe blood transfusion and safe sex practices. In 2001, Executive Yuan set up a council to help fighting against AIDS with CDC.

Tuberculosis (TB) is ranked to the top prevalent and the highest mortality notifiable disease in Taiwan. Since November of 2001, CDC has started to implement the reporting tuberculosis cases by Internet as well as death checking to raise the notification rate. As the result, the rate was around 77.7% in 1999 and was up to 89.3% in 2002. CDC also held a

series of educational trainings for the grass roots physicians and general public, the notification rate has risen sharply. Compare with the past years, the notified cases have been effectively controlled.

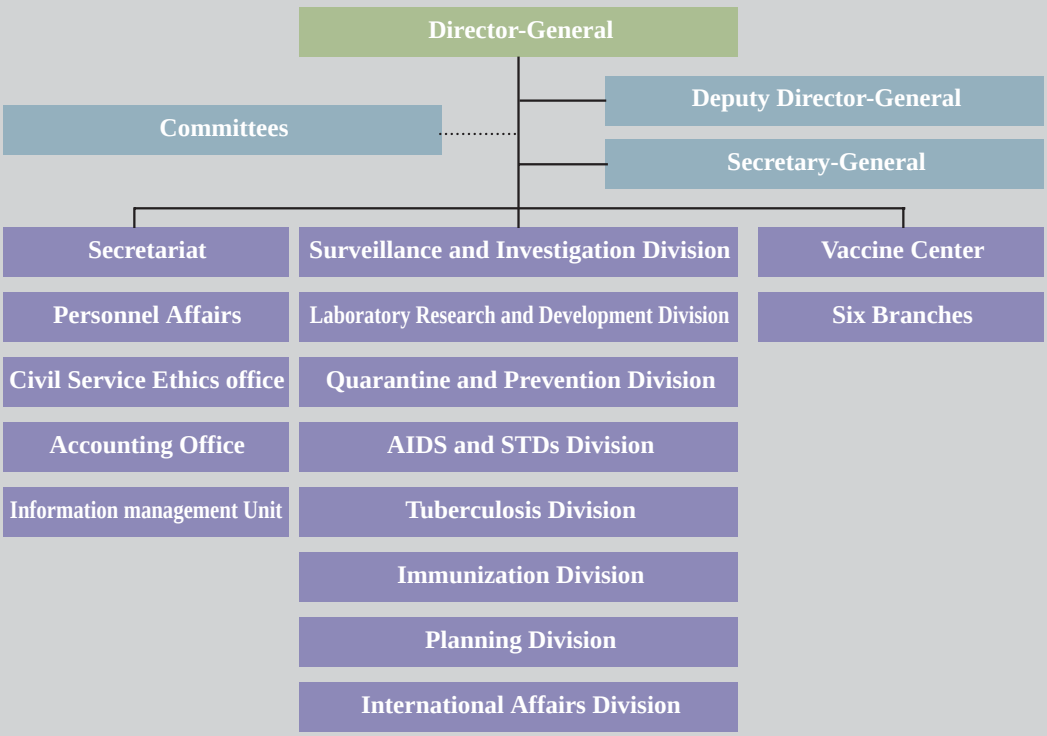
In late 2002, SARS initially emerged in South China, and quickly spread to the world. The SARS outbreak in Taiwan started from early March 2003, and total of 346 cases were confirmed as SARS cases (according to the newest SARS definition of World Health Organization). Fortunately, a dedicated effort by the government and the people of Taiwan had the SARS outbreak under control by July 5, 2003.

Immunization

The childhood vaccination program was successfully implemented in Taiwan and the mortality rate as well as the numbers of infectious diseases in Taiwan have been greatly lowered or even eliminated. On October 29,2002, the World Health Organizations announced that poliomyelitis had been eradicated from the Western Pacific Region, including Taiwan. The effort of Taiwan in disease control over the years had finally gained an international recognition.

Taiwan was the first country to establish the national hepatitis B immunization program. The children hepatitis-carrying rate has since dropped from 10.5% to 1.7%. The toddler's hepatoma incidence rate has been significantly lowered as well. This extraordinary accomplishment is noted internationally. In addition, to treat the hepatitis B carriers and

Table.2 **Organization of CDC**



hepatitis C infected patients to lower the incidence rate of liver cirrhosis and hepatoma. ,"All people Health Insurance to strengthen the treatment for chronic B and C type hepatitis experimental program" was carried out on October 01 , 2003. In 2004, Taiwan has pledged NT $ 2 billion to this program and it has became the first free medicine care program for the B and C type hepatitis patients in the world.

Hepatitis A populates in mountainous area in Taiwan. Since 1995, free hepatitis A vaccines have been given to newborns and children in order to control the high hepatitis incidence in the district. The rate of the hepatitis A incidence has then significantly been well-controlled.

The varicella (Chickenpox) vaccine will be listed in the childhood routine immunization program since January 1, 2004. The children above 12 months (who were born after January 1,2003) are recommended to receive the vaccine. (The immunization coverage refers to figure 3, 4.)

To alleviate the impact of SARS and the prevalence of influenza, CDC embarked an expanded free influenza immunization program and aimed to increase the coverage rate to 80% for the elderly of age 65. In addition, CDC also purchases more vaccines for hospital medical care providers, the members of disease control and the poultry raisers. The vaccination rate for 65 year-old elderly has been risen up to 68.4% in 2003 from 59.9% in 2002. The vaccination rate for the medical care providers and disease control staffs in medical units are up to 91.3% .

Surveillance

In recent years, CDC fully combined and exploited the innovations of computer science technology and infection control strategies to construct an up-to-date infectious diseases surveillance system. The system aims to detect the epidemics in early stages and monitor the progress of the infectious disease spontaneously.

Eight major surveillance systems are installed. They respectively are Active Surveillance System, Geography Information

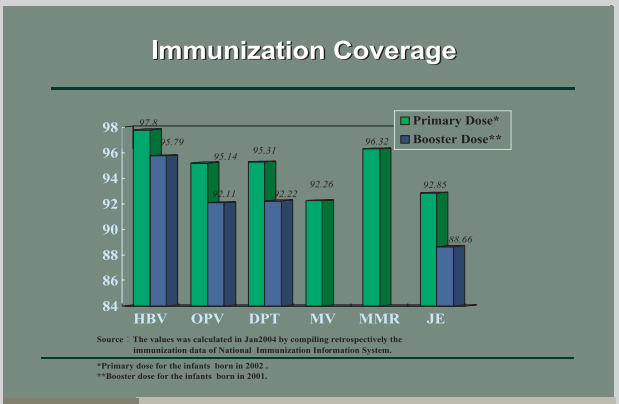


Figure.3

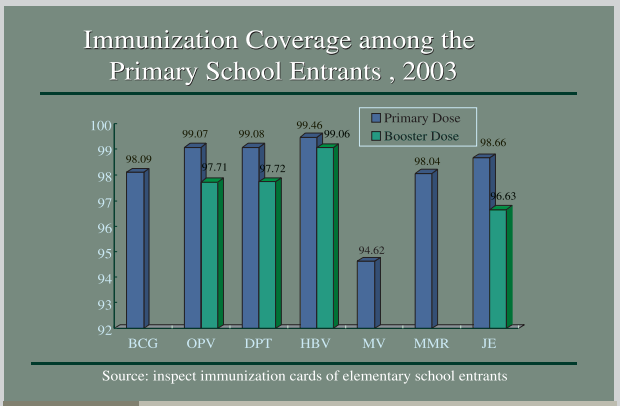


Figure.4

System, Communicable Diseases Reporting System, Nocosmial Infections Surveillance System, Sentinel Physician Surveillance System, School-Based Surveillance System, Syndromic Surveillance System and Institutions Surveillance System. They are constructed to provide a thorough detection for the different diseases and different populations.

Meanwhile, according to the concept of "mobilize all people for health promotion", CDC also set up a 24 hours free toll disease reporting hotline and a "1922 hotline" for general public to consult the disease control questions.

Laboratory Research

Apart from stepping up its own internal quality control, CDC has actively participating in external quality assessment programs provided by various world famous organizations and laboratories such as the Association for Professionals in Infection Control and Epidemiology (APIC) in America, Victorian Infectious Diseases Reference Laboratory under World Health Organization (WHO) in Melbourne, Australia, and Centers of Disease Control and Prevention in America in an attempt to increase its laboratory proficiency. CDC has also taken other measures to strengthen disease surveillance in Taiwan. In recent years, the public has always been terrified upon the mention of enterovirus; the CDC is assiduously developing an enterovirus 71-prototype vaccine, using the foremost biological technology. Moreover, the CDC is planning the construction of the largest flavivirus study center in Asia in response to the constant threats of infectious disease outbreaks brought by arthropods.

Health Education Programs

CDC has devised a variety of multimedia resources such as publication of "virtual magazine" and construction of "virtual radio station" on its website; installation of 15 colorful "health education bulletin boards" throughout the cities and counties in Taiwan; creation of "digital museum", "children-friendly website" and interactive website" to facilitate the public's access to the information on disease prevention. All the students, parents and teachers are ensured to be able to acquire the essential health education materials online anytime they wish.

International Cooperation on Disease Control

Although Taiwan has been excluded from the World Health Organization (WHO) since 1972, the government continue to detach the medical groups and provide moral support to the needed places such as medical supply, financial and technical assistance as well as medical training . Furthermore, Taiwan has been promoting communicable disease surveillance campaign and other international collaboration on various health care issues through its active involvement in Asia-Pacific Economic Cooperation (APEC).

[2003 Focus]

Prevention and Control of SARS in Taiwan

Prevention and Control of SARS in Taiwan

Background

On February 21 of 2003, a nephrologist in Canton had the symptom of respiration infection and died of respiratory failure. Shortly after that, his family, medical personnel who took care of him and a few tourists who lived on the same floor in the hotel all appeared to have the same symptoms. On February 26 of the same year, an American businessman in Vietnam was hospitalized because of fever, dry cough, muscle ache, sore throat and acute respiratory distress syndrome. Four days later, he died after his condition deteriorating and many of the medical personnel that took care of him has gotten the same symptoms. Subsequently, Canada and other countries had reported similar cases to World Health Organization. WHO had named this disease as Severe Acute Respiratory Syndrome, also known as SARS.

While many countries around the globe had notified WHO of this disease successively, The Center for Disease Control of Taiwan had kept alert to this situation, monitored the possibility of SARS epidemic and tried to prevent SARS epidemic to Taiwan. Unfortunately, Taiwan could be rid of SARS invasion. On March 10, 2003, the first case of SARS had appeared on a tourist traveled from China. Subsequently, other cases from abroad had caused the second dissemination in Taiwan. It had become a difficult fight to control SARS after the cluster infectious incident in Taipei Municipal Hoping Hospital in April.

There were 664 SARS probable cases during the period of March to June, 2003 in Taiwan. According to the newest SARS definition of WHO , CDC of Taiwan reclassified the SARS probable cases by the results of PCR and serological testing in order to verify the prevalence of SARS in Taiwan. After reclassification, 346 were either SARS PCR positive or antibody positive, so called SARS CoV(+) cases. Among 346 SARS CoV (+) cases, 73 (21%) were deceased, including 37 (10.7%) were directly due to SARS and 36 were SARS related diseases.

Control of SARS in Taiwan

Organization

On March 17, 2003, the Department of Health set up a SARS Coordination Center to integrate resources of the administration, the academic, medical, and private sectors to fight SARS.

On April 28, 2003, the Executive Yuan established a SARS Prevention and Relief Committee with Premier Yu Shyi-kun serving as its convener to coordinate and mobilize the Cabinet in the fight against SARS.

Legislation

On March 28, 2003, the Department of Health classified SARS as a Type-4 notifiable communicable disease. On August 19 2003, SARS was redefined as a Type-1 notifiable

communicable disease after its etiology and control measure had been confirmed.

The "Provisional Regulations Governing the Prevention and Relief of SARS" was announced on May 2, 2003, in response to the great impact brought by SARS outbreak. On June 18, its revision was published. The temporary regulations were effective on March 1, 2003, and would be expired on December 31, 2004, because they were supplementary to the Law and Act.

Prevention strategies

Quarantine

Arriving passengers were required to complete a SARS survey form and were checked for temperature.

Passengers arriving from SARS-affected areas were subject to 10-day home quarantine between April 28, 2003, and July 3, 2003. Beginning June 24, home quarantine was switched to vigilance for fever (i.e. measuring temperature twice daily) and respiratory symptoms for ten days

Monitoring

1. Strengthening the notification system for Notifiable Communicable Diseases, New Infection Syndrome Monitoring and Notification System, Designated Doctor Monitoring System, School-Based Monitoring System, Hospital and High-Densities Population Fever Monitoring.
2. Promoting temperature monitor for general public everyday and whenever one has a fever should call Fever Hot Line 177 for advices.
3. Strengthening the Epidemic Examination of notified cases and crossing examination of personal Health Insurance Data and Notification Data.

Medical care

A set of Guidelines on the Medication of SARS was formulated for the reference of medical care institutions. Contents of the guidelines included matters such as antiviral therapy, immunomodulating agents, and principles of respiratory care.

Home quarantine

All probable and suspected SARS cases recently discharged from hospital, and persons who might have come into contact with a SARS patient or an infected environment through living arrangements, medical care, or hospital visits, were subject to home quarantine.

Health education and training

Mass media such as TV, newspapers, leaflets, posters, and radio had been extensively used for public education. A SARS prevention TV program was broadcast daily at regular hours to announce government measures and policies aiming at countering the epidemic.

Laboratory diagnosis

In mid-April, 2003, real-time PCR was used for the screening of SARS infection. Two systems were used in parallel. A report was issued only when the two systems produced the same result. When the results differ, nested RT-PCR was used for further confirmation.

In viral serology, in addition to an IFA test, a fast SARS antibody test kit was developed,

which could produce results within 20 minutes.

International cooperation

In response to the global spread of SARS, Taiwan was the first to host an international symposium on the epidemic on April 20 and 21. Experts from twelve affected countries were invited to Share experiences in epidemiology, clinical medicine, and control measures. More than 400 participated. It was hoped that this symposium would enhance international cooperation in the prevention and control of SARS, as well as demonstrate Taiwan’s spirit of humanitarian support.

In order to properly fulfill our role in maintaining world health, Taiwan took the initiative and promptly reported its epidemic situation to the World Health Organization as soon as SARS cases were detected in mid-March. At the Global Meeting on the Epidemiology of SARS organized by the WHO on May 16, Taiwan presented her SARS epidemic situation and control and preventive measures taken. Delegates from Taiwan also exchanged opinions with those from other countries. Moreover, Taiwan was invited and participated in the "WHO Global Conference on Severe Acute Respiratory Syndrome(SARS): Where Do We Go From Here?"on June 17-18. On the other hand, a group of government officials led by Minister Chien-Jen Chen attended the "APEC Special SOM Meeting and Health Minister Meeting"held in Bangkok, Thailand on June 27-28 and they made two concrete suggestions during the meeting that respectively were :1. Forming APEC Health Working Group 2.Setting up disease outbreak alert hot-line system for Health Ministers.

Taiwan wanted to ensure that information on our efforts to control SARS was accessible and transparent. We also wanted to help the international community to understand our specific efforts and draw on the experience of others. Toward these ends, Taiwan invited experts from the US CDC and the WHO to Taiwan to develop a better understanding of the situation and provide necessary assistance.

Achievements in prevention and control

World Health Organization (WHO) announced travel advisory for Taiwan on May 8 and included Taiwan in the list of travel advisory on May 21. On June 17, Taiwan was removed from WHO’s list of travel advisory. On July 5, WHO lifted Taiwan from the list of areas with recent local transmission of SARS.

Prevention of SARS in Taiwan

Prevention strategies

Quarantine

An important measure was to monitor incoming and outgoing travelers. Incoming travelers from SARS-affected areas were asked to keep track of themselves.

Between July 1, 2003, and March 25, 2004, a total of 2,250,835 incoming travelers filled out SARS forms and underwent temperature checks. All of the individuals mentioned above did not show signs of SARS.

Monitoring

1.Administrate Fever Screening Station and monitoring fever patients proactively.

2.Subsume SARS as Type One Notifiable Communicable Disease by amending Legislation of Notifiable Communicable Disease

3.In order to prevent community outbreak, continue Monitoring Fever for SARS at Highly Populated Organizations and Monitoring Fever For SARS in Hospitals. Also protectories, nursing homes, correction facilities, veteran homes, hospitals and other organizations are to administrate temperature monitor procedure to detect any fever cases and to take precaution and proper procedure of prevention tactics.

4.Inform medical personnel and general public information of SARS, also encourage people to notify health organization about any information of the epidemic through all kind of means.

Infection prevention network

The CDC has coordinated with its northern, central, southern and eastern branch offices to form infection command centers throughout the island. Each center is led by a commander and a deputy commander, who monitor the operations of the center during an outbreak.

Hospital Assessment

Health authorities visited several medical facilities above the municipality level from September to October 2003, evaluating them on 10 major criteria:

1. Implementation of previous recommendations.
2. Establishment of an Infection Control Committee.
3. Reporting of suspected SARS and pneumonia cases in accordance with DOH regulations.
4. Fever screening and processing.
5. Diagnosis of suspected SARS and undiagnosed fever patients
6. Health and temperature monitoring of all hospital personnel.
7. Availability of Personal Protective Equipment (PPE).
8. Existence of isolation rooms, observation rooms and handwashing Facilities.
9. Completion of SARS training for all hospital personnel.
10. Crisis management processes.

Bio-safety in laboratories

At the beginning of the 2003 SARS outbreak, all specimens of suspected SARS cases were sent to and tested exclusively at Kun-Yang Lab of CDC-Taiwan. As the case number increased and got out of hand, virology laboratories [of ten medical centers located in different parts of Taiwan] were selected and given the status of "SARS contracted laboratories". After meeting stringent requirements they were authorized and able to test specimens collected at their own hospitals, share the workload and responsibilities of CDC-Taiwan's laboratory, and, most importantly, have specimens tested promptly with no delay. At present, we have altogether 12 such laboratories each assigned to take care of one of 12 separate geographic regions.

During and after the SARS outbreak, more than one hundred research projects on SARS

were contracted out by the National Science Council and conducted fervently by research teams in Taiwan. Many domestic biotechnology companies also expressed their keen interests and engaged in developing new diagnostic kits, vaccines and drugs against SARS.

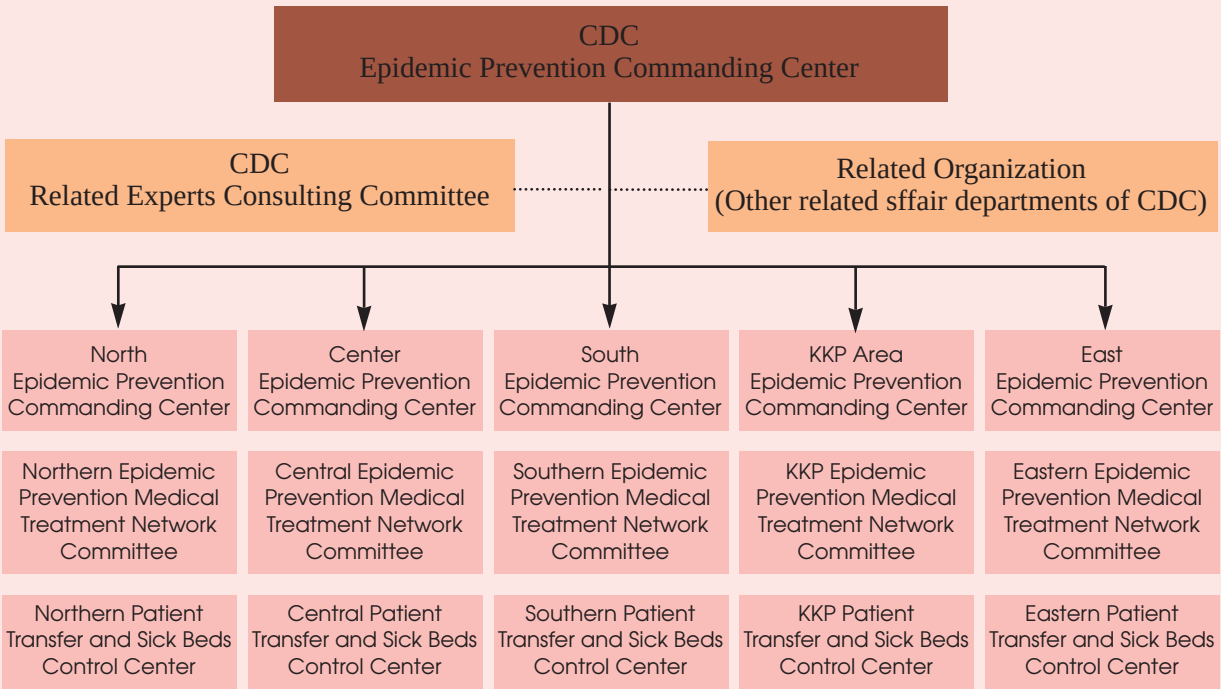
CDC-Taiwan have realized that handling emerging exotic diseases, such as SARS would be our greatest future challenge. Presently our need is urgent to upgrade the bio-safety level of all laboratories involved.

Starting from June 2003, these several preventive actions been implemented:

1. Funds have been diverted to support the construction or complete overhaul of BSL-3 laboratories at seven medical centers. Another two medical centers' construction plans are pending.
2. Further funds have been diverted to support the upgrade of five existing contracted BSL-2 laboratories to our standards.

Ironically, the laboratory is one of the most probable contamination sources of the next outbreak. This concern was validated due to a laboratory acquired SARS infection, which took place in Singapore in early September 2003. Since then, several actions have been implemented.

1. Surveillance of the number and storage



conditions of existing SARS virus isolates

3. As per the SARS alert measure published on the WHO website, we have continued monitoring the body temperatures of all health workers, including laboratory personnel, after the outbreak.

4. Assembly of an expert group to review international standards and adapt them to our own BSL-3 regulatory guidelines. The Chinese version of this compilation is called "Bio-safety Level 3 Laboratory Quality Control Guidelines" (interim). It is accessible on the CDC of Taiwan's website. As matter of fact, back in April 1985, the then Institute of Preventive Medicine obtained permission from the editor and translated the CDC-USA publication, "Bio-safety in Microbiological and Biomedical Laboratories, 3rd Edition" into Chinese. Also, the "Laboratory Bio-safety Manual, ed 2" from the WHO has been translated into Chinese and is under a review process now. This revised version will be presented to the SARS issue committee for finalization.

5. Through workshop sessions, we have been educating laboratory personnel in regards to BSL-3 operations and facilities, and the specifications and use of various bio-safety cabinets.

6. On Jan. 2, 2004, an amended version of the "Communicable Disease Control Act " was passed by the legislature and is awaiting promulgation. From this time forward, all infectious agents are required to be registered. Any transfers or relocations must first be applied for and approved by permission from the CDC. Infectious agents belonging to risk group 3 or 4 may only be stored by the CDC or an officially designated institute. When there is a need for these materials by any laboratory in the future, an application must be submitted to CDC for access.

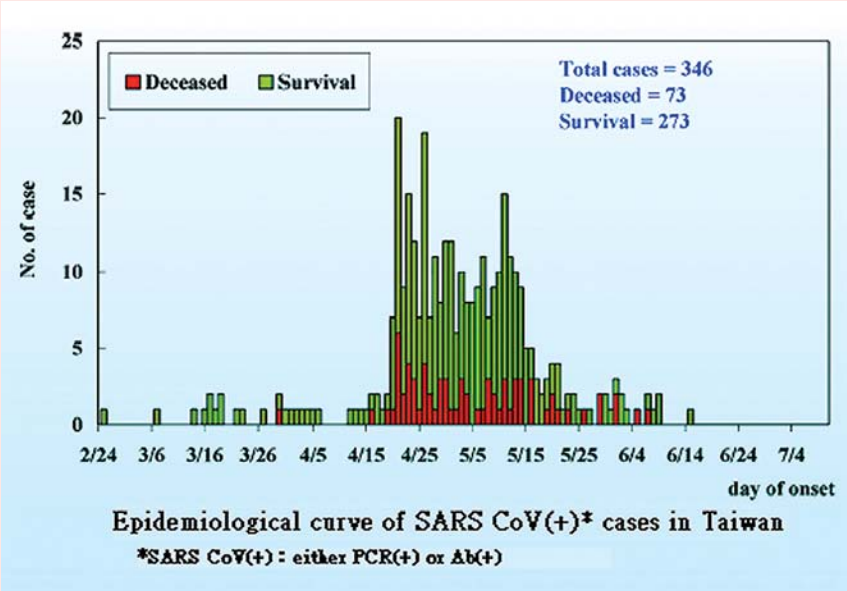
A regulation governing the management of pathogens is in process.

Influence prevention

The Center for Disease Control has operated a national influenza surveillance system since 1999 to monitor and report influenza activities across Taiwan. In order to prevention of SARS during the post epidemic and flu season, several measures were adopted to prevent SARS from recurring. These measures included the establishment of fever screening centers for those coming down with a fever, better design of quarantine facilities, cut down on hospital visits and refrain from going to work or school if they had a fever.

One SARS case reported in post-SARS period

On December 16, 2003, Tri-Service General Hospital had notified a SARS infection case. It was caused by misconduct in the laboratory after investigation. The SARS patient had gone to Singapore for a meeting from December 7 to 10, and he broke out into a fever after he got back to Taiwan. CDC had not only tracked down the 34 people who had contacted with the SARS patient and asked them to proceed fever monitoring, but also notified WHO and other foreign health organization. The patient had left the hospital after treatment on December 30 and the 34 people who were in contacted with



Fatality Rate of SARS CoV(+) Cases in Taiwan

Date:Sep. 4, 2003

	Number of cases A	Number of deaths B	Fatality rate B/A (%)
Total	346	73	21.1
Gender			
Female	218	34	15.6
Male	128	39	30.5
Age			
0-9 yrs	3		
10-19 yrs	15		
20-29 yrs	82	7	8.5
30-39 yrs	68	5	7.4
40-49 yrs	79	12	15.2
50-59 yrs	44	16	36.4
60-69 yrs	20	11	55.0
70-79 yrs	23	14	60.9
80~ yrs	12	8	66.7

the patient had not been infected.

Challenges for the future

With the well-developed transportation technology, and the high frequency of migration, many communicable diseases are not limited at certain areas as before. A territorial disease could have a potential to become a global disease. In the past history, microbes and human are always in a never-ending competition, that both have to learn the ways to cope with each other. However, with

the developing of technology and knowledge, people need to face new challenges constantly while the lifestyle has been changed.

Medicine is to save and treat people, and protect the health of general public is the main purpose of public health. To prevent the outbreaks and the epidemic of emerging diseases, the public health and medical mechanism has to be consolidated in order to deal with challenges in the future.

SARS Personnel Mobilization and Alert Level in Taiwan.

Alert Level	0	Preparation	A	B	C
Timing	No SARS epidemic in Taiwan or around the global at the usual SARS outbreak period.	No SARS epidemic in Taiwan or around the global at a time that SARS doesn't normally happen.	The first confirmed SARS case abroad.	The first confirmed SARS case in Taiwan.	The first confirmed Secondb Infected Case in Taiwan.
Epidemic Situation	No cases both in Taiwan and the global.	No cases both in Taiwan and the global.	Confirmed SARS cases abroad, but not in Taiwan.	The First[a] confirmed SARS cases.	The Second[b] Infectious case in Taiwan.
Commanding Level	CDC	CDC	Department of Health	The Executive Yuan	The Executive Yuan
Alert Time	December To April of the next year. *	May to October *	O Level Alert or Preparation Level three weeks after the last case of quarantine from oversea.	TDowngrade levels three weeks after the last case of quarantine in Taiwan.	

§ The announcement of activation and decision of all levels are by SARS Prevention and Relieve Committee.
a. First Infection: It means that there are cases in Taiwan; however, it hasn't been spread.
b. Second Infection: It means the cases of First Infection have infected other people.
* According to the experience from 2003 to 2004, SARS epidemic cycle is similar to other respiratory infectious diseases.

National Disease Surveillance Systems

3

Notifiable Disease Surveillance System
Sentinel Surveillance system
Symdromic Surveillance system
School-Based Surveillance System
Electronic Bulletin system
Geographic Information System

Notifiable Disease Surveillance System

Perspective

In order to develop the communicable disease surveillance system, CDC estabtished the Notifiable Disease Surveillance System in 1993, which provided a fuction to report infections disease cases for medical personnel, the system merged with the Health Information Network (HIN)in 1997. Meanwhile, in order to lessen the burden of public health workers and to avoid inputting data repeatedly, the first stage of Website Version of Notifiable Disease Surveillance System had been formulated and created in August 2000. It has been officially launched online for the users of contracted laboratories, physicians and 25 Health Bureaus in July 2001 and continued to plan for the expansion of functions. Thereafter, the second stage of Website Version of Notifiable Disease Surveillance System was developed in 2003, the purpose of this renewed system is to correct, strengthen and expand the functions of the first stage version. This system build a more proficient database of communicable diseases in Taiwan, and made it able to monitor epidemics and detect outbreak earlier.

Goals

1) To build a centralized database, manage and analyze communicable disease data accurately and promptly .
2) To integrate the infectious disease information of Taiwan for the purpose of information providing and management.
3) To incorporate different databases in order to unify the reporting of the Notifiable Disease Surveillance System.
4) To alleviate the burden of public health workers in order to work efficiently.

Analysis of Notifiable Communicable Disease

There are 39 Notifiable Communicable Diseases (chicken pox and mumps reported by simple and lots) as well as other diseases, like cat-scratch disease, Creutzfeldt-Jakob disease, HIV and other Syndromic related diseases can be reported to the Notifiable Disease Surveillance System.

Because of the SARS outbreak in March 2003, SARS had been classified as Type IV Notifiable Communicable Disease on March 28, 2003, then was amended to Type I on August 19 in the same year. Also Cholera, Plague, Yellow Fever, Rabies, Ebola Hemorrhagic Fever, Typhus Fever, Diphtheria, Anthrax, Poliomyelitis, Dengue Hemorrhagic Fever/ Dengue Shock Syndrome, Hantavirus Pulmonary Syndrome/ Hantavirus Hemorrhagic Fever, Leprosy, Congenital Rubella Syndrome are only to be counted with confirmed cases.

Table 1 shows the case number of infectious diseases in 2002 and 2003. There were 3,024 SARS reported cases in 2003, which included 347 confirmed cases and one was infected in the laboratory. Due to an dengue fever outbreak in Kaohsiung City last year, the government actively implemented the density of vector-borne mosquitoes survey, health education, active surveillance and prevention for imported cases, as a result, the dengue fever

Table 1 Number of Communicable Diseases in Taiwan in 2002, 2003

Catgory	Diseases	2002		2003	
		Reported	Confirmed	Reported	Confirmed
I	*Cholera	2	2	1	1
	*Plague	0	0	0	0
	*Yellow fever	0	0	0	0
	*Rabies	1	1	0	0
	*Ebola hemorrhagic fever	0	0	0	0
	SARS	0	0	3024	347
II Type A	*Anthrax	0	0	0	0
	*Typhus fever	0	0	0	0
	*Diphtheria	0	0	0	0
	Meningococcal meningitis	81	46	38	26
	*Hemorrhagic fever with renal syndrome	0	0	0	0
	*HPS(hantavirus pulmonary syndrome)	0	0	0	0
	Typhoid fever	135	54	107	40
	Paratyphoid fever	64	18	59	15
II TypeB	*Poliomyelitis	0	0	0	0
	Bacillary dysentery	594	436	342	246
	Amoebic dysentery	412	289	304	121
	Open pulmonary tuberculosis	10225	8886	9456	8409
III Type A	EHEC(Enterohemorrhagic E.coli)	25	0	12	0
	Dengue ferver	15221	5388	1583	145
	*Dengue hemo	242	242	2	2
	*Malaria	28	28	34	34
	Measles	79	24	59	6
	Acute Hepatitis A	367	355	163	160
	Enteroviruses infection complicated severe case	315	162	139	70
III Type B	other tuberculosis	15037	9127	12895	5665
	Japanese Encephalitis	311	19	309	25
	*Leprosy	7	7	3	3
	Acute flaccid paralysis	92	84	72	65
	Scrub typhus	1920	237	1758	283
	Pertussis	203	18	191	26
	Scarlet fever	1655	1032	1162	640
	Legionellosis	1693	72	1758	109
	Rubella	78	4	53	2
	*Congenital rubella syndrome	0	0	0	0
	Haemophilus influenzae type b infection	104	41	67	22
	Influenza severe case	18	5	52	16
	Tetanus	15	0	19	0
	Chickenpox	13070	0	12270	0
	Mumps	664	0	676	0
	Acute Viral Hepatitis B	419	417	333	326
	Acute Viral Hepatitis C	156	156	168	167
	Acute Viral Hepatitis D	9	9	11	11
	Acute Viral Hepatitis E	13	12	11	10
	Unspecified Acute Viral Hepatitis	57	0	39	0
	*HIV Infection	770	770	927	927
	*AIDS	176	176	192	192
	*Syphilis	4182	4182	3947	3947
	*Gonorrhea	838	838	1626	1626

1.*the number of Remarked diseaseis the number of confirmed cases.
2. SARS was publicized as a notifiable communicable disease in Mar 2003.
Hantavirus Pulmonary syndrome was classified as type III nitifiable in Dec 2001
"3.The analysis is based on the onset date. The analyzation date is on Jun 17,2004"

confirmed cases reduced to 145 cases this year. Furthermore, there were several cluster of bacillary dysentery at the aboriginal areas last year. Therefore, the control strategies of this year implemented not only to strengthen the testing of carriers, educate the water and environmental hygiene, but also to actually make awareness of the disease through schools, communities and churches, then the confirmed cases of this year were down to 246 cases.

Sentinel Surveillance System

Background

The Sentinel Surveillance system was established by the former National Quarantine Service in 1989 in an attempt to counterbalance under-reporting and untimeliness on various reportable infectious diseases, and began functioning in 1990. Sentinel physicians are recruited on a voluntary basis and numbers of sentinel sites are adjusted for population coverage. Currently, the number of sentinel physicians is 650 to 800, those cover 80% of all townships in Taiwan. To support the administrations of epidemic prevention policy, the selected diseases under the sentinel surveillance system is reviewed on an annual basis, and all reportable diseases are based on detectable clinical symptoms, with the numbers of reportable diseases kept between 3 to 7 for simplicity and accessibility.

Goals

1.To detect any potential disease outbreak in the community early.

2.To evaluate the reportable disease and how they threaten people's health.

3.To evaluate the results of epidemics control programs.

4.To collect the basic information about indigenous epidemiology in Taiwan.

5.To construct the trend and prediction of endemics.

Table 1 Selected Reportable Disease by year

1990	Chickenpox, Mumps, Measles, Rubella
1991	Chickenpox, Mumps, Bacterial
1992	Gastroenteritis
1993	Chickenpox, Mumps, Bacterial
1994	Gastroenteritis, Whooping Cough
1995	Chickenpox, Mumps, Measles, Rubella, Acute Flaccid Paralysis, Diarrhea
1996	Chickenpox, Mumps , Measles, Rubella,
1997	Acute Flaccid Paralysis, Diarrhea, Acute
1998	Respiratory Infection
1999	Chickenpox, Diarrhea, Acute Respiratory Infection, Influenza-Like Illness, Hand, Foot &Mouth Disease or Herpangina
2000 2001	Chickenpox, Invasive Gastroenteritis, Non-Invasive Gastroenteritis, Influenza-Like Illness, Hand, Foot& Mouth Disease or Herpangina
2002	Chickenpox , Diarrhea (Invasive Gastroenteritis,Non-Invasive Gastroenteritis) , Influenza-Like Illness, Hand, Foot& Mouth Disease or Herpangina
2003	Chickenpox, Diarrhea, Influenza-Like Illness, Hand, Foot &Mouth Disease or Herpangina

Ways of Reporting

The mechanism of the reporting network entails weekly reporting by: (1) telephone, (2) fax, (3) mail or (4) internet.

All sentinel physicians were asked to report the total number of patients ,which meet a case definition for reported criteria.

Analysis of the Reported Case in 2003

1. Influenza-like Illness

1) Case definition: Acute respiratory tract infection with the following symptoms:

I. Sudden onset, with a fever of 38℃ or higher and respiratory problems such as conghing, sore throat and myalgia.

II. Accompanied by myalgia, headache or extreme fatigue, except a simple running nose, laryngitis or bronchitis.

2) In 2003, the weekly average number of influenza-like Illness cases varied from 11.5 to 46.6. The number reached a peak in the fourth week then gradually decreased, and gradationally increased again in the forty-eighth week. Taiwan is divided into four areas, the northern part, the middle part, the southern part and the eastern part. The average number of influenza cases was comparatively higher in the northern part of Taiwan. Apart from that, the influenza-like Illness trends in the four areas were similar.

2. Chickenpox (Varicella)

1) Case definition: Blisters of variable size begin to appear throughout the body and may clinically be accompanied by fever.

2) In 2003, the weekly average number of chickenpox cases varied from 0.3 to 1.7. The cases in January to June were obviously much more than in July to December. The cases in South part of Taiwan are comparatively higher than other areas. The trends in the four areas were similar.

3.Diarrhea

1) Case Definition: Diarrhea up to three times daily, including any of the following symptoms: 1.Vomit, 2.Fever, 3.Stool with mucus or blood,

2) In 2003, the weekly average number of diarrhea varied from 7.9 to 18.7. The number in the southern part of Taiwan was higher than other areas. The trends in the four areas were similar.

5.Hand, foot and mouth disease(HFMD)or herpangina

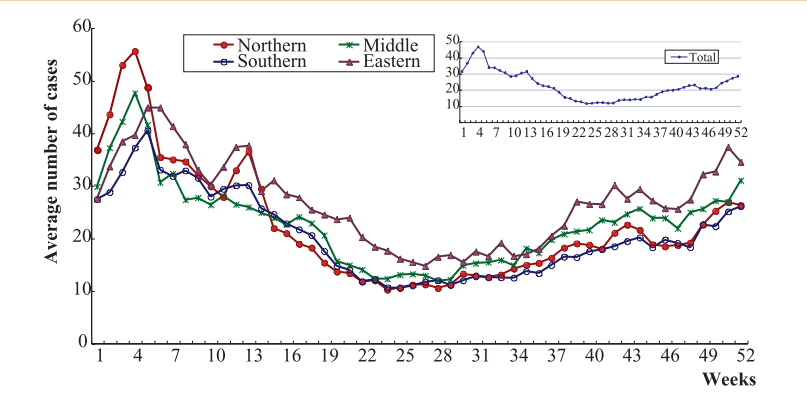
1) Most people infected with enterovirus either not to develop any symptoms or develop mild fever symptoms. Sometimes, the infected people might develop HFMD, herpangina, nonbacterial encephalitis, viral encephalitis, myocarditis, paralysis and hemorrhagic conjunctivitis. Therefore, HFMD and herpangina are included in the sentinel surveillance.

2) Case Definition of HFMD: Small blisters or rashes appearing at the mouth, palms or kneecaps and buttocks.

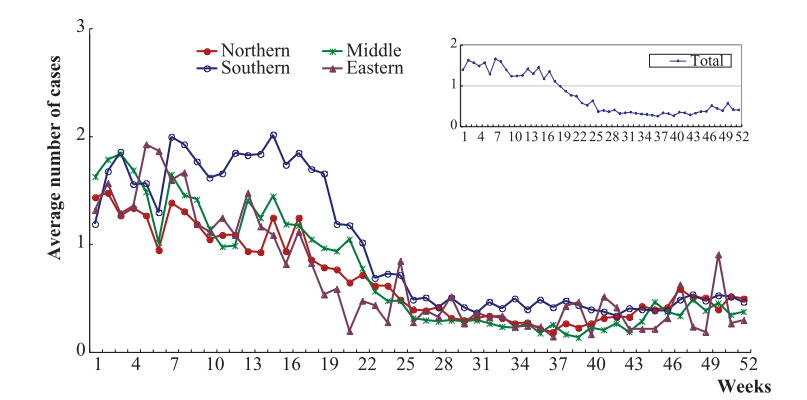
3) Case Definition of Herpangina: Fever with small blisters or ulcers appearing at the pharynx.

4) In 2003, the weekly average number of enterovirus varied from 0.9 to 6.3. The major clinical symptom was herpangina. Generally

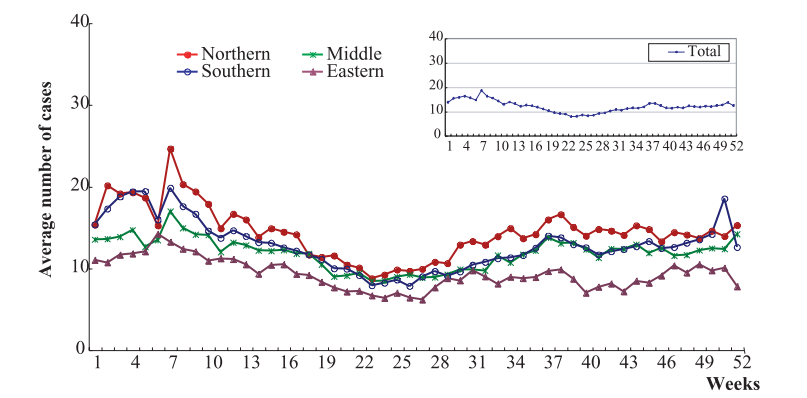
speaking, the number obviously increased in the 14th week and reached the peak in the 19th week; in different areas, the northern part reached the peak in the 19th week; the central and southern areas were in the 18th week and the eastern was in the 17th week. The number decreased gradually from then on. The average number of cases was the highest in the northern, followed by the central part and southern part; the lowest was in the eastern part. Overall, the trends in the four were similar.



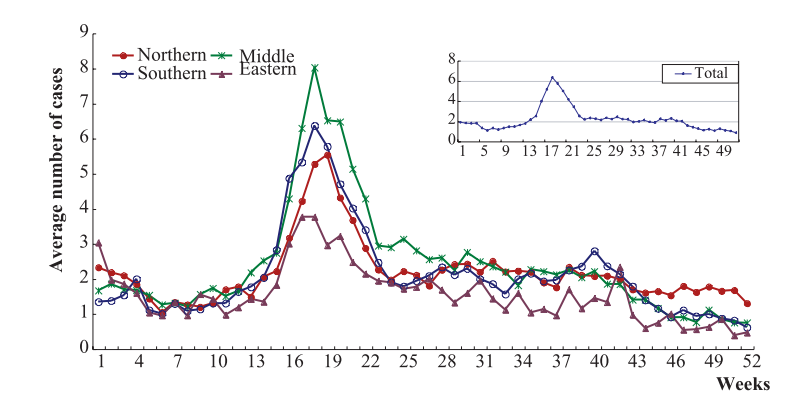
Average number of influenza-like illness cases reported from sentinel site of different areas in Taiwan, by report week, 2003



Average number of chickenpox cases reported from sentinel site of different areas in Taiwan, by report week, 2003



Average number of diarrhea cases reported from sentinel site of different areas in Taiwan, by report week, 2003



Average number of suspected enteroviruses cases reported from sentinel site of different areas in Taiwan, by report week, 2003

Syndromic Surveillance System

Perspecitve

The Center for Disease Control in Taiwan was established in July 1999 for monitoring and preventing the infectious diseases. Because of the limitation of disease definitions from Notifiable Diseases , the infectious diseases with similar symptoms were not necessary to report to the existing system. For the reason, the CDC has invited experts to sketch out each syndromic related diseases based on epidemiology between national and international , and the latest international health regulations. The four syndromic related diseases were named acute nervous syndrome, acute jaundice syndrome, acute hemorrhagic fever syndrome and acute respiratory syndrome.

Five medical centers first implemented the syndromic surveillance in July 2000. In July 2001,seventeen medical centers, six military hospitals and four local hospitals participated in the system. And the acute diarrhea syndrome was included in January 2002. Furthermore, the system was promoted to local teaching hospitals in October 2003, with 150 hospitals at present. The establishment of this system not only helps the CDC control syndromic related diseases but also broaden the scope of disease surveillance and gain more information about specific cases and pathogens for future research.

As a whole evaluation, the syndromic surveillance immediately detect the unknown disease which might need to be analyzed and controlled, enlarge the ambits for disease prevention and collect information for further investigation. Physicians could report any suspected syndromic related disease case

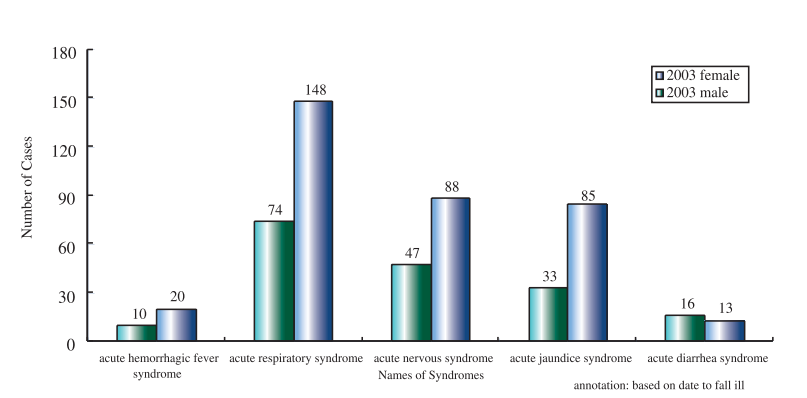


Figure.1 Cases of Syndrome of Different Gender Groups in Taiwan, 2003

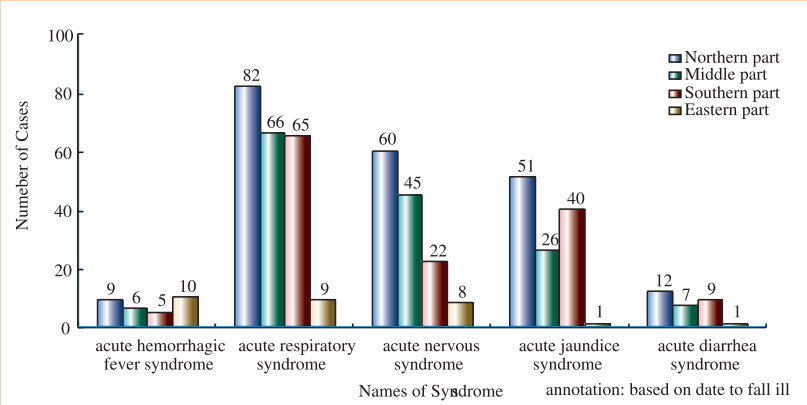


Figure.2 Cases of Differnt Syndrome over different part in Taiwan, 2003

through website to CDC, and CDC will first identify the accuracy and completeness of the information of suspected cases, and then examine the cases by way of diagnosis and analyze epidemiology of the disease in order to take appropriate measures, pathogens of the case were inspected if necessary. As the laboratory is not able to identify the pathogen, it will be sent to foreign laboratory for further analysis, however, it still cannot be identified, the sample will be stored up at the serology bank within the CDC for future examination.

Goals

1. To build up an accessible and rapid network in an attempt to prevent any disease outbreak in the shortest period of time.
2. To open up the function of the "Syndromic Surveillance Medical Consultant" in order to expedite the examination process of cases for the"Syndromic Surveillance" and to locate the pathogen of a disease in a hurry.
3. To consolidate the syndromic related disease definition so as to familiarize the physicians to be reported to CDC.
4. Laboratory diagnosis protocols and examination reagents are the major objective of the future development in the cause of expediting the procedure of diagnosis, and the pathogen detection by virtue of the numerous cases of unknown pathogens.
5. To accelerate the reporting system process

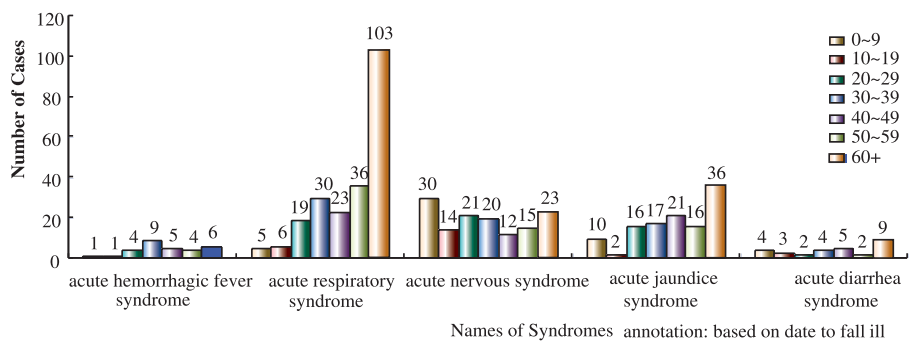


Figure.3 Cases of Different Syndromes of Differnt Age Groups in Taiwan, 2003

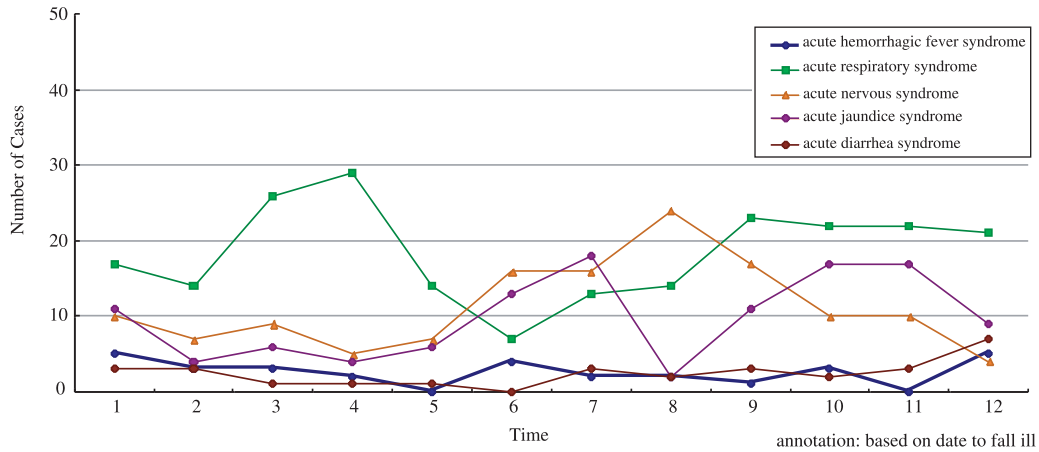


Figure.4 Reported Cases Curves from 2003/1/1 to 2003/12/31 in Taiwan

with GIS for the sake of finding out the trend of a syndromic relatd disease.

6. To organize emerging epidemics task force and personnel training in a shot at raising the physicians' inclination to report cases.

Accomplishments

Figure 1 shows the reported case number by different syndromic related diseases in 2003. Figure 2 indicates the acute respiratory syndrome are the most prevailing syndrome in Taiwan in 2003, the cases of acute jaundice syndrome are reported more frequently in the southern Taiwan and less common in the eastern Taiwan, furthermore, the cases of acute hemorrhagic syndrome are reported most frequently in the eastern Taiwan. Moreover, Figure 3 exhibits that the age distribution of the five syndromeic related diseases. Figure 4 indicates the reported case numbers of acute respiratory syndrome arrived at its peak in April, the reported case numbers of acute nervous syndrome reached its apex in August, the reported case numbers of acute jaundice syndrome got its apex in July, moreover, the numbers of acute hemorrhagic syndrome

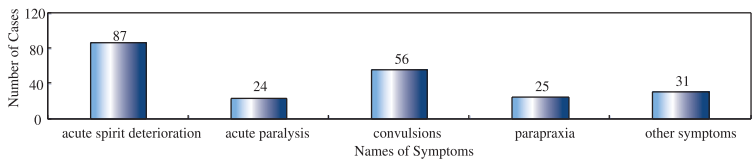


Figure.5 Distribution of Different Symptoms in Acute Nervous Syndrome, 2003

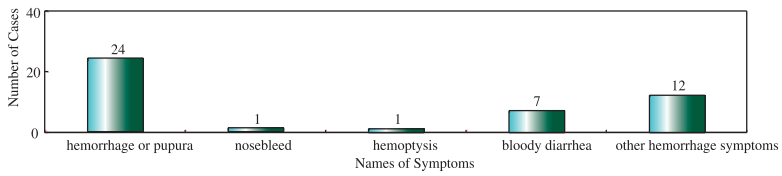


Figure.5 Distribution of Different Symptoms in Acute Hemorrhage Fever Syndrome, 2003

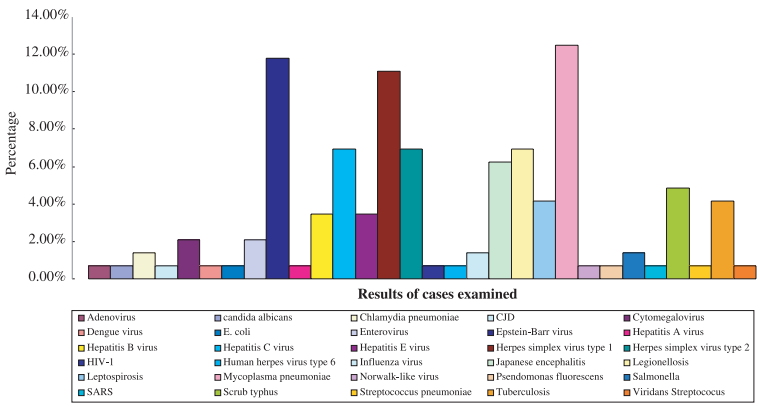


Figure.6 Examination Results of Syndrome reported in 2003

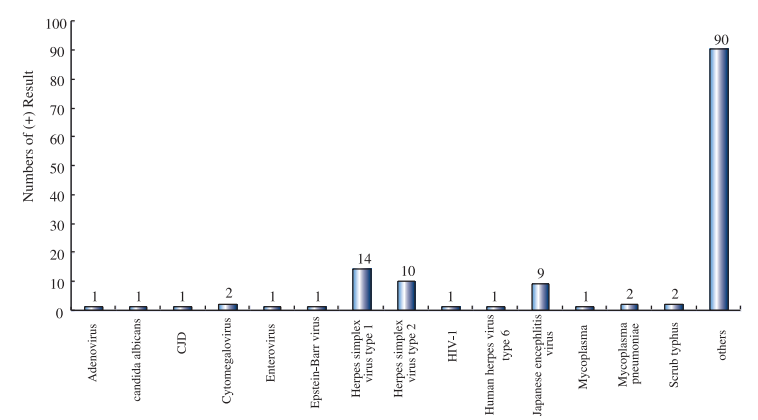


Figure.7 Positive Resulus from Acute Nervous Syndrome

and diarrhea syndrome got in relative high level from October to December. On account of insufficient data, it could not be acquired the reasons for the occurrence of each syndrome. However, figure 5 points out the most frequently occurring symptom in acute nervous syndrome is acute spirit deterioration, and that in acute hemorrhagic syndrome is hemorrhage or purpura. In terms of all positive results from data, Figure 6 shows that the most frequently occurring positive result is Mycoplasma pneumoniae as well as figure 7-11 indicate that the most possible positive result is others. Figure 7 shows the regular positive results are HSV1, HSV2 and Japanese Encephalitis give doctors a clue to examine patients behaving specific symptom about acute nervous syndrome. By the same token, figure 9 also tells doctors an approach to come at the most possible result about acute respiratory syndrome.

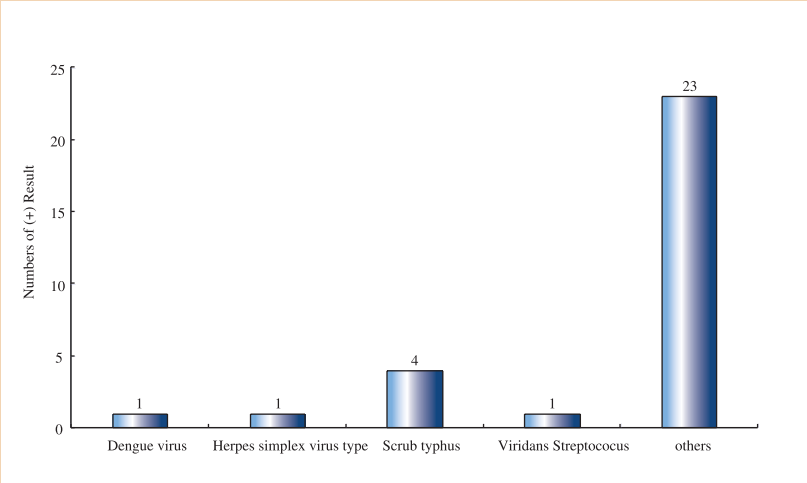


Figure.8 Positive Results from Acute Hemorrhage Fever Syndrome

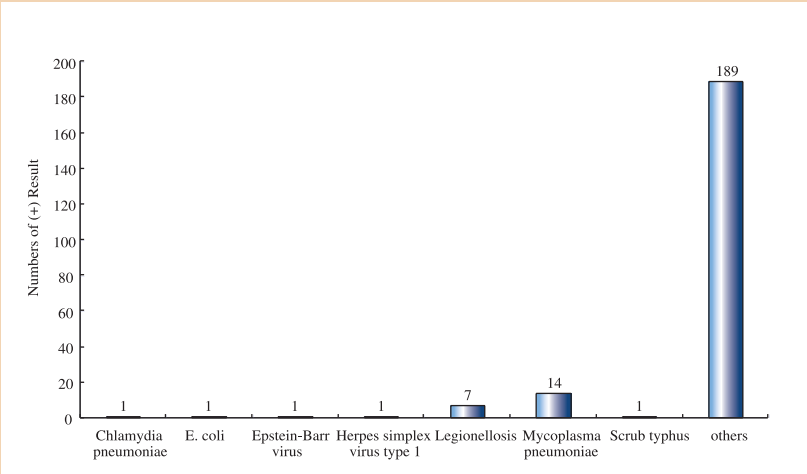


Figure.9 Positive Results from Acute Respiratory Syndrome

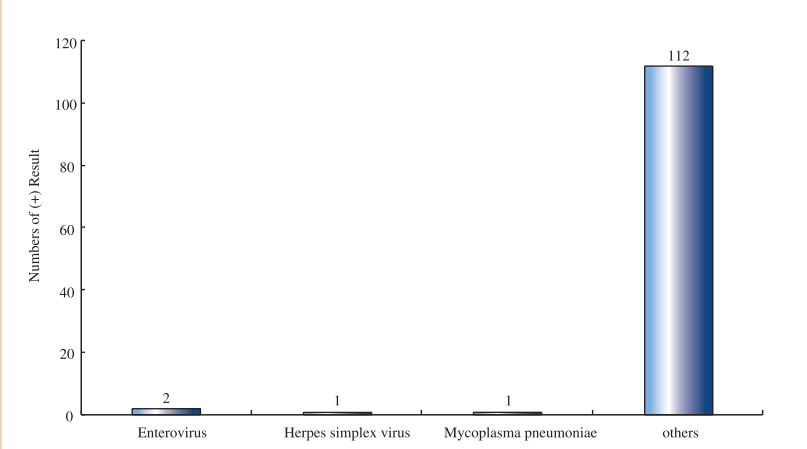


Figure.10 Postive Reuslts from Acute Jaundice Syndrome

School-based Surveillance System

Introduction

According to the data collected from September 1993 to December 2003 by the Center for Disease Control (CDC), there were decades of important disease outbreaks that took place in schools. Above all, an elementary school consists of a dense population and students have weak resistibility, diseases spread easily in the elementary schools. Therefore, school-based surveillance system was built to effectively control disease outbreaks. Subsequently, the system helps detect the pathogens and prevents the disease transmission early.

Goals

The purpose of establishing the school-based surveillance system is to monitor the outbreak of epidemics early in an attempt to take appropriate precautions promptly and stop the disease transmission in schools. The surveillance system cooperates with the health education in schools in order to accomplish disease control and ensure the students'health.

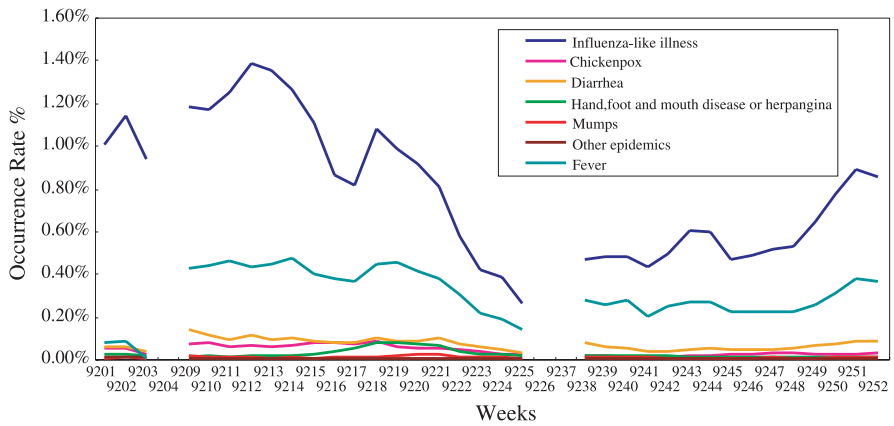


Figure.1 Comparison of the occurrence rate of each disease in 2003, Taiwan area

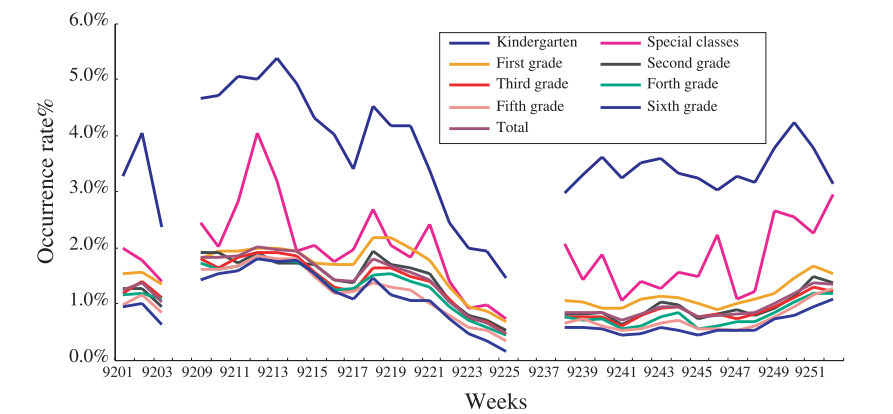


Figure.2 Comparison of the occurrence rate at each grade in 2003, Taiwan area

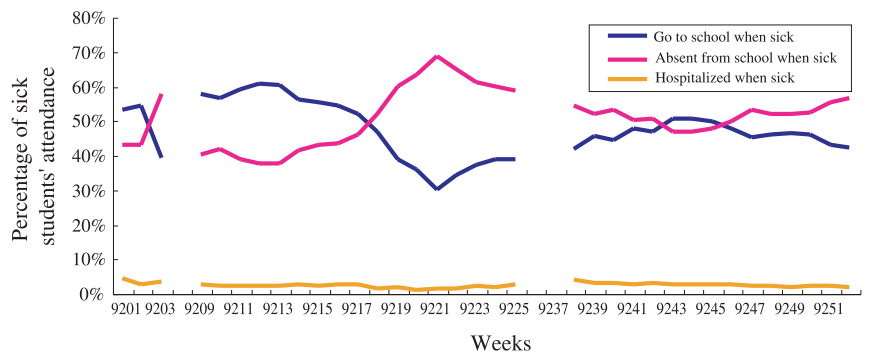


Figure.3 Distribution of Different Symptoms in Acute Hemorrhage Fever Syndrome, 2003

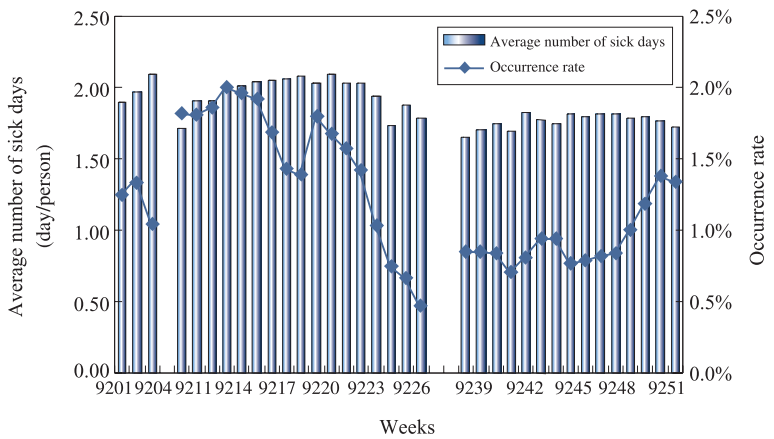


Figure.4 The average number of sick days and the occurrence rate in 2003, Taiwan area

The school-based surveillance system is a simple, flexible, unique and sensitive disease surveillance system. At the same time, the system can timely and effectively reflect the condition of the surveillance reporting system and methodically collect students' disease information for analysis and explaining the disease. The information is also used for evaluation and reference for disease prevention policies. Therefore, to monitor the disease outbreaks in schools can stop diseases spreading into students' families or communities which may cause a larger scale outbreak.

Constructing school-based surveillance database and using multiple means to survey diseases are ways to compensate the defects of relying solely on physicians to report cases of legal epidemics. It also makes the disease surveillance systems more integrated.

Strategies and Methods

From February to June of 2001, Tainan County and Kaohsiung City implemented the school-based surveillance system as a pilot stway. From February to June of 2002, five elementary schools were selected from each parts of Taiwan to employ the reporting system. 134 schools in 25 counties and cities enrolled in the system From September 2002 to January 2003. Beginning from February of 2003, recommended by the Bureau of Education, one elementary school at least in every city/township has to participate to the system. Till the end of 2003, there were 438 elementary school took part in the surveillance system.

Electronic Bulletin System

The main purpose of Electronic Bulletin System (in abbreviation of EBS) is to analyze and produce statistical graphs and charts automatically from different systems or databases, which based on the parameters that given by users through interface to reflect latest disease situation. Currently, EBS can provide real-time statistical graphs or charts of "Notifoable Disease Surveillance System", "Sentinel Surveillance System", " Geographic Information System","Data Bank of Contacted Laboratory", "Data Bank of Enterovirus Hositalized Case", and "Pharmaceutical Products Management System". The graphs or charts are usually regenerated everyday; However, if an outbreak occurs, the data will be renewed once an hour to reflect the real-time epidemic situation. The graphs or charts will be displayed with EXCEL and downloading function is also provided.

When an outbreak occurs, it is very important to make accurate decisions in a short time in order to successfully control the outbreak. Therefore, the decision-makers will rely on complete and precise information. So far, EBS is able to provide common decisive guideline: Up-to-Date information, such as number of cases, distribution, gender and age incidence rates, trend and predictive analysis of disease, comparison analysis about historical data at the same period of time and the last 5 weeks, cross analysis such as time, area, gender and age. It also shows that some special figures for Dengue Fever and the hospitalization of suspected enterovirus cases.

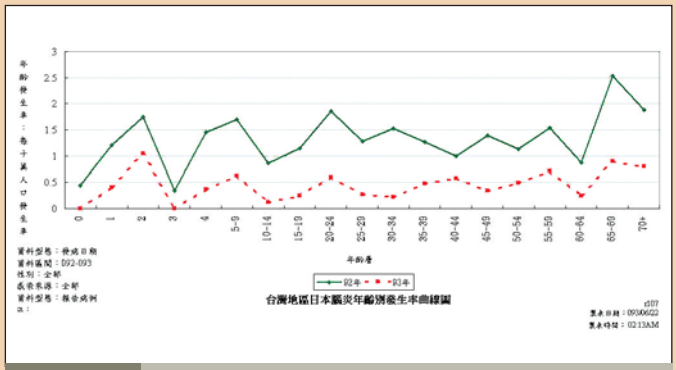


Figure.1

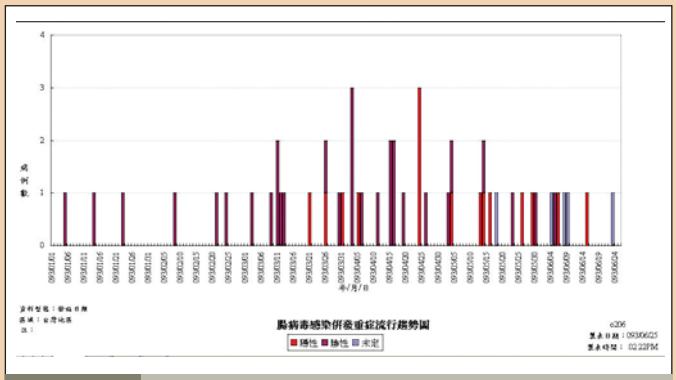


Figure.2

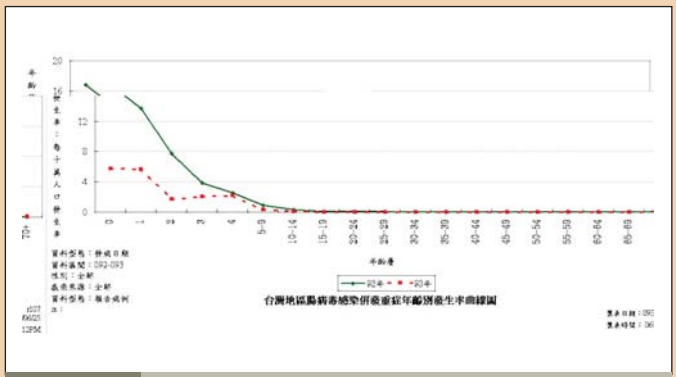


Figure.3

Decision-makers will be able to get the latest epidemic information through the Epidemic Bulletin Board. The data will usually be updated every day, when there is an outbreak occurs, it will be updated every hour.

The outbreak could occur at any time; therefore, the information in the system is changeable, which means the graph and data will be updated with time. Therefore, EBS will always label the parameters clearly in every graph such as the name of diseases, the format of the data, and the period of time span. Also the time of production of the graphs will also be showed to ensure the display of epidemic and the situation of current diseases are comparable. (Figure 1.)

Take Enterovirus as an example, the decision-maker's will be able to reach the result of the development trends and current situation of enterovirus with Historical trend Chart, Incidence Rate, Comparison of Historical Data Chart, Graph of Case Demography by cities and counties in Taiwan, and Laboratory Result Chart, (Figure 2 to 5.) Through the charts produced by suspected cases reported by doctors , we will be able to achieve the goals of monitoring this disease, (Figure 6 - 7.)

EBS has anticipated the following results: 1. Saving the costs of time and manpower by using automatic chart generator, 2. Providing up-to-date analyzed information to decision-makers and 3. Users will be able to program their own parameters and customize charts. With the help of EBS, decision makers will receive the latest information in order to make the proper prevention policies and measurement, and accomplish the goal of building-up achieved diseases prevention.

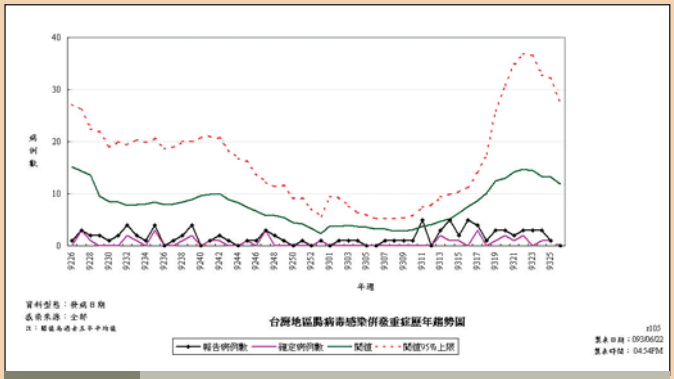
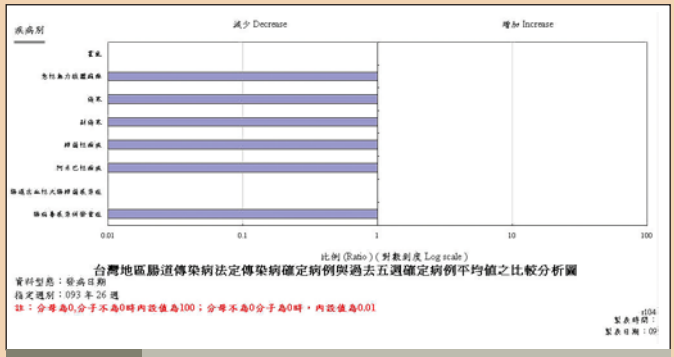


Figure.4



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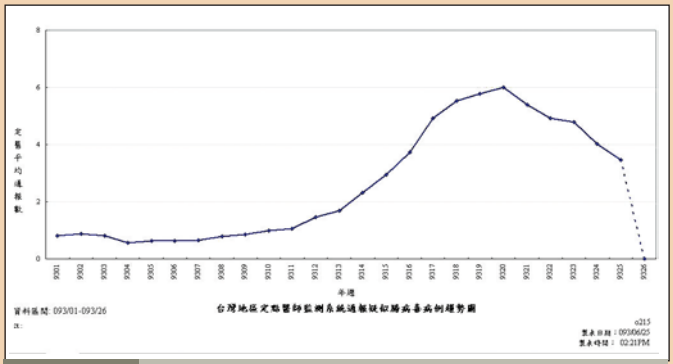


Figure.6

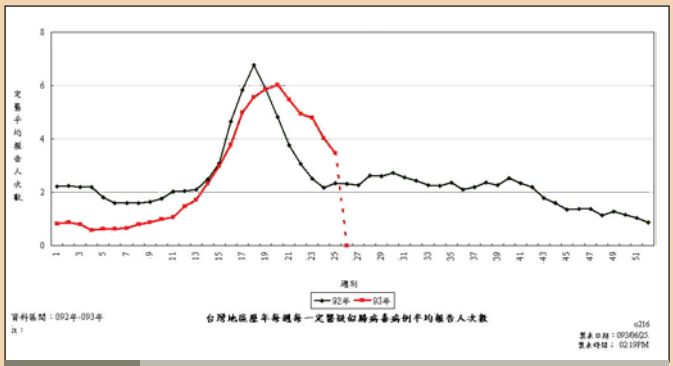
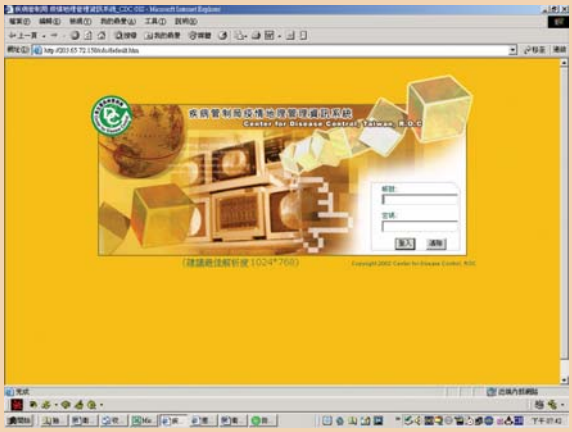


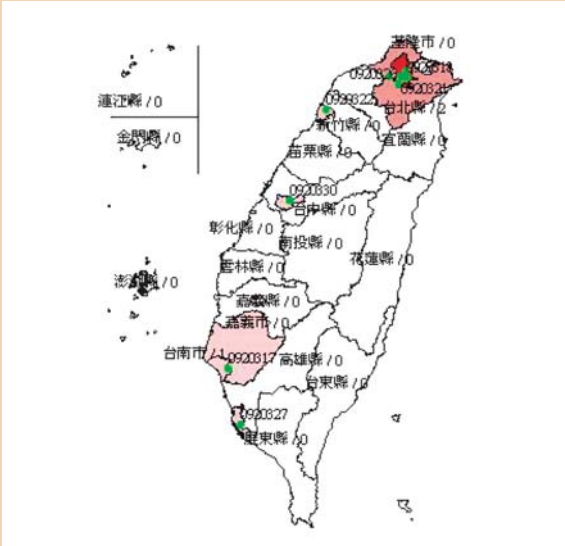
Figure.7

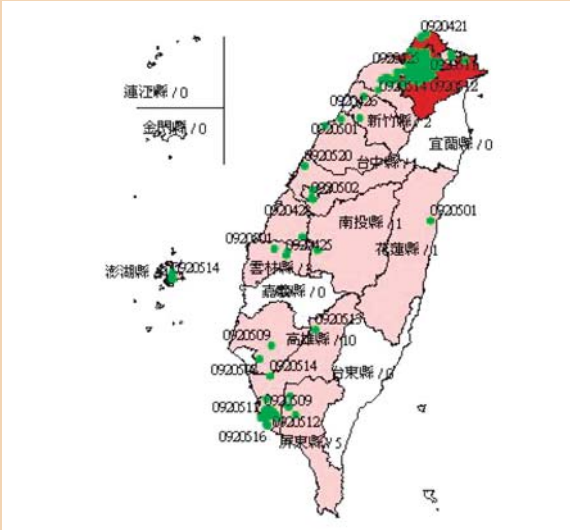
Geographic Information System

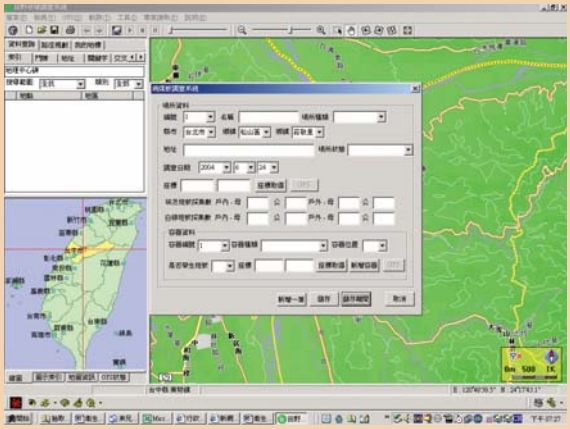
CDC started to build Geographic Information System (GIS) in 2001. With GIS software, it connects the CDC existing databases, like : notifiable diseases surveillance database, sentinel surveillance database, syndromic surveillance database, immunization database to effectively gather, store, analyze and display the disease-distribution information. Different colors were used to depict the risk level of diseases. Moreover, it exactly shows the distribution of cluster cases on the computerize figures; "Interactive search" in GIS allows to study the sequences of incidence rate during a specific period of time. GIS displays the spreading situation of diseases on the map in an interactive way. Those functions provide decision-makers lots of treasure information on making epidemic control strategies.

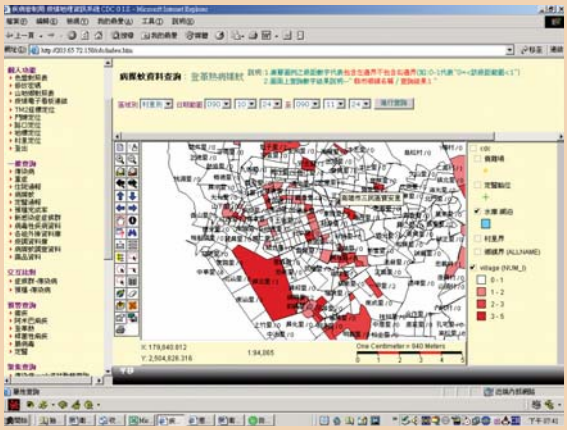
In 2003, the whole world as well as Taiwan were under the threat of SARS. During the first case was reported in mid- March of 2003 and before the SARS outbreak in Hoping Municipal Hospital, all SARS reported cases were imported. On the case distribution map, it indicated that the sporadic distribution was located in Taipei county and Taipei city. After the nosocomial SARS outbreak in Hoping Municipal Hospital on April 22 and many suspicious nosocomial infectious incidents, the number of cases in Taiwan increased sharply. The information can be easily catched on the GIS case distribution map.











Moreover, "Interactive Search" is one of the functions of GIS which allows to study the occurrence of specific diseases and it gradationally shows on the map in an interactively way. As the distribution of bacillary dysentery cases for example, it displays in a chronological order from the day of disease onset. On the statistics, it obviously indicated a clustering infection of bacillary dysentery in Nantou County.

Additionally, CDC combines with PDA and GPS to install a " Field Epidemic Investigation System" for promoting the GIS functions. By this system, the public Health workers can immediately catch the information such as: the exactly location of cases, the activity range of cases, the risk factors surround the cases residences for the surveillance on notifiable diseases or specific cluster incidents. As for the vector investigation software, it assists to collect the information of vectors, locate the high density of vectors to clean the resource and eliminate the vectors.

GIS affords a great assistance on studying the disease distribution and spreading. It also provides the decision-makers necessary information to formulate the prevention strategies.

Communicable Diseases of Interest to the Public

4

Dengue Fever
HIV/AIDS
Tuberculosis
Enteroviruses
Bacillary Dysentery control in Mountain Areas
Influenza

Dengue Fever Prevention

Background

There were three island-wide dengue outbreaks in 1915, 1931 and 1942. After forty years of dormancy, a DEN-2 outbreak occurred in Luchiu Township of Pingtung County in 1981. Yet, more dengue outbreaks took place in Kaohsiung (1987-1988), Chung Ho, Taipei County (1995), Taichung (1995), Taipei, Taipei City (1996) and several others in Kaohsiung City and County, Tainnan City and Pingtung County.

In 2002, another outbreak of dengue fever occurred in the southern part of Taiwan and it was similar to the outbreak in 1988 that started in 1987. The number of dengue fever cases increased tremendously since mid-June. The epidemic originated at the border between Chien Chen, Kaohsiung City, and Feng Shang, Kaohsiung County. The disease gradually spread to other places such as Pingtung County, Tainan City and Penghu County. The total number of confirmed cases was 5336, including 241 dengue hemorrhagic fever (DHF) cases and 21 deaths.

The dengue fever prevention was continuously conducted in 2003. Due to the enthusiastic participating of local communities and the members who were from" Expanded Public Services Employment Project", there were only 86 indigenous confirmed cases reported in 2003, and 51 cases out of total initiatively reported in Kaohsiung and Pingtung area before March 8, those who were the lasting of dengue outbreak in 2002. However, after August of 2003, there were only 35 indigenous confirmed cases. It shows that the cases had been significantly decreased.

Objectives

To eradicate dengue fever in Taiwan by thoroughly cleaning the vector breeding ground and effectively control the vector (mosquito) density.

Strategy

CDC has devised three stages of preventative measures in an attempt to control dengue fever infection. The primary prevention includes vector source reduction and controlling the number of vector population. The secondary prevention covers the disease surveillance and a disease emergency contingency mechanism. The tertiary prevention involves controlling the number of deaths resulted from the critical illness.

1. Primary Prevention

(1) To implement health education through various means of communication in an attempt to promote dengue awareness.

(2)To get the community involved in improving environmental and household hygiene as well as vector source reduction through training volunteers.

(3)To put the regular vector breeding source inspection and operation mechanism into practice by vacating empty houses, places and other potential vector breeding sources and by keeping a record of these places for future inspection.

(4)To reinforce the educational training for

the disease prevention workers and volunteers.

(5)To set up a vector surveillance mechanism to check on places with a higher mosquito density in an attempt to spontaneously wipe out the source of the vectors.

2. Secondary Prevention

(1)To construct a disease surveillance mechanism to promptly control suspected cases and strengthen disease surveillance and disease trend evaluation through the use of legal epidemic reporting system, emerging diseases surveillance and the public reporting and symptoms declaration forms.

(2)To set up a disease emergency contingency mechanism in order to promptly investigate the suspected source of transmission, spray insecticide to abolish the vector source as well as to promote health education to eliminate any likely infection.

3. Tertiary Prevention

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

Accomplishment

The dengue fever emergency contingency mechanism was initiated in Kaohsiung in an attempt to strengthen the disease control by the local government since there were more dengue cases in the area. In addition, related personnel and financial assistance from various health departments in other cities were sent to Kaohsiung. A zone defense was devised to get more people involved in clearing of the vector sources. The accomplishments are listed below:

1.Primary Prevention:

(1)2,000 nationwide health education activities were held.

(2)To design and produce health education materials such as: posters, pamphlets, handbooks , videos and distributed to general public.

(3)"National Dengue Fever Control Conference" was held in March. The prevention team-workers from Tainan city exhibited the prevention strategies, methods and consequences.

(4)To integrate the correlative resources of five counties in southern Taiwan to fulfill the" Mobilize All People for Dengue Fever Control Program"The needed manpower and materials were supported by the military to completely clear out the vector sources during the prevalent period. In addition, the mosquito density surveillance was implemented by the early of April.

(5)To reserve the manpower for emergency contingency mobilization and for emergency insecticide-spraying, CDC held the " 2003 Emergency Insecticide Spraying Training Program" 88 participants who were respectively from Tainan county, Tainan city, Chiayi county and Chiayi city health bureaus, CDC and the branches attended the event and received the licenses from the Department of Environment Protection.

(6)To implement the dengue fever screening for the fever tourists in airports from July and 17 imported dengue fever cases were screened by the end of 2003.

(7)In July of 2003 , the "National Dengue Fever Control Conference" was held in

Kaohsiung Grand Hotel. The experts from Department of Environment Protection, hospitals, academic institutes and the members from health bureaus were invited. There were about 200 people participated the conference.

(8)The "Dengue Fever Control Handbook" was revised in July. The contents included the introduction of dengue fever, history and trend, introduction of vectors, surveillance system, investigation, the focuses of dengue fever control, laboratory and clinical treatments. 7,500 copies were distributed to the health and environment protection units for controlling dengue fever.

(9)Established and modified the related Acts and regulations for dengue fever control; Keelung and Hsinchu city also organized the "Desuetude Houses and Vacancy Management Regulations".

(10)Co-organized the "APEC Dengue Fever Outbreak Area Cooperation Conference" in November. There were 14 affiliates of APEC, including delegations, experts, health and environment protection members. The total participants were 250 people. Some projects like, "community participation", "emergency mobilization", " laboratory diagnosis", "control strategy " and "regional cooperation" were discussed and the future cooperation program was made.

2.Secondary Prevention:

1.An awarding system was established to encourage physicians and the public for reporting cases in an attempt to detect the disease transmission as early as possible. NT$2500-NT$5000 is awarded to physician and other medical personnel for reporting the first indigenous case of dengue fever and for discovering the imported case of dengue fever. A probable infected patient who goes for blood drawing at a health department and has then been confirmed a case of dengue fever will also be awarded NT$2500.

2.Dengue fever infection may cause an untypical symptom. It usually would cause the delay of medical diagnosis and the timing of report and missed the golden time for early prevention. Therefore, the serology surveillance mechanism was built to collect the specimen from fever cases. There are 60 hospitals located in Kaohsuing and Pingtung areas participated this program, and 2300 specimens were collected. One confirmed case in Kaohsuing Lingya district was diagnosed.

3.Reinforce the frequency of vector density surveillance and investigation to one time per month for every village around dengue fever prevalent areas in southern Taiwan. 86,601 time/ village of vector density surveillance were implemented in Taiwan area from January to December of 2003. There are 87.1% of total under Breteau Index one, it's 3.1% exceed the anticipation rate (84%).

4.To conduct the inside of vector mosquito virus surveillance program in order to study the dengue virus. 1,453 female and 2,638 male Aedes aegypti, 1,050 female and 648 male Aedes albopictus were collected from Kaohsuing county, Kaohsuing city and Pingtung county. After the RT-PCR examination, no dengue virus was checked-out among those mosquitoes.

1.Tertiary Prevention:

(1) The" Dengue Hemorrhagic Fever Clinical Treatment Training"was respectively held in

northern, central, southern and eastern Taiwan in August and September of 2003. Some critical projects like,"the clinical symptoms, diagnosis and treatment for dengue fever", " the pathology of dengue hemorrhagic fever", "surveillance and controlling strategies" were detailed discussed. There were about 500 people participated the conference.

(2) Clinical care practitioners and epidemiologist were invited to be the members of "Clinical Critical Care Consultation Team" to assist in diagnosing and confirming cases of dengue hemorrhagic fever (DHF).

(3) Publication of " DHF Clinical Care Guidelines".

(4) Recommending a list of "Post DHF Hospitals" as a reference for the medical centers.

Future Prospects

CDC will formulate the "Reinforcement plan for dengue control - Vector breeding ground eradication, a 4-year plan for elimination of indigenous dengue fever" to strengthen dengue control. CDC, the Environmental Protection Administration (EPA), the local governments and community bodies will implement the plan in collaboration to augment health education promotion and encourage the general public to get involved in environment maintenance and household hygiene. CDC and EPA will construct a spontaneous disease surveillance system and a responsive mechanism in an attempt to annihilate the vector source and consequently stop the occurrence of indigenous dengue fever.

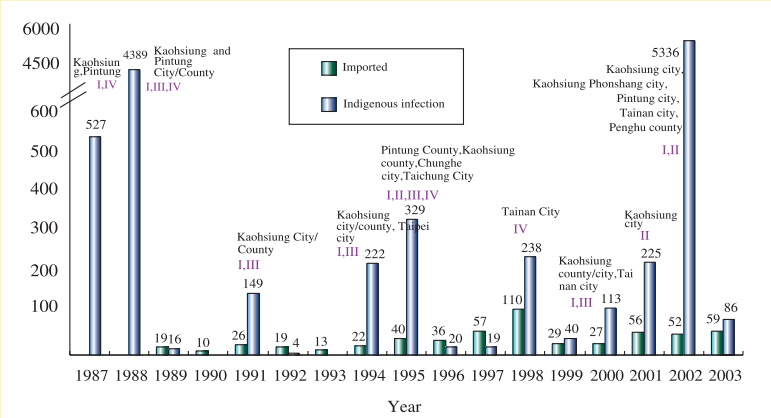


Figure.1 The number of confirmed dengue cases from 1987 to 2003

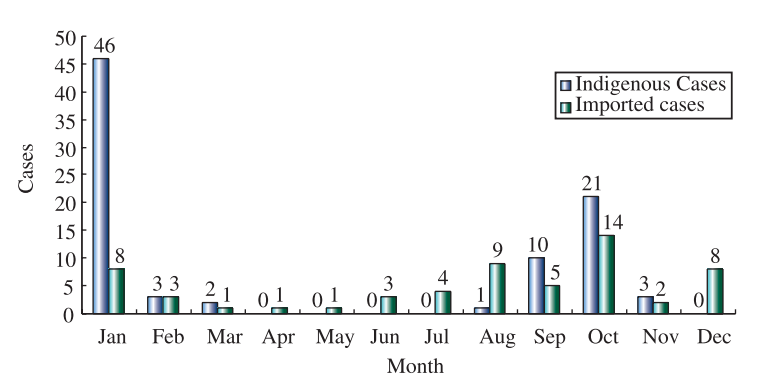


Figure.2 The number of confirmed dengue cases by month in 2003

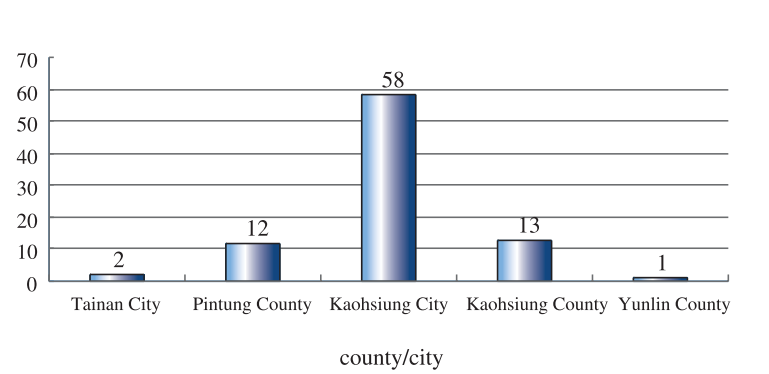


Figure.3 Distribution of the number of indigenous dengue fever cases by location in 2003

HIV/AIDS

Background

Acquired Immunodeficiency Syndrome or simply AIDS is considered the most serious catastrophe in the 21st century. AIDS transmission is a result of changes in the cultural and behavioral norms. Comprehensive prevention measures provide the best solution for decelerating the spread of AIDS.

The first AIDS contractions case in Taiwan was reported in 1984. As of December 31 of 2003, there were 5,221 reported cases of HIV positive and 911 of them have died. The annual reported case of HIV infection has been increasing as the years go by. The HIV increasing rate was 10% in the year of 2003 in Taiwan. The latest number of reported case has reached 857 (refer to table 1). 90% of the HIV reported cases are between the ages of 20 to 59, who are just in the working class. With increasing HIV infection rate, the workforce in Taiwan is deteriorating, upsetting the social balance. Therefore, AIDS prevention is critical and cannot be put off.

Objectives

1.Overall Objectives:

1) To limit the spread of HIV/AIDS efficiently, prevent the uninfected population from HIV.

2) To make sure the infected people have received proper medical treatment and raise their living standards.

2.Targeted Objectives (to achieve over next three years, to 2006):

To limit the spread of HIV/AIDS not into the generalized HIV epidemic (with HIV prevalence above 1 % in pregnant women nationwide).

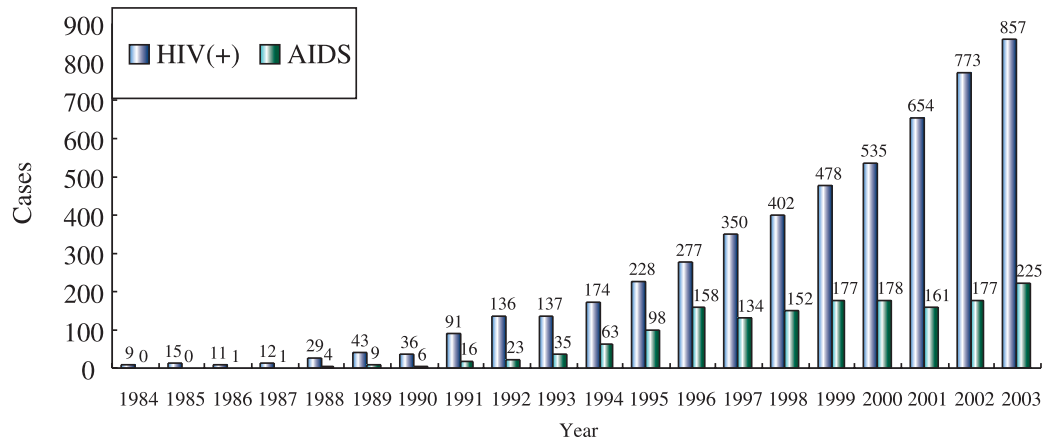


Table.1 Report Cases of HIV/ AIDS by Year in Taiwan 1984-2003(Taiwanese)

Strategies

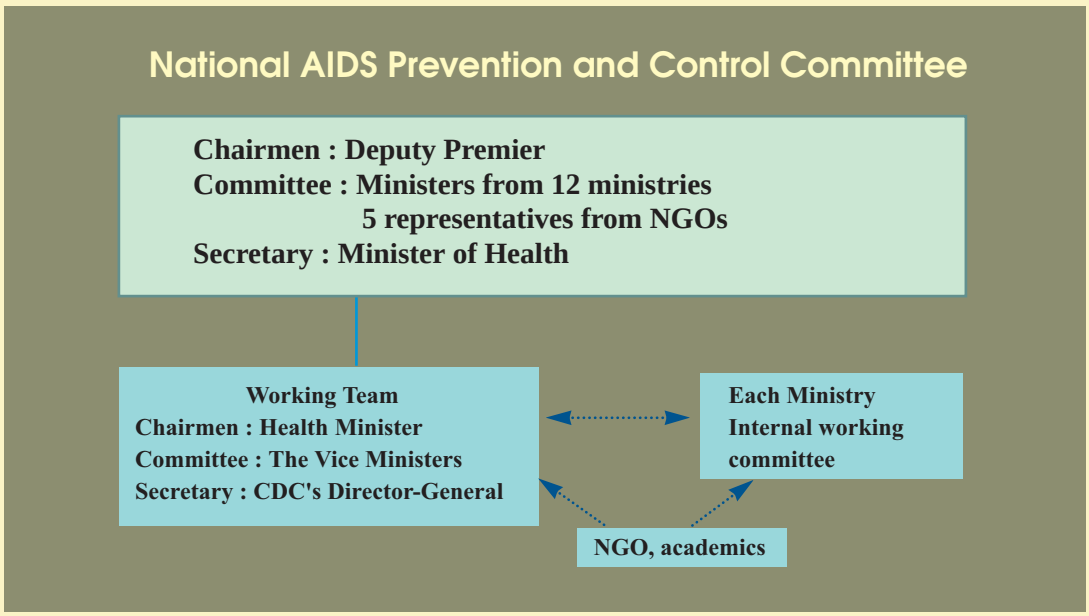
1. **Policy making and organization of authorities:** In December 2002, the Executive Yuan founded the National AIDS Prevention and Control Committee in an attempt to plan and supervise AIDS control programs. The Deputy Premier was appointed the chairman of the committee while 12 ministers and five representatives from nongovernmental organization (NGO) constituted the members. A working team was set up under the committee. To carry out the work of AIDS prevention thoroughly, the mayors and county magistrates had also set up working teams throughout the cities and counties in Taiwan

2. **HIV/AIDS awareness:** Mass AIDS prevention promotion through media such as television and the internet is intensified. A variety of educational programs are planned specifically for different communities. Both formal and informal classes have included sex education and AIDS control in their curriculum. The campaign is set up in an attempt to inculcate all the people with AIDS awareness since awareness is the only way to stop AIDS from spreading.

3. **Programs focus on greater risk group:** To plan applicable HIV/AIDS prevention program for specific community and transient community such as prostitutes, homosexual, drug user, sailorman, and migrant population with AIDS prevention program.

4. **Support and respect:** To administer proper medical treatment to AIDS patients and respect their rights. To strengthen the health care system in order to provide the AIDS patients and their kith and kin with mental and moral support.

5. **Improved disease surveillance:** Performing disease surveillance program to further understand and analyze the AIDS-prone communities in order to formulate appropriate policies and services.



6.Research and development: To augment the social, the economical, the civic, the cultural and the medical hygienic aspects of AIDS control, technology research and development are conducted.

Accomplishments

1.The working team under the "National AIDS Prevention and Control Committee" had held eight meetings to discuss a range of AIDS preventive activities such as the " AIDS Awareness Campaign" and the " AIDS Control Everlasting Program".

2.In the aspect of AIDS prevention education activities, CDC not only organized "Go with Condom Festival" on Valentine's Day, Chinese Lover's Day, Middle Autumn Festival, and New Year Eve activities, but also arranged the "Take away AIDS Label and Discrimination Activity", which included "AIDS Caring Tour in Taiwan", "Exhibition of AIDS Memorial Sheet and Photography", "AIDS Movie Festival", "Red Ribbon Creation Campaign", "Seminars for AIDS Patients" and the " Exhibition of Accomplishment of AIDS Prevention on World AIDS Day". All of the activities were incorporated with magazines, newspaper and Internet for maximum exposal. There were totally 3,096 such activities held by all the Health Bureaus in Taiwan Area in 2003 and the number of attendance was 694,144 man counts.

3. In the perspective of constructing a comprehensive disease surveillance system, CDC has built various disease inspections, including the blood donor inspection in 1988, the draftee inspection in 1989, the prisoner inspection in 1990, and the alien worker inspection in 1991. 2.5million specimen were examined in 2003 and 914 of them were positive for HIV. 230 out of the total were confirmed AIDS cases. Anonymous inspection service was provided

in 1997. 8 hospitals were appointed by Department of Health, the Executive Yuan to administer anonymous and free HIV inspection service. 2944 people have received the service and 88 of them were tested HIV positive. The percentage of being tested positive for HIV is thus 2.99%. CDC will continue to strive to improve the surveillance system for AIDS and to generalize HIV testing in order to monitor the source of the disease and people's wellbeing closely.

4. The insurance program offered by the Bureau of National Health Insurance covers the payment for AIDS treatment. Therefore, AIDS patients receive free HAART (Highly active antiretroviral therapy). Till the end of 2003, there were 26 assigned hospitals in Taiwan that tend AIDS patients. The Garden of Mercy Foundation(愛慈教育基金會) , a Protestant-run non-profit organization, provides hospice care and a halfway home to the AIDS patients. In addition, the halfway home has served more than 228 people and it accommodates 11 medical beds. Doctors and social workers regularly visit the Garden of Mercy to evaluate the conditions of individual patient in order to provide the patients with physiological and psychological care.

5. In the perspective of ongoing technology researches and development, National Taiwan University Hospital has been authorized to install an AIDS Prevention Center in order to administer professional training to an AIDS medical team and to plan AIDS preventive measures accordingly. There were altogether 11 research projects in 2003.

Future Prospects

According to the statistics provided by the Bureau of National Health Insurance, AIDS patients spend approximately 410 millions dollars on medical treatment, averaging about 0.35 million dollars is spent per patient per annum. A person typically spends about 3,500 dollars on medical care in general population. Conclusively, average AIDS victim on average spends on medication about 100 times the amount of the average of general population. The cost of AIDS treatment is going to increase tremendously as the number of AIDS patient increases, as the therapies and healthcare improves, and as the survival time of the patients prolongs. Apart from increased expenditure on healthcare, the national economic expense also includes direct expenditure on public education and establishment inspection, medical expenditure on clinical examinations and psychological consultation and indirect expenditure on losses in workforce and technology, withdrawal of foreign investment, as well as decrease in the amount of export and people's annual income. AIDS indeed has resulted in a significant loss in the nation's economy.

For the past eight years, Taiwan has managed to provide excellent medical care for the AIDS patients. However, the annual contraction rate has failed to lower significantly. The Center for Disease Control proposes to control the HIV infection rate more effectively in the near future by taking up a more active role in stopping the spread of AIDS.

Prevention of TB

The TB Epidemic Situation in Taiwan

Mortality Rate

In 2002, the TB mortality rate in Taiwan was 5.68 per 100,000 populations and the death count was 1,277 people, which is 1.01% of total death. It was ranked the 12th leading causes of death and was the top one among notifiable communicable diseases for years. In 1947, the TB mortality rate was 294.44 per 100,000 populations and the number has decreased to 5.81 per 100,000 populations in 2002 in Taiwan. The morality rate has reduced every year; however, the drop in TB mortality rate thereafter slowed down in recent years.

In 2002, there were 93.89% of TB patients died of pulmonary tuberculosis in total TB mortality rate and the rest of 6.11% died of extra-pulmonary tuberculosis. Classifying by gender, the male TB death counts was approximately 3.6 times that of females while the mortality rate was approximately 3.43 times. Classifying by age, the TB mortality rate increases with age, and out of the total 1,277 deaths due to TB, 80.3%, which was 1,025 people were elderly over the age of 65 and followed by age were between 45 and 64. In comparison to the past, the age distribution of TB deaths is noticeably leaning towards the elderly population; and the mortality rate in the younger population has declined in recent years.

Classifying between cities and rural areas, the mortality rates and the incidence of TB have been toward a parallel tendency; Eastern Taiwan is higher than the Western and the Southern Taiwan is higher than the Northern Taiwan and cities are usually lower. In 2002, the highest standardized TB mortality rate was in Taitung County and the number was as high as 14.03 per 100,000 population, followed by Hualien County and Pingtung County. The mortality rate of mountain regions was 30.17 per 100,000 populations, which was 5.3 times of TB mortality rate of common areas (5.68 per 100,000). The TB death count in mountain regions was accounted for 3.01% of the total and was ranked the 8th on the list of leading causes of death.

Prevalence

Starting from 1957, the Pulmonary Tuberculosis Prevalence Survey in Taiwan Areas (excluded extra-pulmonary tuberculosis) was held in every five years to understand the epidemic inclination and as references for the prevention strategies of TB. The method of prevalence study was to randomly select approximately 25,000 to 35,000 people from the population of people over 10 years of age in Taiwan (the samplings had been changed to people over 20 years of age at the 5th prevalence study) for chest X-ray examination and filling out questionnaires. If opaque were found on the X-ray, then sputum exam would be performed. There were 8 such prevalence studies from 1957 to 1993.

The 1st TB prevalence survey was held in 1957, the prevalence of chest X-ray diagnosis for the population above 20 years of age was 5.15% and after bacteriological study the

prevalence was proven to be 1.02%. In 1993, data from the 8th prevalence survey showed that the prevalence of chest X-ray diagnosis for the population above 20 was 0.65%. After bacteriological study, the prevalence was proven to be 0.06%. The prevalence had lowered by 87.4% and 94.1% respectively in decades. Results from the past surveys all revealed that: the older the age, the higher the incident rate, and males pulmonary TB prevalence was comparatively higher than females, by about 2.2 to 3.3 times.

In 2002, according to the data of medical records of age 20 and above from the Bureau of National Health Insurance, the TB epidemic is about 0.113% (the TB epidemic according to WHO is 0.143%). The prevalence rate does show a tendency to decline.

Incidence

The registered number of TB notification in 2002 was 25,262 people. After diagnosis, there were 16,758 new TB patients and the incidence rate for TB was 74.6 per 100,000 populations. It has been the number one incidence rate among notifiable communicable diseases for years in Taiwan.

The registration for TB patients started from 1957. It was aimed at sputum positive infectious tuberculosis patients. Thereafter, the target was expanded. In 1991, all active tuberculosis patients should be notified and registered. However, the process of notification in medical centers wasn't performed smoothly enough to reflect the real epidemic situation. The Bureau of National Health Insurance had enforced the policy of "No Notification, No Payment " for TB in July 1997. In 2001, CDC has set up TB Division to handle the notification of TB Death Data matching and notification through the Internet, the suspected cases were included as well; therefore, different types of notification has produced different notification rates. As a result, the number of TB patients notified by medical centers has climbed rapidly. The epidemic statistic data and the real epidemic situation have begun to close the gaps, and the notification rate has come closer to the true value.

There were 16,758 new TB cases in 2002; Classifying by gender, male patients were about 2.2 times that of females, and the incidence rate

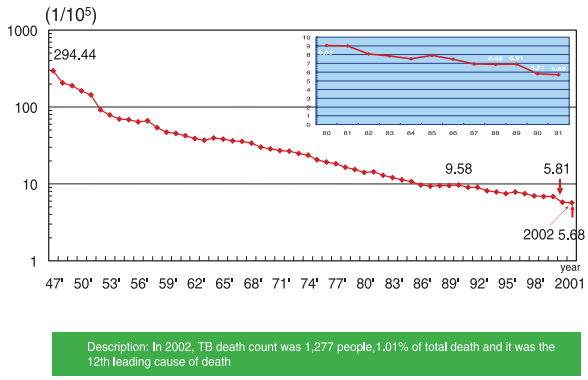


Figure.1 Tuberculosis Mortality in Taiwan 1947-2002

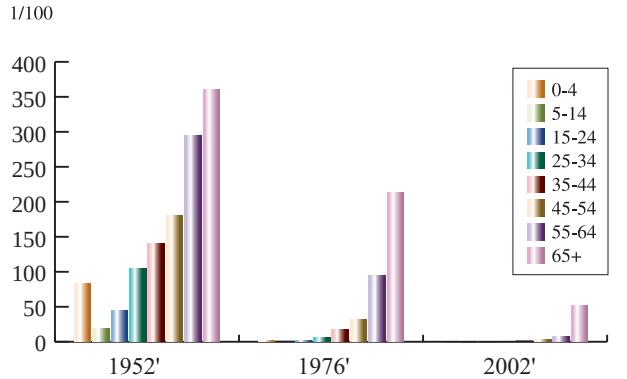


Figure.2 Tuberculosis Mortality by Age Group

was 2.1 times that of females. Classifying by age, the number increased evidently with age, new TB cases of age 65 and above ware at 48.22%. The incidence rate has increased with age and male was more than female. In the mountain regions, the TB incidence rate was 289.8 per 100,000 populations and it was 3.9 times higher than common areas (76.6 per 100,000).

Goals & Objectives

1) Goals

1. Discover and treat infected patients as soon as possible.
2. Providing completed medical care to TB patients in order to cut down the mode of transmission.
3. Effectively lower the source of transmission and protect the general public from infection.

2) Objectives

1. Connecting the medical care network to build up a well-developed TB diagnosis and treatment system to improve the medical care quality.
2. Constructing an excellent tuberculosis laboratory framework to provide accurate references for TB diagnosis and treatment assessments.
3. Enhancing the TB immunization system, upgrading the functions on disease surveillance, case management, high-risk group screening, special management for high-risk group, vaccination, education, and medical personnel training.
4. Enforcing the intercommunion with foreign authorities and the relevant researches to provide information as references for prevention policies as well as study evaluation.

Strategies

1. Connecting Infection Medical Network to build up a quality TB Treatment Network

Using "Communicable Disease Prevention Medical Network, Department of Health "as a basic framework, to establish 6 TB Centers and Education Training Centers to solve the cases of medication resistance, trouble cases and personnel training in Taiwan. To establish TB

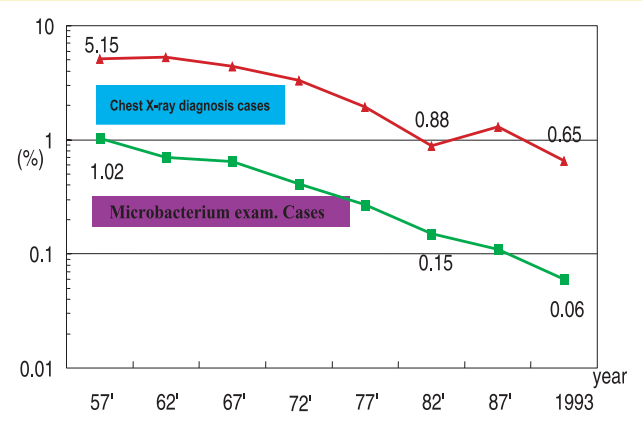


Figure.3 Prevalence for Pulmonary TB in Taiwan (Population above the age of 20)

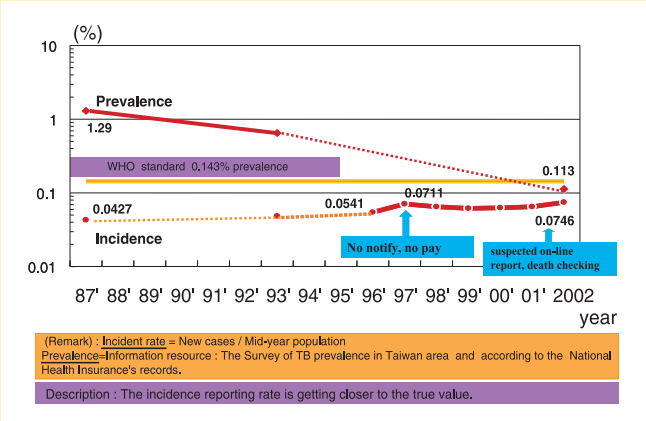


Figure.4 Tuberculosis Incidence and Prevalence in Taiwan,1987-2002

Consulting Committees in Northern, Southern, Central, and Eastern of Taiwan; to recruit local and experienced specialists as consultants to correctly diagnose TB cases, evaluate the second-line medication, deal with medicine-related questions and provide consulting services. In order to prevent and enforce nosocomial infection of TB, the effective preventing strategies were implemented and the " TB nosocomial Infection Handbook" was published. Combining with the improved medical payment for TB patients by the Bureau of National Health Insurance to enhance the quality of medical care and treatment in hospitals. Trainings for professional personnel, including medical and publish health staffs were conducted as well.

2. Building and Strengthening TB Laboratory Framework

The medical centers and hospitals with qualified TB laboratory are selected and recommended by experts to offer TB screening services. The responsibilities of designated medical centers are distributed according to the needs of regional residents and the level of the facilities. The delivery units are the local hospitals and health centers. To enhance the quality of TB examination, the " TB laboratory Handbook" was revised. As a result, the standardized procedures and guidelines are provided and recommended by the experts of academic authorities to perform the national TB laboratory surveillance program. In addition, TB Central Reference Laboratory is built to administer the relevant research and examination technique development. It will improve the criteria of national TB laboratories.

3. Strengthening TB Public Health Management System

1). Maintaining TB patient database and Internet Notification Systems; collecting the update information of TB cases such as: completed diagnosis, notification, registration, treatment, examination, management and persons in close contact of TB patients in order to monitor TB epidemic and provide the information for case management.

2). Administrating monitoring, dealing, diagnosis reconfirming, and tracking mechanisms in designated hospitals,

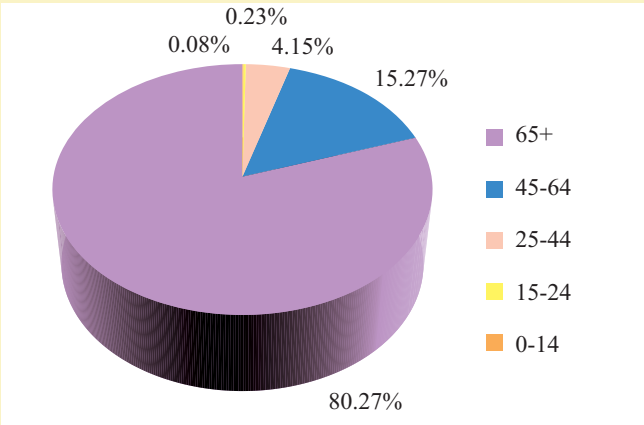


Figure.5 Percentage of Tuberculosis death cases, by age, Taiwan, 2002

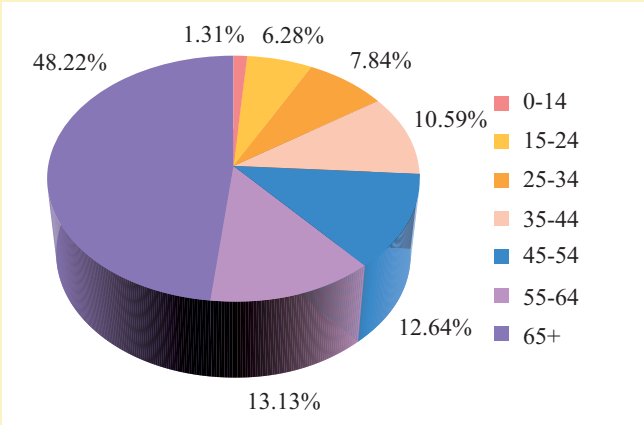


Figure.6 Percentage of Tuberculosis cases, by age, Taiwan, 2002

schools and other organization for suspected TB cases. Targeting the high-risk groups such as correcting facilities, nursing homes, mental hospitals and medical resources deprived mountain regions, offshore islands and rural areas by using patrol cars equipped with X-rays to perform carpet screening. Also, the schoolteachers, staffs, those in close contact with TB patients and those over 40 of age in TB affected areas are all targeted objects to have x-ray screening examinations.

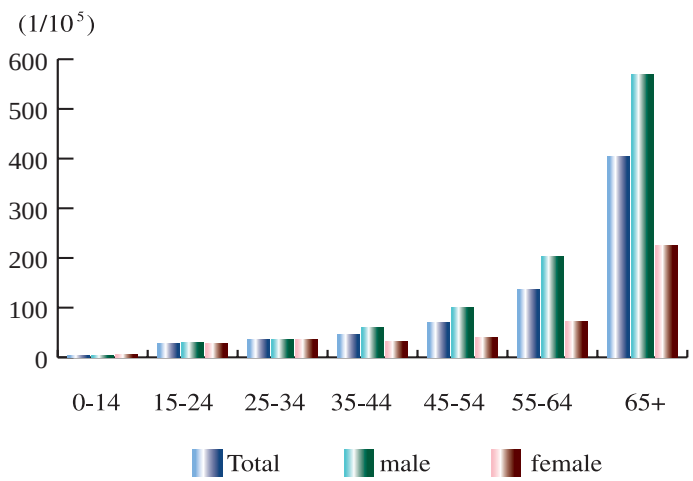
3). Actively monitor medication progress mechanism: Confirmed patients are prioritized in DOTS treatment plans. Other patients will be included according to the resources of local government. By observing closely and making sure every patient takes their medication to ensure each case will be cured to cut off every possible infectious origin. It can also prevent medication resistance and increase the effectiveness of TB medication. Select an area respectively in northern, central, southern, eastern and offshore islands of Taiwan to implement DOTS Pilot study as the exemplification of TB prevention to conduct and promote the DOTS plan in Taiwan areas.

4). All infants will be vaccinated with BCG Vaccine before 1 year old. Any infant that isn't vaccinated will be tracked periodically for vaccination case by case.

5). To utilize media to educate people: Organizing TB Prevention Training and education materials for hospitals, local Health Centers, schools, and organizations to strengthen health knowledge.

4. Strengthening the TB Prevention for specific groups and enforce the relevant research

Budget for free medical care services for the patients without Health Insurance in Health Bureaus and designated hospitals. Monitor and register high-risk groups such as homeless people to implement the DOTS plan and



Description:The incidence rate increases with age, male is higher than fen

Figure.7 Age-sex distribution of TB cases in Taiwan, 2002

allowance mechanism. In addition, combine government organization, social networks such as religion groups to employ health improvement plans and education programs; provide patrol cars screening services in mountain regions to proactive monitor the TB cases; perform strategic screening for TB cases as well as AIDS and diabetic patients TB through medical committees and other medical organizations are undergoing. Meanwhile, the related studies that target on mountain regions, aborigines, AIDS, diabetes and chronic diseases are formulating and conducting as well.

Accomplishments

1. Invite specialists in related profession to publish "TB Diagnosis and Treatment Handbook" as references for TB standard treatment for doctors. " TB Diagnosis and Treatment Seminar" was held to discuss related issues on World TB Day in 2004.

2. Increase the referral hospital laboratory to 9 labs in 2004 and the service areas were expanded to national-wide. National TB Laboratory specialists were invited to publish the "TB Laboratory handbook" as references for medical facilities. By the end of 2003, the "TB Laboratory handbook" was revised to provide the update laboratory information for lab personnel in hospitals.

3. In 2003, there were 229,250 newborns were vaccinated. The survey for TB- scar in grade 1 students was 9,402 people and re-vaccination was 6,989. The newborn vaccination rate was 56% and grade 1 students without TB scars was 1%.

4. According to the Communicable Diseases Act, TB has been listed as Type 3 of Notifiable Communicable Disease. By law, medical centers are to notify Health Center within one week. After the implementation of new notification regulation and Internet notification, the time from diagnosis to registration has been shortened 1.7 days from the average 44 days. The abnormal case rate notified by medical centers, which was more than 7 days from diagnosis to registration, has also lowered rapidly from 69% in 2001 to 2% in 2003.

5. Establish TB epidemic data for Health and Medical Centers and general public through Internet researches.

6. TB notification checking system training programs were held respectively in hospitals and health centers. In 2003, 16 training courses were held and 560 people participated. 5,073 people were trained to improve the understanding and the working quality for Health Center nursing personnel in Taiwan.

7. The carpet screening was performed in correcting facilities, nursing homes, mental hospitals, high-risk organizations, mountain regions, offshore islands and rural areas. Also elementary school and kindergarten teachers and staffs, those in close contact with TB patients, those who age over 40 in high-risk areas have also been examined. The proactive screening was performed to discover more patients. In 2002, 268,217 people were examined, and the new patients rate was 312 per 100,000 populations. In 2003, 249,857 people were examined.

Enterovirus

Background

Enterovirus belongs to a group of small RNA viruses of 66 types, including 3 polioviruses, 23 Coxsackie A viruses (CA), 6 Coxsackie B viruses (CB) , 30 Echoviruses (Echo) and 4 other enteroviruses (EV68-71). The newly discovered EV71 has a significantly higher pathogenicity among the known enteroviruses, especially in the respect of causing neurological complications. Enterovirus is found in gastrointestinal tract (stool of an infected person, mouth, water, food) and respiratory tract (aerosols such as saliva, sputum, or nasal mucus, coughing, sneezing). People can be infected by direct contact with the secretions of an infected person or a contaminated surface or objects.

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

According to various surveillance data, the enterovirus infection trend in 2003 suggests that children under the age of 5 are prone to critical complication and death resulted from enterovirus infection and the associated mortality rate is 11.4%. The major symptom of enterovirus infection is hand, foot, and mouth disease (HFMD). EV 71 is the most commonly seen type of enteroviral pathogen in Taiwan. Another surveillance data collected by the local health departments and the physicians' reporting surveillance system points out that the number of suspected enterovirus cases increased from mid March of 2003 and reached the peak around early May. Comparing the data gathered in 2002 and that in 2003, the peak has arrived a month early in 2002. The main clinical symptom of EV 71 infection is still herpangina and the number of HFMD cases in 2002 is dramatically less than that in 2003. A total number of suspected enterovirus infection inpatients in 2003 is 12178 and the number of confirmed enterovirus complicated severe cases is 70, including 8 deaths.

Objectives

1. To control the trend of enterovirus infection

in Taiwan and to set up a database of the variety of active enteroviruses in Taiwan.

2. To lower the mortality rate resulted from enterovirus complications.

3. To organize a "Clinical Critical Care Consultation Team" to set guidelines for acute enterovirus complication treatment.

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

5. To develop EV 71-prototype vaccine.

Strategy

1. To reinforce case surveillance and disease evaluation abilities

The CDC will continue to collect and analyze enterovirus infection information to construct an enterovirus infection database in an attempt to understand the disease outbreak and to make responsive policies.

2. To augment health education

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

3. To strengthen emergency disease control mechanism

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

4. To conduct prudent research and related personnel training

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

Accomplishment

1.Accomplishment in the construction of surveillance and database

Figure 1 shows the trend of enterovirus

infection in Taiwan. The annual number of enterovirus outpatients begins to increase mid March and reaches its peak around early-May. The number generally decreases afterward. Enterovirus has become one of the seasonal epidemics in Taiwan.

Table 1 shows the annual critical enterovirus complication mortality rate in Taiwan is around 11.4% to 25.7%.

Figure 2 shows that the trend of the various enterovirus infection in Taiwan over the past five years. Enterovirus type 71will recurrent in every year.

Figure 3 shows that EV71 is the most pathogenic virus in acute enterovirus complication in Taiwan.

2.Health Education

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

(2) The local organizations work with the community to promote enterovirus education and prevention.

Table 1 : Acute Enterovirus Complication Mortality Rate during 1998-2003

Year	Cases	Fatality	Mortality Rate
1998	405	78	19.3
1999	35	9	25.7
2000	291	41	14.1
2001	393	58	14.8
2002	162	30	18.5
2003	70	8	11.4

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

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

4. "Enterovirus Control Plan", "Enterovirus-prone group Control Booklet" and

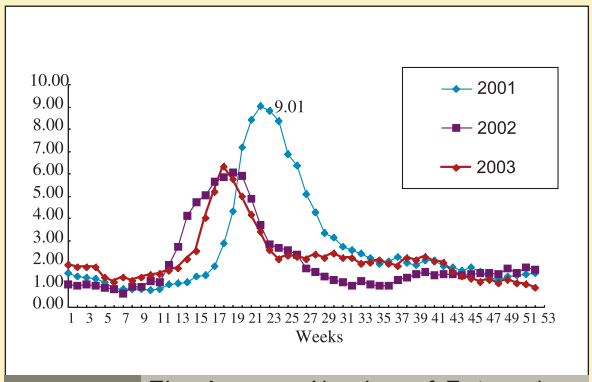


Figure.1 The Average Number of Enterovirus Cases reported from sentinel sites in Taiwan

(Y-axis: Average number of cases; X-axis: Weeks)

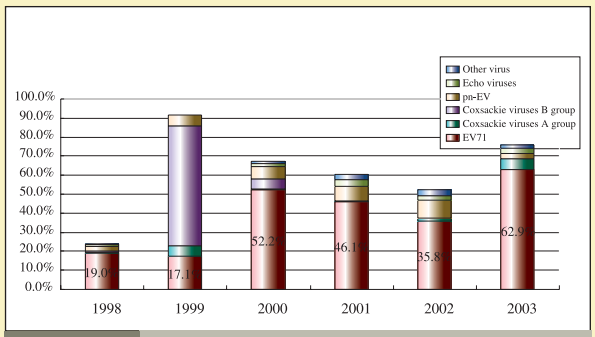


Figure.2 Distribution of number of confirmed critical enterovirus complication cases resulted from different types of enteroviruses over year 1998-2003

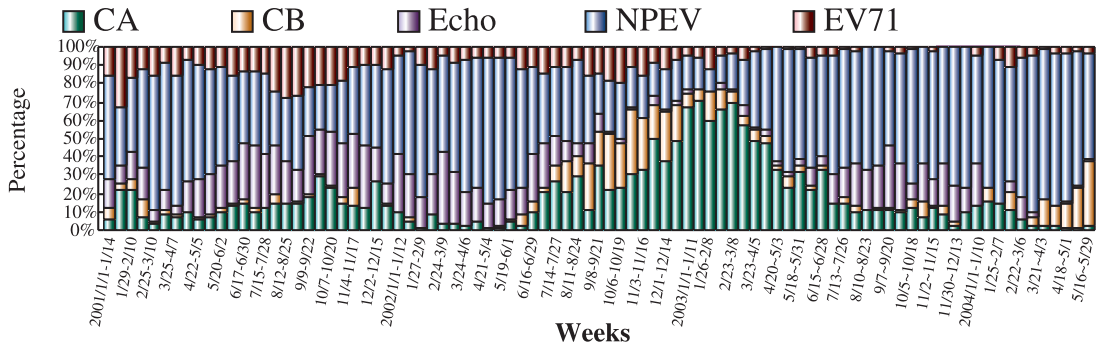


Figure.3 The isolation rate of different type Entervirus in Contracted Laboratory , 2001-2004

"Enterovirus Control Handbook for Child Care Worker" are written to list all the necessary precautions and published in large quantity for distribution to all the health institutions in Taiwan.

5. Co-organized "EV 71 in Taiwan Conference" with Chang-Gung Linkou Children Hospital. The clinical health care workers, central and local disease control workers and people from the academic attended the conference to exchange knowledge and experience of enterovirus in order to upgrade the professional capability in enterovirus prevention.

6. Regarding to the creation of EV 71Vaccine,there are several accomplishments achieved. First, the system produces 20 liters of virus at a time and the virus produced is 107 TCID 50. Second, an enterovirus purification system of colloid partition analysis is constructed. The purification result can be proven by techniques such as colloid electrolysis, enzyme-linked immunosorbent assay (ELISA) and Western blotting. Third, the strength of the antibody produced by the purified EV 71-immune mice is more than 1:1400.

Future Prospects

1.Reinforce Enterovirus prevention

(1) Strengthen promoting household Hand-Washing Activity, the adults come back form outside must wash hands before contact children.

(2) Highlight the concept of "no school and no work when get sick".

2.The assessment of present prevention policy.

(1) The assessment of consequence of no school policy

(2) Conducting the across area and medical facility integrity research to assess the treatment criterion of Enterovirus severe cases.

3.Continuing developing the related research.

(1) Research in EV 71 Vaccine.

(2) Seroepidemiologic surveillance for EV 71.

(3) To investigate and study the risk factors of enterovirus complicated severe case.

(4) To study the genetic mutation and toxicity of enterovirus.

Bacillary Dysentery Control in Mountainous Areas

Background

Gastrointestinal tract infections such as cholera, typhoid fever, paratyphoid fever, amoebic dysentery, hepatitis A and other diseases are very rare in Taiwan now. Due to the several disease control policies implemented by the government, the environmental hygiene and people's standards of living have thus been greatly improved. However, hepatitis A and bacillary dysentery (shigellosis) are still the major epidemics in the mountainous regions. Therefore, the Department of Health has employed the hepatitis A vaccination program in the mountain regions since June 1991. The disease incidence rate has been significantly reduced since 1997 and it was even lower than other regions in Taiwan in 1998. Nevertheless, there are still numerous cases of bacillary dysentery in parts of mountain districts in Taiwan. Bacillary dysentery has become the major endemics in these regions. The shigellosis incidence rate is considerably higher in the mountain regions compared to that in other places. The rate is about ten-folds and even hundred-folds higher in mountain districts. (Refer to Figure 1.)

Shigellosis (Shigella spp.) is a gastrointestinal tract epidemic caused by the shigella bacteria. The incubation period is one to three days. People who caught the bacteria usually developed diarrhea (often with blood and pus) along with symptoms like fever, nausea or toxemia, vomiting, cramps, and tenesmus. Moreover, one third of the patients develop watery diarrhea. On the other hand, an infected person might not develop the symptoms of shigellosis but he is still a shigella bacteria carrier. As a result, he can pass the disease to other people because the pathogen can be found in his stool. Shigellosis is transmitted through oral-anal contact. People are infected with shigellosis through eating or drinking contaminated food or by direct contact with an infected person. In addition, pathogen-carrying insects like flies and cockroaches can also contaminate food. Therefore, practicing personal hygiene, environmental cleanliness and ensuring food and water safety are ways to prevent the spread of shigellosis.

Bacillary dysentery plagues all sectors of society and country. The disease is not merely a personal health problem. It is, at the same time, an economic burden for the family, the community and the nation. For instance, the infected patients would not be able to go to work for several days due to the symptoms of the disease, affecting the amount of home income. In addition, hospitalized isolation of the patients depresses the medical resources. On the other hand, the shigellosis incidence rate is considerably high in mountainous regions. Therefore, the presence of bacillary dysentery greatly discourages tourism in the mountainous regions. As a result, if shigellosis cannot be eradicated from mountain district, the tourists' health is at stack and the tourism business is also greatly affected. Furthermore, the circulation of shigella bacteria could damage the nation's image due to the fact that shigellosis usually happens in places where public health system and sanitation are poor, especially in southeastern Asia and Africa. Yet,

Taiwan is already a developed country and the people's average annual gross salary is over 14 thousands US dollars. The numerous shigellosis cases have indeed lowered Taiwan's image in the International. Consequently, the eradication of mountainous bacillary dysentery ensures the mountainous inhabitants' wellbeing, protects the tourism business and enhances the nation's image.

The CDC has set up a "4-year Mountainous Shigellosis Control Promotion Plan" in 2000. The plan was implemented in 2001 in the hope to eliminate the epidemic from the mountainous areas.

According to the annual statistics, several mountainous villages are more prone to bacillary dysentery compared to the other villages. The plan is thus implemented in the thirteen villages in six counties where the shigellosis incidence rate is comparably higher. They respectively are Datong Village and Na'ao Village in Yilan County, Xiulin Village, Wanrong Village and Zhouxi Village in Hualian County, Daren Village, Haiduan Village and Lanyu Village in Taidong County, Fuxing Village in Taoyuan County, Jianshi Village and Wufeng Village in Xinzhu County, and Xinyi Village and Ren'ai Village in Nantou County (refer to Table 1).

Conclusively, changing various respects of the Aborigines'life is the only way to completely control the spread of shigellosis in mountainous areas. Correcting personal bad habits, improving cleanliness of residence and water supply as well as reinforcing health education and disease surveillance reporting system are ways to stop the mountainous Aborigines from being infected by shigella bacteria. The CDC has already organized a "Mountainous Shigellosis Control Group" in order to improve people's living standard and wipe out bacillary dysentery. The Group works in collaboration with the mountainous health departments and actively set up health education in an attempt to promote shigellosis awareness among the Aborigines.

Objectives

To lower the average bacillary dysentery incidence rate in the thirteen mountainous villages to below 50% of the incidence rate in the past five years by the year 2004.

Strategy

1. To cooperate in the tribal health promotion plan, training and involvement of mountainous social workers in order to organize health education campaigns.
2. To subsidize colleges and other charities in constructing health education programs.
3. To hold residence cleanliness competition or community observation activities in an attempt to promote the concepts of cleaning and maintaining environmental sanitation.
4. To organize talks on shigellosis prevention and drinking water safety for schools and long-term care organizations as well as officials in the health departments in order to upgrade their knowledge about bacillary dysentery control.
5. To schedule health education programs for medical personnel in an attempt to control the disease transmission, strengthen the reporting system and carry out the disease prevention as early as possible.
6. To implement the health education programs both at school and the community in order to

correct people's habits and to stop the circulation of the disease.

7. To set up integrated epidemics surveillance system in order to completely control the disease outbreaks and eventually eradicate the disease.

8. To establish laboratory examination supporting system in the areas of transmission for early detection of the disease, keeping track of cases and pathogen carriers, preventing double transmission and disease outbreak from happening.

Accomplishment

Accomplishment in 2001:

1. Numerous health promotions were organized at schools, community, churches and medical centers. Promotion flags, pamphlets, posters and gigantic bulletin boards were made. Disease prevention groups were set up in the counties. Regular assessment meeting were called to review the disease prevention work.

2. To subsidize the construction and installation of basic health infrastructure such as water supply, sewage disposal, garbage disposal and hand-washing facilities.

Accomplishment in 2002:

1. Volunteers'work in shigellosis control:

   Volunteer prevention plan for bacillary dysentery control was conducted at Datong Village and Na'ao Village in Yilan County, Lanyu Village, Haiduan Village and Daren Village in Taidong County, Taoyuan Village, Sanmin Village and Maolin Village at Kaohsiung County, Sioulin Village, Wanrong Village, and Zhouxi Village in Hualin County, Fuxing Village in Taoyuan County, the mountainous villages in Pingdong County, Jianshih Village and Wufong Village in Xinzhu County, and Xinyi Village and Ren'ai Village in Nantou County.

2. Healthy residence, habit and farming activity education promotion:

   1257 promotions were organized at Yilan County, Xinzhu County, Taoyuan County, Nantou County, Jiayi County, Kaohiung County, Pingdong County, Taidong County and Hualian County.

3. Talks on augmenting hospital reporting system were arranged:

   59 talks were scheduled at Yilan County, Xinzhu County, Taoyuan County, Nantou County, Jiayi County, Kaohsiung County, Pingdong County, Taidong County and Hualian County.

4. Constructing the laboratory supporting system at Nantou County, Xinzhu County and Yilan County.

5. Organizing mountainous bacillary dysentery prevention drawing contest and making the wining pieces into a huge bulletin board in an attempt to integrate the Aborigine's culture and characters into the health education for better promotion.

6. To establish control groups at different counties and to call on regular assessment meetings for these groups.

7. To assemble various national assessment meetings at different times of the year to strengthen the mountainous shigellosis prevention throughout the year.

8. The epidemic was brought under control at 11 villages, namely Datong Village and Na'ao Village in Yilan County, Sioulin

Village, Zhouxi Village and Wanrong Village in Hualiang County, Daren Village, Haiduan Village and Lanyu Village in Taidong County and Jianshih Village and Wufong Village in Xinzhu County.

Accomplishment in 2003:

1. Volunteers'work in shigellosis control:

   Volunteer prevention plan for bacillary dysentery control was conducted at Datong Village and Na'ao Village in Yilan County, Lanyu Village, Haiduan Village and Daren Village in Taidong County, the mountainous villages in Kaohsiung County, Sioulin Village, Wanrong Village, and Zhouxi Village in Hualin County, Fuxing Village in Taoyuan County, the mountainous villages in Pingdong County, Jianshih Village and Wufong Village in Xinzhu County, Xinyi Village and Ren'ai Village in Nantou County and Alishan village in Chiayi County.

2. Healthy residence, habit and farming activity education promotion:

   1048 promotions were organized at Yilan County, Xinzhu County, Taoyuan County, Nantou County, Chiayi County, Kaohiung County, Pingdong County, Taidong County and Hualian County.

3. Talks on augmenting hospital reporting system were arranged:

   147 talks were scheduled at Yilan County, Xinzhu County, Taoyuan County, Nantou County, Chiayi County, Kaohsiung County, Pingdong County, Taidong County and Hualian County.

4. Constructing the laboratory supporting system at Nantou County, Xinzhu County and Yilan County.

		1996	1997	1998	1999	2000	Total	Average	Median
Taidong County	Haiduan	0	2	4	2	5	13	3	2
	Daren	0	1	0	1	0	2	0	0
	Lanyu	0	1	2	0	1	4	1	1
Total		0	4	6	3	6	19	--	--
Yilan County	Datong	0	3	8	35	17	63	13	8
	Na'ao	0	1	2	8	8	19	4	2
Total		0	4	10	43	25	82	--	--
Hualin County	Sioulin	0	13	11	19	52	95	19	13
	Zhouxi	0	0	6	3	9	18	4	3
	Wanrong	0	1	12	0	9	22	4	1
Total		0	14	29	22	70	135	--	--
Nantou County	Ren'ai	2	43	33	29	22	129	26	29
	Xinyi	0	5	1	6	6	18	4	5
Total		2	48	34	35	28	147	--	--
Taoyuan County	Fuxing	0	2	9	0	1	12	2	1
Total		0	2	9	0	1	12	2	1
Xinzhu County	Wufong	0	0	0	4	0	4	--	--
	Jianshih	6	1	10	11	1	29	6	6
Total		6	1	10	15	1	33	7	6
Overall Total		8	73	98	118	131	428	--	--

Table.1 The number and the statistics of shigellosis cases over five years (1996-2000) of disease prevention

5. To establish control groups at different counties and to call on regular assessment meetings for these groups.

6. To assemble various national assessment meetings at different times of the year to strengthen the mountainous shigellosis prevention throughout the year.

7. The epidemic was brought under control at 12 villages, namely Datong Village and Na'ao Village in Yilan County, Sioulin Village, Zhouxi Village and Wanrong Village in Hualiang County, Daren Village, Haiduan Village and Lanyu Village in Taidong County and Jianshih Village and Wufong Village in Xinzhu County, Xinyi village and Ren' ai village Nantou County

Future Prospect

The spread of bacillary dysentery in the mountainous area is very closely related to the Aborigine's culture, habitat and economic activity. The spread of shigellosis in mountainous areas is a result of the Aborigine's norm and custom, their misleading belief in diseases and a range of problems in their water supply, environment, farming economic activities and disease reporting system.

Therefore, the CDC strives to use different means of communication to promote shigellosis awareness among the Aborigines. Consequently, the spread of the disease can be controlled and the mountainous incidence rate of bacillary dysentery can be lowered.

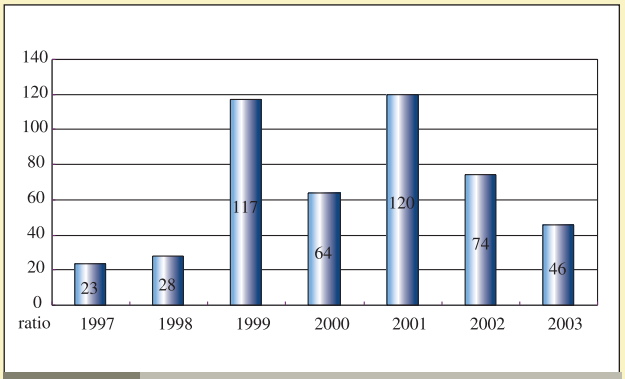
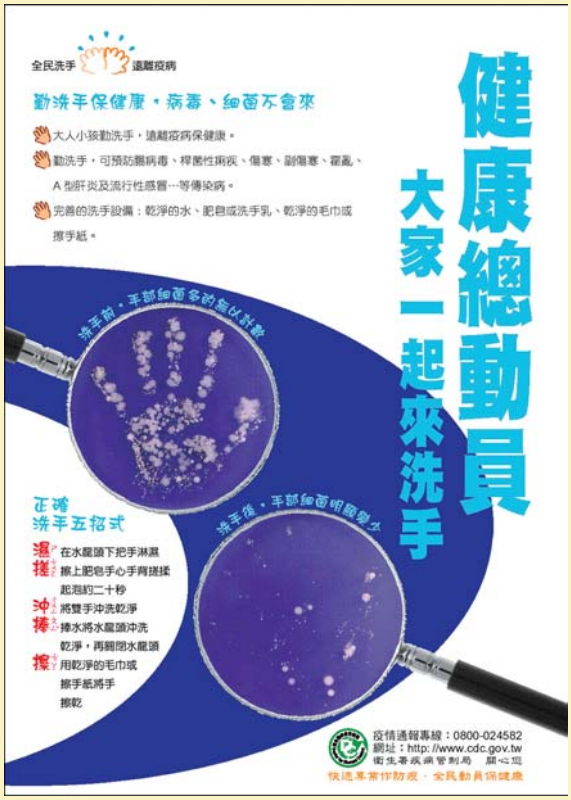


Figure.1 The ratio of the bacillary dysentery incidence rate between non-mountainous region and mountainous region.

(Y-axis: ratio; X-axis: Year)

Figure2. Poster



Prevention of Influenza

Background

Influenza (flu) spreads rapidly and the antigens change quickly. The antibody only lasts for a few months after infected. As a consequence, several epidemics in the communities, cities or countries even all over the world appear every year. To effectively monitor the flu epidemic in Taiwan, the influenza-like illness was listed in the Sentinel Surveillance System since 1999. Furthermore, CDC has sighed with contracted laboratories in several medical centers in Taiwan to identify different virus type.

Type A influenza virus is the only one Orthomyxoviridae that can infect avian. All birds are thought to be susceptible to infection with avian influenza. The outbreaks of the highly pathogenic avian influenza have been caused by influenza A viruses of subtypes H5 and H7, which may cause acute clinic symptoms on chicken and turkeys. However, there is no antibody against avian influenza in human and the mortality rate is very high when infected. Considering the fact that the toxicity of virus will be increased after genetic reassortment, and human population have been infected by the viruses H5N1 and H9N2 in Asia between 1997 and 1999, scientists began to worry that viruses can be infected cross-species, which means it can be infected directly by fowls without mixing vessels. As a result, influenza has a great potential to cause global pandemics, and it is therefore of particular public health concern in many countries.

It is predicted that there would be approximately 4.8 to 12 million people would be ill with infection, about 30,000 to 80,000 out of total infected people would need to be hospitalized in Taiwan if a flu epidemic occurs around the world. Concerning about the threat of flu virus to human being, the influenza pandemic plan was organized in many countries since 1997, and Taiwan also implements the preparedness program actively.

Goals and Strategies

Building and operating of the commanding center, constructing surveillance and information system, broadening and generalizing lab techniques, proper supply and use of vaccine, proper supply and use of anti-virus medication, proper resource and use of medical workforce, organization of community volunteers, psychology consulting for media and the public and international cooperation in researching.

Accomplishments

1) Commanding Center: Set up a commanding center to work together with all government departments before the flu epidemic. The contingency plan has been made to deal with any of flu pandemic.

2) Surveillance System: Five Surveillance systems were built-up as below: Notifiable Disease Surveillance System, Sentinel Surveillance System, Laboratory Surveillance System, School-based Surveillance System, and Syndromic

Surveillance System. These surveillance systems will monitor respectively on the popularity, acuity, demography and types of the flu.

3) Vaccination:

1. To avoid any clinical diagnosis confusion caused by fever or similar symptoms and delay the prevention and medical caring, all medical center personnel have received flu shots. By the cooperation of hospitals and health centers, the coverage rate was achieved up to 92.1%.
2. Actively educate people and take the coordinated policies to raise the immunization coverage rate for high-risk group. The immunization coverage rate for nursing home residents is up to 91.1%. For elderly of 65 and above, it has been raised from 59.9% in 2002 to 68.4% in 2003.
3. To increase the satisfaction and willingness for immunization, Health Centers proactively went to the communities to provide the flu shots services. CDC also coordinated with the Veterans Affair Commission and Health Centers to provide door-to-door flu shots service for solitary and handicapped elderly. Meanwhile, the people with rare diseases, and homeless people will have the priority to get the shots service.
4. Due to the widespread of avian flu, anyone who contacts with poultry farms, butchery, sales, transporting and production of poultry will be given flu shots for free. The total vaccinations were given to approximately 24,000 people.
5. Create the flu immunization certificate: The flu immunization certificate will be given when immunization has done. It also can be used as a reference for doctors.

4) Usage of Antiviral Drugs

In order to lower the severe complication or mortality rate of flu for elderly and residents of nursing homes, to avoid the institutions epidemics, and cut down the infectious rate for avian flu for the people who traveled around and have contacts with fowls, CDC authorized 318 contracted hospitals and branch offices have administrated the usage of antiviral drugs. From December 15, 2003 to the early June of 2004, the usage of antiviral drugs was 13,728 doses for 1,420 people.

5) Health Education

CDC creates many health education materials such as fliers, posters, Q&A pamphlets, videos, broadcasting ... etc. of flu and avian flu that are distributed and published by the Health Bureaus, Education Bureaus or medias in Taiwan. Meanwhile, the website of flu and avian flu is also set up to provide the updated information and it contains different versions like, English, Thai, Indonesian and Vietnamese for the foreigners in Taiwan. Furthermore, CDC produces「The Different Aspects of

Influenza and Novel Influenza」 film to cope with the occurrence of Novel Influenza and to enforce the understanding for medical personnel.

6) Monitoring of High-Risk Groups

To maneuver the health management procedures for the workers of poultry farms that are exposed to avian flu in an attempt to efficiently monitor and manage the situation of the high-risk groups.

7) Researches

To conduct efficiency-assessments to the authorized or CDC-developed researches which are related to flu vaccines and antiviral drug. The consequences of the researches can be the references for establish the strategies of flu prevention.

Visions:

Effectively control the epidemic trend of flu, establish contingency plans to reduce the impact of flu pandemic and ensure the health of people in Taiwan.

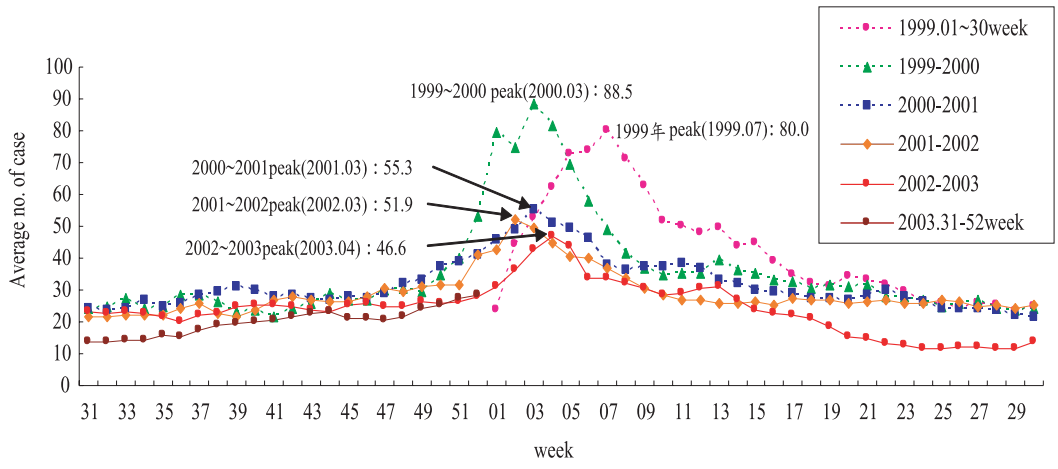


Figure.1 Average number of influenza-like illness case reported from sentinel sites in Taiwan, by report week, Jan.01,1999-OCT.40,2004

Quarantine Services

5

International Ports Quarantine Activities
Foreign Labors and Incoming Passengers Health Management

International Ports Quarantine Activities

Background

Taiwan is located in the subtropical zone, which means the environment is suited for many different tropical communicable diseases to be spread. During the Japanese occupied period, there were already quarantine practices. After the KMT came to Taiwan, the government had strengthened the quarantine practices even more and changed the quarantine institutes totally. The government set up aviation quarantine office at Songshan Airport, and set up port quarantine offices at Keelung and Kaohsiung Ports. Tamsui, Anping, Budai, Hualien and other 14 seaports were set up with branch offices of quarantine offices to prevent the introduction of foreign communicable diseases and protect the health of general public in Taiwan. Afterward, the quarantine practice had also been changed for several times. So far, the branch offices of Center for Disease Control, Department of Health, which are also called quarantine authorities, are in charge of the practices of International Ports Quarantine Activities. The practices of quarantine have also been supervised and planed by Quarantine and Prevention Division.

In order to work with the International Health Regulation, IHR of World Health Organization, to prevent communicable diseases to spread internationally with ships, aircrafts and other transportation devices. CDC has especially standardized International Ports Quarantine Regulations to perform necessary quarantine measures to arriving ships, aircrafts, passengers and goods by quarantine authorities to protect the safety and health of general public in Taiwan.

Goals

1. Manage Information: Keep the function of the One Stop Service for Quarantine to make the quarantine procedures and information management effortless.
2. Simplify the Procedures: Innovate and adjust the procedure with time.
3. Prevent the Invasion of Diseases by Performing Quarantine Practices Accurately: By quarantine departure and arrival ships, aircrafts, passengers and goods, control of rodents on ships and the inquiries of vector-borne disease at ports to prevent communicable disease to be spread into Taiwan.

Strategies

1. One Stop Service for Quarantine Practice: Set upOne Stop Service for Quarantine System to process the quarantine activities of aircrafts, ships and marine products. Also manage Deratting Exemption Certificate, vaccination, charging of regulation fee and link up with Internet to proceed with statistic audition for all kinds of quarantine and regulation fees.

2 .International Ports Quarantine Activities:

1) Implementation of Quarantine Examination : Before aircrafts or ships coming from abroad to the airports or ports in Taiwan, they are required to contact and report about the health

Statistics Chart of International Ports Quarantine Activities in 2003

Quarantine Authorities	Number of incoming vessels	Ship Passengers	Number of Incoming Aircrafts	Aircraft Passengers	Number of Incoming Cargo Aircrafts	Total Cargo Aircraft Weight
First Branch, Keelung Port	8,464	118,218	0	0	0	0
Second Branch, CKS Airport	0	0	50,138	8,182,451	13,028	4,049,515
Third Branch, Taichung Port	7,877	79	0	0	0	0
Forth Branch, Kaohsiung Port	16,869	133,416	0	0	0	0
Fifth Branch, Kaohsiung International Airport	0	0	10,010	1,190,578	578	191,716
Total	33,210	251,713	60,148	9,373,029	13,606	4,241,231

condition of the vehicles and passengers to quarantine authorities s through telegrams, teletypes, faxes, mobile phones, emails or other electronic communication devices. When the quarantine authorities are sure that there will be no question of vector-borne diseases on board, only then the aircrafts or ships will be allowed to come into Taiwan without on-board inspection to shorten the time and procedures for of quarantine.

2) On-Board Inspection: Those ships and aircrafts from abroad that have not applied for quarantine, were found with ineligible quarantine results, were found with possible communicable disease patients or death, or were found with abnormal deaths of rodents will need to be inspected on-board. The following chart showed the practices of quarantine activities in 2003.

3. Quarantine for Passengers

1) Incoming passengers are to fill out Symptom Declaration Forms: Perform specimen testing for those passengers that declared with symptoms and keep track of them after they enter Taiwan to prevent communicable diseases to be spread and protect the safety of general public in Taiwan. Starting in 2003, because of SARS outbreak, the form was changed to SARS Survey Form and after some relieve attention of SARS epidemic, the form was further changed into "SARS and Other Communicable Diseases Survey Form", all passengers are required to fill out proactively.

2) Temperature Taking: If any one with body temperature of 38℃ or higher, the passenger will be taking to hospitals for further observation.

3) Self-Health Management and Home Quarantine: Starting from April 28, 2003, arrival passengers from SARS affected areas will need to be home quarantined for 10 days and without the permission from personnel of health authorities, the quarantined people aren't allowed to go out. In accordance with the SARS

epidemic in Taiwan and abroad, the Alerting Level of O, A, B and C will be activated accordingly starting from October, 2003. Those arrival passengers from SARS affected areas, possible SARS patients and passengers on the same flights with confirmed SARS patients will need to proceed with self-health management or home quarantine procedures.

4. Imported Marine Products Quarantine Activity: In order to regulate and prevent imported marine products carry vibrio cholerae to start the cholera epidemic in Taiwan, any imported marine products with A02 as "Customs Import Tariff and Import and Export Commodity Classification of the R.O.C." will need to apply for quarantine inspection and only when the results are eligible can the products be imported and cleared from the custom. The Statistic Chart of Imported Marine Product Quarantine Activities in 2003 are as following.

5. Vector-borne Survey and Control at Port Areas: The purpose of vector-borne survey and control at port areas is to manage the density of vector-borne at international ports and prevent vector-borne communicable diseases. All the quarantine authorities of Department of Health located at international ports will adopt the following procedures to control and stop the multiplication of vector-borne diseases to protect the health of the general public in Taiwan.

   1) Control of Rodents at Port Areas: Place poisonous, which contain anticoagulation raticide around the international ports all year round. These baits will be put where the rodents mostly likely to appearing and hiding places in ports and airports. The baits will be checked and replaced every 10 to 15 days to ensure the efficiency of deratization.

   2) Control of Vector-born Mosquitoes at Port Areas: Mosquitoes are the medium for yellow fever, dengue fever and other communicable diseases. The concentration of mosquitoes has close relationship with the spreading and epidemic of these diseases. Therefore, it is vastly important to control the colonies and concentration of mosquitoes at port areas and exterminate whenever it is necessary to prevent outbreak of epidemic. The methods are as following:

      i) Survey of density of dengue fever mosquitoes in every containers at the port areas: Once a month, check every empty bottle, can, tires and water gathering container at the port areas to better understand the multiplication of vector-borne mosquitoes and remove the containers and larva to keep from multiplying.

      ii) Set up mosquitoes ovitrap to control the concentration of vector-borne mosquitoes: Place lots of mosquitoes laying trap devices with Temephos pesticide around the port areas and providing nonwoven for the mosquitoes to lay their eggs there. However, the hatched larva will be killed by the pesticide and won't be able to grow into mosquitoes. Also the nonwoven should be changed every month to estimate the number of mosquitoes at the port areas.

Statistic Chart of Imported Marine Products Quarantine Activities in 2003

Quarantine Authorities	Quarantined Lot	Weight(kg)	Testing Result Positive of Vibrio Cholerae	
			Non Toxigenic (lot)	Toxigenic (lot)
First Branch, Keelung Port	1,977	40,053,450	0	0
Second Branch, CKS Airport	26,534	27,910,970	0	0
Third Branch, Taichung Port	46	906,966	0	0
Forth Branch, Kaohsiung Port	3,266	150,919,450	0	0
Fifth Branch, Kaohsiung International Airport	2,804	1,751,024	0	0
Total	24,587	221,541,860	0	0

iii)Survey for mosquitoes:Place mosquito trap lights at appropriated places around the port areas to catch all kind of mosquitoes. Also break them into different types and make statistics to understand the colonies and activities of mosquitoes.

iv)Set up"Dengue Fever Prevention Supervising Association in Port Areas: Quarantine authorities of Department of Health will hold monthly meetings for harbor bureaus / airport bureaus, harbor police offices / airport police offices, directorate general of customs, cargo stations and other organizations to oversee the results of monthly vector-borne mosquitoes inspection and the wiping of mosquitoes. If it is necessary, relative departments will perform pesticide administration.

3) Control of Rodents on Ships: With the intention of preventing the spreading of rodent-borne diseases on ships that sail on the international voyage use「The article 53 of International Health Regulation」and「The article 22 of Regulations Governing Quarantine at International Ports」control rodent on the ships.

i) Deratization of Ships : Deatting / Deratting Exemption Certificate is only validated for six months. It will need to be re-applied when it is expired. However, if any sign of rodent is discovered, ships will need to be checked again before the certification can be issued.

ii) Supervising the Hanging of rat guards: In order to prevent rodent get into port areas from shoring ships, all ships will need to place rat guards on the ropes. Any ships are found without rat guard will be corrected right away and filed to be checked on-board and supervised whenever the ships come into the ports again.

4) Adopting International Ports Quarantine Regulations and setting up of quarantine offices in Kinmen and Matsu areas to practice quarantine affairs in attending to the Small-Three Links between Kinman /

Matsu and the Mainland

5) The quarantine application of fishermen from China and stowaways at every fish ports are to be implemented by the local health centers.

6) Quarantine authorities of Department of Health invite ports to set up "Vector-Borne Prevention Supervising Association in Port Areas" and meet regularly to oversee prevention matters.

Future Goals

1. To prevent international epidemic come into Taiwan, it is important to reinforce manpower and resource of quarantine practices, strengthen the function of quarantine, and actually apply boarder quarantine control.

2. Emphasizing on the training of quarantine personnel, encouraging the development of quarantine technologies, advancing the condition of the quarantine officer and the quality of quarantine practices.

3. Intensifying the practice of deratting on vessels, the density survey of vector-borne at port areas and other vector-borne control operations to prevent the epidemic of vector-borne diseases.

SARS防制調查表
Severe Acute Respiratory Syndrome (SARS) Survey Form

臺灣有些SARS個案爲境外移入。請確實填報此表，保障您及家人健康。
Many SARS cases in Taiwan are imported. Please fill out this form. The information provided will be used to protect you and your family's health.

姓名（Name）：_____

出生日期：_____年_____月_____日
（Birthday）：_____mm/_____dd/_____yy

身分證或護照號碼（Passport No.）：

性別（Gender）：☐男Male　☐女Female

地址（居家隔離）（Address in Taiwan）：_____

電話（居家隔離）（Phone No. in Taiwan）：)_____

入（出）境日期（Date）：_____

班機（Flight No.）：_____ 座號（Seat No.）：_____

簽名（Signature）：_____

（填寫不實者，應負法律責任）（Anyone who falsifies answers may be subject to legal action.）

1. 請問您最近十天內是否到過以下地方？
（Have you been to any of the following areas over the past 10 days?）
☐ 中國（China）　☐ 香港（Hong Kong）
☐ 澳門（Macao）　☐ 東南亞（Southeast Asia）
☐ 加拿大多倫多（Toronto, Canada）
☐ 其他地區（Other）_____

2. 請問您是否於這十天內出現過以下症狀？
（Have you had any of the following symptoms over the past 10 days?）
☐ 高燒（>38℃）High fever（>100.4℉ or >38℃）
☐ 咳嗽（Cough）
☐ 呼吸困難或急促（Difficulty breathing or shortness of breath）
☐ 其他症狀（Other）_____
☐ 無（None）

3. 您或您家屬是否曾與診斷爲SARS（嚴重急性呼吸道症候群）之個案有接觸
（Have you or your family had direct contact with respiratory secretions and/or body fluids of a patient suspected of having SARS?）
☐ 是（Yes）　☐ 否（No）

（您可撕下此聯攜回 Please retain this card）

健康提醒　Health Notice

如您於入境後十天內有高燒、咳嗽、呼吸困難或急促症狀，請主動通報，戴上口罩就醫，告知醫師旅遊及接觸史。

If you have high fever, cough, or difficulty breathing in the next 10 days, please wear mask, seek medical advice, inform your doctor of your recent travel history and contact the local health authority or CDC.

行政院衛生署疾病管制局 關心您
Center for Disease Control, Taiwan
疫情通報諮詢專線（CDC Hotline） 0800-024-582
疾病管制局全球資訊網（Web address） www.cdc.gov.tw 2003.07.

Foreign Labors and Incoming Passengers Health Management

In order to avoid foreign labors bringing in their local diseases into Taiwan and affecting the health of general public in Taiwan, all legally imported foreign labors will need to have eligible physical documents of approved foreign hospitals or medical centers to apply for entering visas. Furthermore, within three days after entering Taiwan, they are required to have another physical examination at designated hospitals. Moreover, foreign labors are required to have a checkup every 6 months to monitor their health. So far, the mandatory checkup items for the foreign labors are chest X-ray for pulmonary tuberculosis, HIV antibody, syphilis serum screening, hepatitis B surface antigen screening, intestinal parasite screening, marijuana test, amphetamin and opium metabolite test in urine, pregnancy test, leprosy screening, and general health checkup.

If a foreign labor is found to carry intestinal parasite (excluding Entamoeba histolytica), he/she is required to receive treatment within thirty days after the disease discovery. On the other hand, if the foreign labors tested positive for any of the mandatory categories or is found with any of the 21 notifiable communicable diseases would be deported under the legislated time in order to protect the safety of the general public in Taiwan.

In 2003, the total number of the employed foreign labors who had health check-up is 586,929, 11,495 out of the total failed to pass the check-up, resulting in a failure rate of 1.96%. Moreover, 10,848 of the failures were tested positive for intestinal parasites., resulting in the failure rate of 1.85% among all the tested categories. Followed by chest X-ray for pulmonary tuberculosis examination and the failure rate was 0.03%. there were 47 people were tested positive for HIV antibody.

Health Declaration for incoming passengers

The CDC practices necessary quarantine policy according to the "Law on the "Control of Communicable Diseases" and the "International Ports Quarantine Regulations". Moreover, we employ relevant policy on arrival passengers and follow up on those with symptoms in order to prevent importation of international communicable diseases into Taiwan through means of transportation such as vessels and aircrafts and ensure the citizens'health and wellbeing. Beginning July 2002, arrival passengers with symptoms of disease are required to fill out the "Symptom Declaration Form" actively. However, because of the outbreak of SARS, the declaration form has been changed to "SARS and Other Communicable Diseases Survey Form" since March 30, 2003 and all tourists entering Taiwan are required to fill it out.

The total number of arrival passengers in 2003 is 8,728,922. 34,326 out of the total number wrote down their symptoms, resulting in 3.9 out of 10,000 of total arriving passengers. After following up, there were some notificable communicable diseases found, such as 17 cases of dengue fever, 37 cases of dysentery, and 1 case of malaria.

National Immunization Programs

6

Expanded Immunization Program

NIIS

Hepatitis Immunization Program

Eradication Program of Polio, Measles, Congenital Rubella Syndrome and Neonatal Tetanus

Expanded Program on Immunization (EPI)

Background

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

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

Strategies

1.To continue the routine immunization services, and follow the goal of the global disease control strategy to strengthen the immunization system and promote a supplement plan.

2.To increase the immunization coverage and quality of service.

3.To develop a high-quality supply and vaccine management program.

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

5. To review and modify the EPI strategic plans to face the current need for the national and international control of infectious diseases as well as the ongoing immunization needs and capabilities.

Working Targets

1. To initiate a chicken pox immunization plan for infants. Starting from January 1, 2004, the chicken pox vaccine is compulsory for infants born after January 1, 2003. It has been included to the EPI-recommended vaccine list.

2. To manage and maintain the purchase, distribution, and cold chain system of vaccines recommended by the EPI program.

3. To increase the immunization coverage by strengthening the immunization services and to promote the supplement plan.

4. To hold training seminars on cold chain system, storage management and immunization practice, in order to ensure the quality of vaccines and the professional knowledge of medical personnel.

5. To continue the flu vaccination program.

6. To complete a National Immunization Information System (NIIS).

Future Visions

1. To build up a plentiful and safety vaccine supply system and to increase the immunization coverage for all kinds of vaccination by implementing the immunization services, in order to reach the goal of eradication or elimination of some vaccine-preventable diseases.

2. To consider including a new vaccine to the EPI-recommended vaccine list by reviewing the current situation of communicable disease control; assessing their impacts on the public health, social economics and medical costs; updating information on the vaccine R&D, production and supply; allocating the health fiscal budget for vaccines purchase.

3. To develop and promote an appropriate immunization program for the elderly, in order to reduce the mortality and morbidity that caused by the severe complications of the vaccine-preventable diseases.

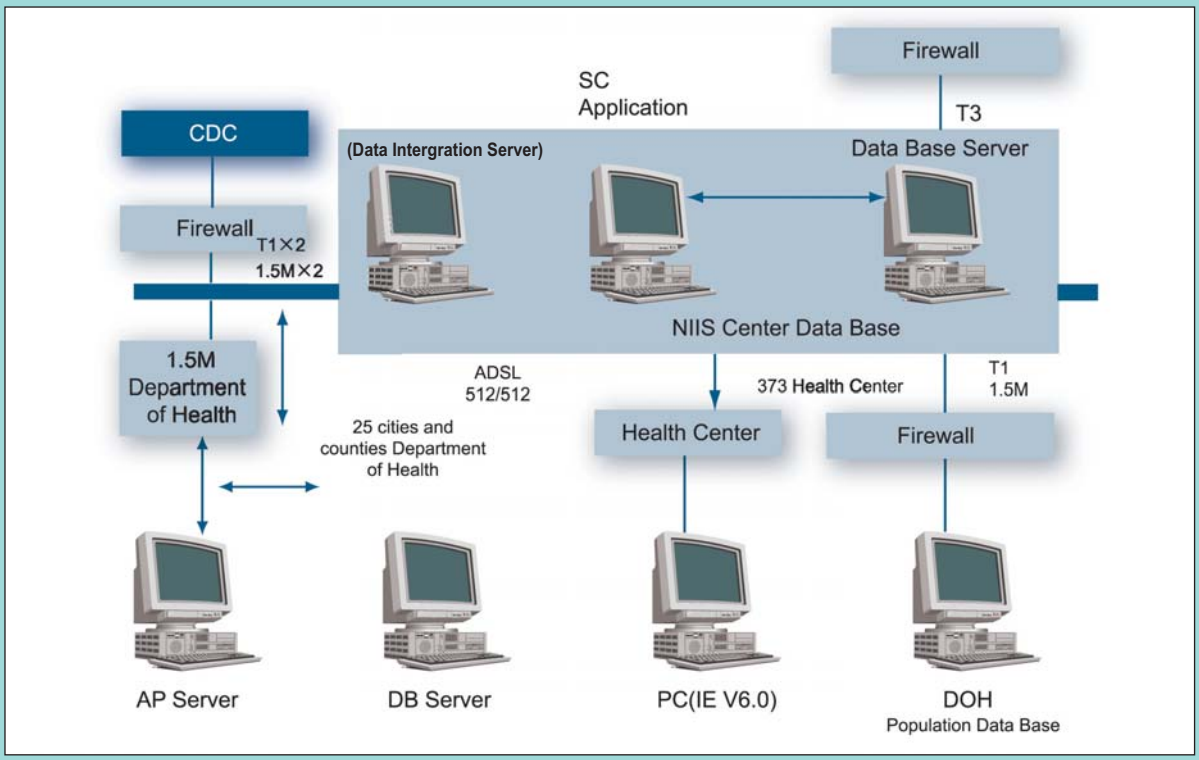
National Immunization Information System(NIIS)

Background

With the fast changing and the popularizing of medical resources in the recent decades, the medical services of health centers have been minimized; however, the vaccination program has been highly valued. As a result, vaccination program needs to be computerized in order to increase its efficiency. Hence, when the computer had been developed, it was expected to take over manual operation to effectively administer the data management. Department of Health started to facilitate the computerized operation since 1993. The DOS version PHIS System is used to guide health centers with building and installing of 3 main systems: outpatient consultation service, immunization care and administration management. New operation system needs to be created continually. On the other hand, information science and Internet technology are developing very fast. Especially for the development of Internet and the technology of data base have led the developing directions and ways of various application systems; as a result, DOS version PHIS System is gradually out of date.

Considering the convenience for people to maintain the health data and the freedom of migration, and the vaccination is an essential requirement as well, CDC anticipates that with the well-developed Internet, IT technology, development and the building of National Immunization Information System, also known as NIIS in every Health bureaus and medical centers to integrate the data base of the health administration units, contracted medical centers

Figure 1 NIIS Operation Procedure



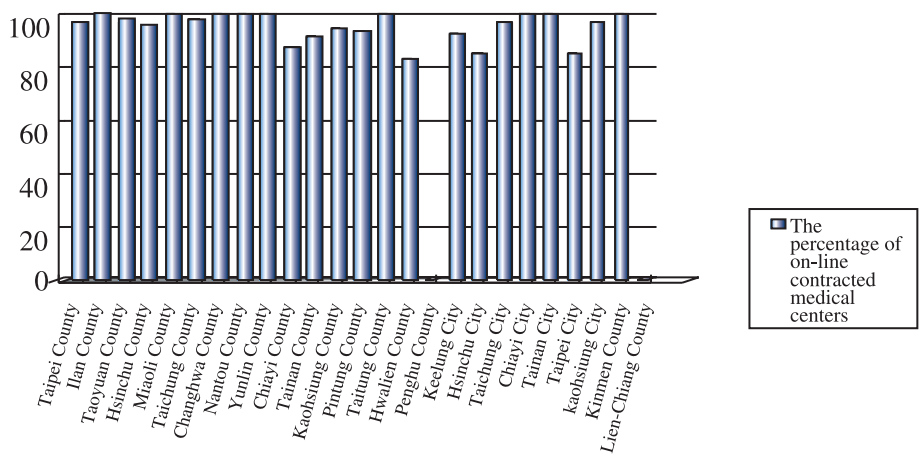


Figure.2 The percentage of on-line contracted medical centers

and Household Registration Offices in order to advance the accuracy of vaccinations information and ease the work load of the health center personnel, shown as Figure 1.

Goals and Strategies

1. Health Bureaus of every city and county will be in charge of promoting Internet connection with contracted medical centers in order to reach the goals of 94% connection rate and above.

2. Use Internet service to download the changes in Household Registration Office of Ministry of Interior and load the information with NIIS and transfer the information to health centers. Therefore, health centers will have complete changed household registration information such as newborns, move-ins, move-outs and death. Also use this mechanism to integrate vaccination information at local health centers to minimize the cost of manual inputting, document keeping, mail sending and transfer to be more cost effective.

Accomplishments

1. Up until February 15, 2003, the percentage of on-line contracted medical centers is up to 94.8%, shown as Figure 2.

2. There are 374 health centers that have applied the system to send paperless vaccination information to registered health centers and Yellow Slips have already been terminated to cut down the costs of manual operation, mailing and man power.

Visions

When NIIS has been thoroughly implemented in Taiwan and connected through Internet with Household Registration Offices and medical and health centers to cut down the work load of health department personnel, the effectiveness can be seen right away. Also, health centers can start working on management for irregularity and increase efficiency of vaccination, dispatching of vaccines, the safe usages of vaccines, effectiveness of services and faith of general public to the government. It can also be used to track the evaluation of vaccination, trail and get sample of undesired vaccination reaction notifications and monitoring vaccines for prevention of diseases.

Hepatitis Immunization Program

Background

Chronic hepatitis, cirrhosis and liver cancer have been the major causes of death in Taiwan for a long time. 95% of chronic hepatitis, cirrhosis and liver cancer have been the sequelae of infection of hepatitis viruses in Taiwan and among there is approximately 80% was infected by hepatitis B. Therefore, prevention of hepatitis B has become a very important public health issue in Taiwan. During 1982 to 2002, the five-year-plan for Hepatitis Control Program has gone through the first, second, third and fourth stage. The results of the four stages have been most supremacy, which including HBsAg carrier rate for children aged of 6 years have been lowered to 1.7% in 1993 from 10.5% before hepatitis B vaccination. Also for carrier rate of children 15 years of age in Taipei has been dropped to 0.7% in 2000. After hepatitis B vaccination program, the incidence rate of liver cancer for children between the age of 6 to 9 was declined to 0.13 out of 100,000 populations to 0.52 before hepatitis B vaccination. The confirmed cases of acute viral hepatitis A in mountain regions have been diminished to zero confirmed cases in 2003 from 183 cases in 1995 and the incidence rate was lowered from 90.74 out of 100,000 populations in 1995 to zero in 2003, please refer to Figure 11. The five-year-plan of Hepatitis Control Program started in 2003 and will last until the end of 2007, not only has raised the immunization coverage rate, but also provided general public with convenient services of screening test and vaccination. In addition, it is very important to bridge the academic institutions and health organizations in order to strengthen the diagnosis and treatments of hepatic sequelae infected HBV.

Goals and Strategies

Goals and strategies are mainly included to raise the immunization coverage rate of hepatitis B to 93% and above, to increase the free prenatal women screen rate for hepatitis B up to 90% and above, to promote immunization coverage rate for hepatitis A for 2 year -old babies in the mountain regions up to 80% and above, strengthen the quality control of hepatitis diagnosis and make the accurate of hepatitis diagnosis up to 90% and above.

Accomplishments:

1. Immunization: Combine the effects of departments of health, and over a thousand hospitals and clinics to put in a service network of free hepatitis B vaccination for newborns. The carrier rate of hepatitis B for children under the age of 6 has been reduced from 10% to 1.7% after hepatitis B vaccination has been listed under the standardized vaccination lists in 1986. Also the survey has showed that the incidence rate of liver cancer for children between the age of 6 to 14 has dropped from 0.7 every 100,000 children (during 1981 to 1986) to 0.57 (1986 to 1990). And the incidence rate has dropped even lower to 0.36 between 1990 and 1994. Starting from June 1995, 15-month-old babies in the mountain region will be given free vaccination of hepatitis A; as a result, hepatitis A has been reasonably controlled in Taiwan. There were only 3 confirmed cases of hepatitis A in mountain regions during 1999 to 2003. Furthermore,

there was no hepatitis A confirmed case in 2003. It has visibly lowered down from 219 cases before the immunization.

2. Health Education: Educate the general public through the publicized printouts and electronic broadcasting medium. Design different types of publicized and educational methods for different target general public to reinforce knowledge and prevention of hepatitis.

3. The Examination Quality Control of Hepatitis Diagnosis: Supervise and monitor the quality control of hepatitis Examinationdiagnosis in order to keep the average miss error value diagnosis of HBsAg below 5%.

4. Study and Research of Hepatitis: Proceed with the study of prevention of all types of hepatitis to understand related problems with the incident situation, infected residual defects, mechanisms, and treatments as well as provide the study result as references for hepatitis prevention measurement.

5. Promotion of Enforcing Hepatitis B and C Trial Treatment Program of Bureau of National Health Insurance: There are approximately 2.5 million of carriers of hepatitis B and 300,000 of hepatitis C. In order to give treatment to the infected population, and lower the incidence rate of cirrhosis and liver cancer, Bureau of National Health Insurance has put into 1 to 2 billion NT dollars to promote Enforcing Hepatitis B and C Trial Treatment Program of Bureau of National Health Insurance which is also the first time anywhere in the world has provided such plan for patients of hepatitis B、C with free medication treatment. Up until June of 2004, the program has already treated 5,920 and 3,353 of hepatitis B and C patients respectively.

Future Goals:

Promote public awareness about hepatitis risk factors, increase the immunization coverage rate and strengthen the study on diagnosis and treatment for hepatitis to further reduce the incidence rate and mortality rate of all kinds of hepatitis.

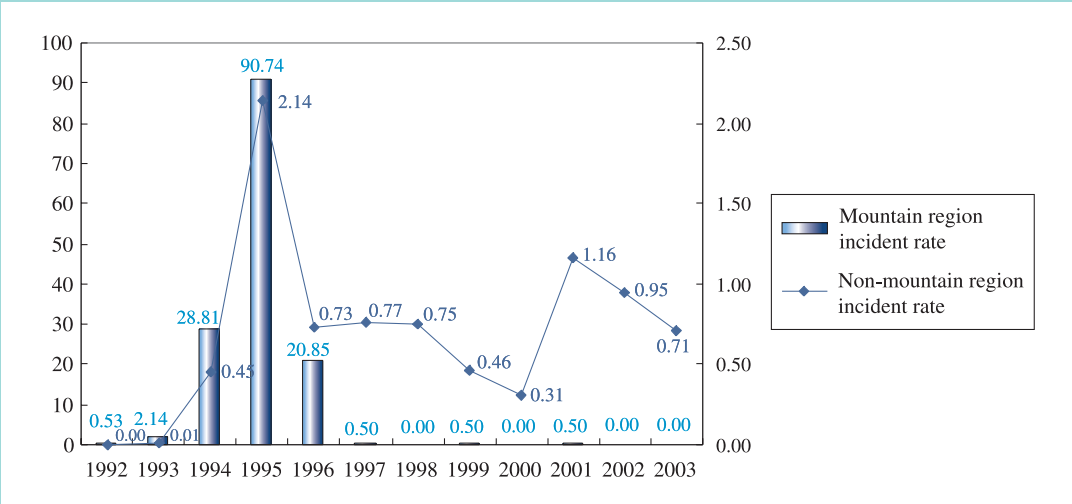


Figure.1 Incidence Rate of Acute Viral Hepatitis A among Mountain and Non-Mountainous Region, 1992 - 2003

Eradication Program of Polio, Measles, Congenital Rubella Syndrome and Neonatal Tetanus

Background

During January 1991 to December 2001, the five-year-plan for eradication polio, measles, congenital rubella syndrome and neonatal tetanus has gone through the first and the second stages in Taiwan. The result of the program has been most significant. The eradication of polio has been accomplished on October 29, 2000 prior to the targeted date, 2001. The third stage of the five-year-plan for eradicating polio, measles, congenital syndrome and neonatal tetanus has begun in 2002, which will last till the end of 2006. The program is implemented in cooperation with WHO to stop the transmission of wild-type poliovirus by 2002 and subsequently eradicate the disease globally in 2005, stopping the use of oral polio vaccine and eliminating vaccine preventable diseases such as measles, neonatal tetanus and congenital rubella are to be accomplished during 2005 to 2010.

Goal and Strategies

1.Maintaining the high immunization coverage rate of polio vaccine and AFP surveillance system will be reinforced in order to eliminate importation of the disease.

2.Strengthening the eradication of measles.

3.The related research for eradication of neonatal tetanus to ensure the result of elimination in Taiwan.

4.Promoting the high immunization coverage rate for all kinds of vaccination up to be 95% and above.

5.Continuing the promotion of improvement of communicable disease notification and NIIS to make the administration of the plan easier.

Accomplishments：

1.Polio eradication program evaluation: Dealing with the abnormal cases of VDPV immunization, survey 1,684 laboratories and ask the six laboratories that own potential viruses to destroy related biomaterial. Hold Polio Eradication Certification Committee and publish documents to be approved by WHO.

2.Increasing of Immunization Coverage Rate: Integrating, statistics and monitoring the statements of the usage of vaccines in every city and county. Monitoring and guiding departments of health in every city and county and tracking, visiting, re-immunizing and educating those who haven't complete immunization to raise the immunization coverage rate. Handling the checking of Vaccination Record Cards for pre-school children and grade one students and re-immunization. There are 99.62% of grade one students holding the Vaccination Record cards and the immunization coverage rate for them, except measles is over 95%. Also strengthen the management for the vaccination of foreign and Chinese spouses. Starting 2002, foreign and Chinese spouses need to be tested positive for the rubella antibody screening or provide prove of immunization of rubella. Foreign and Chinese female of breeding age of 15 to 49 will be immunized for MMR for free when

the rubella antibody screening is negative or no prove of rubella immunization provided.

3.Rising the affectivity of Immunization: Purchase, distribute, cold transport and store of Polio, Measles, Congenital Rubella Syndrome and Neonatal Tetanus. In order to ensure the quality of the vaccines, survey of immunization services of 25 cities and counties will be done proactively. Also supervise and examine the cold storage, monitor, immunization and management of Departments of Health, health centers and medical centers. Follow through and keep track of any misconduct for improvement. In addition, raise the professional knowledge of immunization for personnel of immunized organizations. Furthermore, every city and county will hold training for cold transportation, storage management and immunization periodically.

4.Strengthen Monitoring System: There were 59 notified cases of measles totally in 2003, and 57 cases'specimen had been checked, the specimen-checking rate was 97%. 52 cases of rubella was reported and 45 cases' specimen were taken, the rate was 87% and the Acute Flaccid Paralysis was reported to be 73 cases and 71 cases of at least one specimen was taken, the rate was 97%. Even though, all notification cases have been investigated; there is no notification for Congenital Rubella Syndrome and Neonatal Tetanus.

5.Publicizing Health Education:Create teaching and publicizing materials, also provide infant immunization education pamphlets in English, Thai, Indonesian and Viennese languages for the publicity of immunization activities.

6.Related Research: Conduct survey of MMR immunization for age 50 and under for serum epidemiology, study about the cell-mediated immunity and protective coverage after immunization of MMR, study and set up of laboratory of polio testing and verification, Oral Poliovirus Vaccine test for congenital immunity deficiency in Taiwan.

7.Setting up of NIIS(National Immunization Information System) : Complete the development of Automatic Voice Vaccination Reminder System for health centers, set up of NIIS throughout the island and promote for all contracted hospitals to be connected with NIIS.

8.Related Training Seminars: Subsidize every city and county for immunization training programs and hold the following trainings; seminars for foreign and Chinese spouses, survey and prevention measure for eradication of Polio, Measles, Congenital Rubella Syndrome and Neonatal Tetanus, supervise individual cases of notification of communicable diseases, handle immunization checking, re-immunizing seminars and rap sessions for pre-school children and grade one students.

Future Goals:

No more indigenous case of polio, neonatal tetanus, congenital rubella syndrome and measles in Taiwan by 2006.

[International Cooperation to Combat Communicable Diseases]

International Cooperation to Combat Communicable Diseases

International Cooperation to Combat Infectious Diseases

Background

Today's world provides a series of disturbed elements to continued good health. Global village also accelerates the spread and transmission of infectious diseases. To establish a responsive worldwide disease prevention network is necessary. It is great to see that the world leading health organization, World Health Organization (WHO), exactly plays this role by connecting countries together with technical or other resources support. In addition, one of international communities' responsibilities is to provide the needed countries adequate disease prevention resources to completely eliminate disease outbreak that might threaten human health and economy development.

In 1972, Taiwan was excluded from the WHO due to political reasons. However, while the outbreak of Severe Acute Respiratory Syndrome (SARS) impacted Asia-Pacific nations, Taiwan took the initiative and promptly reported its epidemic situation to the WHO. Through constantly hard working and communication, Taiwan eventually received the answers from WHO. It was the first time that WHO dispatched related officers and experts to Taiwan in thirty years. Subsequently, there were many international partners came to support and assist us in controlling emerging disease. This is a giant breakthrough of Taiwan and we insisted that building strong partnerships around the world is crucial to improve the global health.

In the future, we still face the threat of new diseases in every minute. In order to improve global health, CDC plays a critical role to strength international relationship by actively participating international disease prevention programs, build a close contact channel and collaboration with international partners.

At the same time, CDC has been developing infectious disease control and prevention collaboration models in the Asia-Pacific region by participating in the APEC activities.

Objectives

Actively and vigorously participating international health programs, strengthen bilateral and multilateral relationship in an attempt to promote Taiwan's efforts on disease



control and prevention. Develop and sustain vital relationship with allied Asian, European and American countries.

Accomplishment

Host international symposiums and activities

In response to the global spread of emerging and re-emerging diseases, Taiwan actively held international conferences to fulfill our role in maintaining global health. For instance, Taiwan was the first one to host an international symposium on the epidemic of SARS on April 20 to 21, held 2003 International Public Health Workshop on October 7 to 14, after that, on October 29 to 30, we held International Conference on Influenza and the Resurgence of Severe Acute Respiratory Syndrome (SARS), 2003 Symposium on APEC Networks of Pharmaceutical Regulatory Science, Control of Dengue Outbreaks regional Cooperation Project and AIDS International Conference were held on November and December of 2003.

Participating in international conferences and workshop programs

In order to research the global infectious diseases prevention resources, CDC vigorously participated in international conferences and workshop programs. For instance, during the outbreak of SARS, CDC dispatched related officers to visit Hong Kong, Singapore, Vietnam, Europe and Japan to study the epidemic and seek the contingency strategies in controlling of SARS. Moreover, Taiwan was also invited in the "WHO Global Conference on Severe Acute Respiratory Syndrome (SARS): Where Do We Go from Here?" as well as "APEC Special SOM Meeting and Health Minister Meeting" on Bangkok. We also keenly involved in infectious diseases prevention projects, including attending conference of American Health Policy, SMDP 2003 Management for International Public Health, 2nd Southeast Asia and West Pacific Areas TEPHINET Conference and Options for the Control of Influenza V.

Providing international healthcare assistance

To provide public health assistance to allies aids such as, aids to the Care France for the AIDS of Chad, AIDS assistant programs and donated medical materials to Vietnam, a malaria control project in Sao Tome& Principe and so on.

Promoting bilateral and multilateral cooperation

1.Training and education programs

Training and education programs have been developed around the US CDC and medical institute, Belgium ITM, London School of

Hygiene and Tropical Medicine, Leiden Medical Center University in Holland. Many specialty staffs of CDC Taiwan were trained in the fields of laboratory diagnosis and epidemiology of vector-borne diseases.

2. Taiwan International Public Health Workshop

Taiwan CDC organized "2003 Taiwan International Public Health Workshop" and invited 40 participants from Asia Pacific, Latin America and Africa to share with their health care systems, infectious diseases and primary health care as well as the situation and experience of public health in Taiwan.

3. Asia Pacific Economic Cooperation (APEC)

Since 1995, when the importance of fighting emerging infectious disease was addressed in the APEC meeting of ministers of science and technology, Taiwan has been participating in activities of APEC Industry Science Technology Working Group. In 2003, the outbreak of SARS caused the severe impacts on people's health, economy and human societies, as well as worry about the recurrence of SARS, Taiwan was invited to "APEC Special SOM meeting and Health Minister Meeting". A group of government officials led by Minister Chien-Jen Chen attended the meeting and made two concrete suggestions during the meeting that respectively were: Creating APEC Health Working Group or taskforce 2. Setting up disease outbreak alert hot-line system for Health Ministers. This is the first APEC Health ministerial Meeting since APEC was established in 1991.The APEC Health Taskforce was agreed by the end of 2003 at APEC Senior Official Meeting.

4. "Memorandum of Understanding" was signed with National Institute of Infectious Disease, Japan.

5. During the SARS outbreaks, the first time for WHO officials to Taiwan in 31 years. Taiwan was invited to participate in WHO sponsors conference, videoconference and teleconference.

6. To get the updated information efficiently and correctly to access the strategy of infectious control, two major SARS projects are cooperated with international partners, such as the countries of European Union, China, Vietnam, Hong Kong and Singapore, etc.

Future Prospects

With the frequently international exchange and transportation, the issue of global cooperation becomes more important than ever. CDC will do its best to strengthen cooperation with other countries as well as with other international healthcare agencies. Based on



some achieved programs of training and education, international cooperation on infectious disease prevention will continually focus on setting up a globally defense network. In addition, training experts in international public health, infectious disease prevention, tropical medicine and fully involved in international communicable disease prevention project will also be the next target of development. The detailed future prospects are listed as follow:

To continue constructing the collaboration platform and channel with international healthcare organizations

1. To work with international healthcare organizations such as APEC and health authorities in various countries in order to set up the defense network.
2. Actively participate in international conferences in order to build up a health network and share the experiences on disease control and prevention.

To train experts in international public health, infectious disease prevention and tropical medicine

1. To train experts in tropical medicine in terms of clinical diagnosis, infectious disease investigation, vector and its natural habitat, laboratory techniques, and practical control formulation.
2. To set up a tropical medicine consultation team through recruiting both domestic and international tropical medicine experts and organizations in an attempt to improve the quality of tropical medicine related service.
3. To reinforce public health related personnel training at various medical schools, public health schools, Department of Health, Ministry of Foreign Affairs, Ministry of National Defense, International Cooperation and Development Fund.
4. Additional public health practice related classes should be opened at various graduate schools.

Getting involved in international communicable disease prevention projects

To organize academic conferences with nearby countries like Japan, Malaysia, Singapore, Thailand… etc.

1. Domestic and international expert will be invited to attend the aforementioned conferences.
2. To lend our helping hand to other country when there is an outbreak in that area.
3. To assist medically laid back countries by carrying out communicable disease prevention collaboration plan

[Research and Development]

8

Manufacturing of Serum and Vaccines
Laboratory Research and Development
Post 2003 SARS Outbreaks Bio-Safty Issues Concerning
Laboratories in Taiwan

Manufacturing of Serum and Vaccines

Background：

The Vaccine Center has fifty years of experience in producing biological products. It is the first government supported pharmaceutical factory that complies the GMP authority in Taiwan. The center follows the current Good Manufacturing Practice (c-GMP) guidelines to ensure the quality of the biological products. It continuously supplies about ten biological agents, including BCG, tetanus toxoid, adsorbed diphtheria and tetanus toxoid, adult absorbed tetanus and diphtheria toxoid (adult use), cholera vaccines and anti-snake venoms biological products to partially fulfill the demand of communicable disease control in Taiwan.

Strategy:

Two strategies executed at the Vaccine Center namely are: 1. Stably manufacture and supply biological products. 2. Focus on the research and development of vaccines against indigenous and specific regional diseases.

Accomplishments

1. 582,300doses Frozen dried of BCG, 27,588 doses of cholera vaccine, 237,480 doses of adsorbed tetanus and diphtheria toxoid (TD) (adult use), 52,716 doses of adsorbed diphtheria and tetanus toxoid (DT), 863,600 doses of alum precipitated tetanus toxoid (TX),1,550 doses of lyophilized bivalent antivenin of Tr. mucrosquamatus and Tr. gramineus, 2735 doses of Antivenin of A. acutus (Lyophilized),2904 doses of Antivenin of B. multcincutus and N. naja atra (Lyophilized), 7,189 doses of 20ml diluents and 337 doses of 10ml diluents were manufactured in the center.
2. Inspection on 38 lots of finished biological agents, 11 lots of bulks, 111 lots of ingredients, and 77 lots of materials were conducted.
3. The second phase of cGMP validation program for BCG vaccines had passed the Bureau of Food and Drug Analysis assessment.
4. Accomplished the program of "Evaluation of Clinical Responses to Undiluted and Diluted Smallpox Vaccines". It shows that frozen dried over 20 years smallpox vaccine are still active and safe. After examined by update bifurcated needles and human clinic test, the safety storage amount of smallpox vaccine could be expanded to 28 million doses from recently 700,000 doses.
5. Completed "The Assessment of BCG Vaccine Viability Project". The result of vaccine freeze surveillance and examination could be the criterion for national wide regions to enhance the vaccination quality and to reach the effectual demand.
6. 「The patients who are recovered form SARS Serum Distribute Flowchart」was implemented."The patients who are recovered form SARS Serum produce and prepare proposal" was presented and accessed by the Department of Health; "The patients who are recovered form SARS Serum Centrifugation Procurement" was

completed and "The patients who are recovered form SARS Serum Produce and Prepare Contract" was signed with Chinese Blood Services Foundation.

7. Completed the "Probable SARS cases specimen collection regulations", 677 probable cases were re-screened and serum sample tracing for 543 cases, total specimen taken was reached to 100¢M.

8. Under the authorization of Executive Yuan, the planning and responsibility to set up the biological pilot plant has been transferred to National Health Research Institute.

9. The development cooperation program of enterovirus 71 Vaccine with Kuo-Kwang Biotechnology Company will be devolved to National Health Research Institute.

10. Established the scale-up 20L production and purification methods of enterovirus 71 as well as Cell Bank and virus seed stocks. Furthermore, 100 units of Vero cell master bank°Bworking bank and virus bank for each and passed the mycoplasma cultivation test; virus standard was established by size-exclusion chromatography and concentration of virus standard is 1mg/mL; anti-VP1 polyclonal antibody was completed and the result of utilized in ELISA (enzyme-link immunosorbant assay is processing.

11. Utilize detoxified cobra venom immuned duck to product IgY cobra Antivenin and develope the technique of extraction and purification of IgY antibody. The animal test shows that the protecting consequence of 30mg/ml/IgY antibody is equal to 60MLD horse serum, and the high titer antibody in duck egg can last three months.

12. The clinical test and application, inspection & registration of antivenin of Vipera Russelli Lyophilized:

The Department of Health has agreed that the new medicine inspect and registration has to follow the regulations of rare disease medicine and prevention. There were 8 new Vipera Russelli Lyophilized-bite cases; the recovery rate can reach to 100%. In the end of 2003, there are 26 clinical test cases in total. The vaccine center is processing the production of a new serum agents and related validate procedures. Moreover, the correlative process validation and the

stability-testing program are also undergoing.

13. About the safety testing of new developed Japanese Encephalitis, the Vaccine Center has completed 5 inspections of working cell bank and end of production cell bank; 20 inspections of master virus seed stock and working virus seed stock; 6 inspections of bulk harvest testing, final purified bulk virus product testing and final clinical product testing.

14. The technique authorized professional training of three biological agents(BCG, Td, DT), completed the produce and technique training courses of tetanus toxoid on Feb 11 to April 19, completed the produce and technique training courses of diphtheria toxoid on May 26-28.

Future Prospects :

1. The Vaccine Center will set up the risk management mechanism during the process of vaccine manufacturing and validated production to meet the criterion of cGMP.
2. The center will construct a national pilot plant to meet cGMP/GLP/ FDA requirement and provide scale-up technology service or facilities to academic and private industry
3. The center will effectively integrate the research result and resources of industry, government and academics, to set up a cross

platform and vertical cooperation model; then to consolidate the technique development and application of mass production; and gradually shift its production technology to the grassroots manufactures.

4. The Vaccine Center will provide three technology platforms to meet the goal of producing the notifiable communicable disease vaccines: (1) The "State of Art " of antiserum manufacturing processes (2) Biologics product characterization and evaluation (3) GMP validated production facilities.
5. The Vaccine Center will play a leading role in the local and specific biological product development.
6. The Vaccine Center intends to set up the Asia- Pacific Antivenom Serum Development Center.

Laboratory Research and Development

Foreword

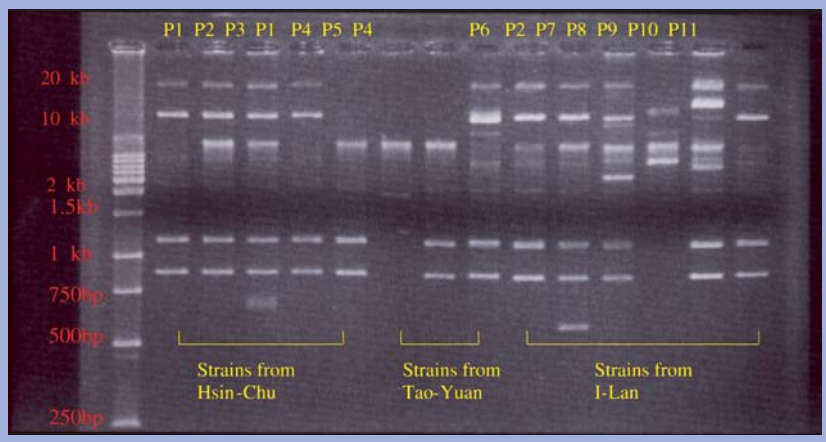
The primary objective of the division is to efficiently locate the pathogen of a disease and to understand the pathogen in order to help control the spread of the disease. Therefore, the main role of the division is to carry out regular inspection and various pathogen researches. The division incessantly develops or introduces new laboratory technology to study pathogens in order to remain technologically current in laboratory proficiency. In addition, laboratory control is required to maintain its proficiency, so the division is also devoted to laboratory control. The division is divided into six laboratories, namely bacteria, viruses, arbovirus and rickettsia, mycobacteria, fungi and parasites. The focuses and accomplishments of the division in 2003 are listed as followed:

2003 Focuses:

Respiratory and Enteric Bacteria Laboratory:

1. To complete the surveillance examination of plague-related laboratory.
2. To help carry out the bacillic dysentery in the mountain areas prevention plan.
3. To examine and keep track of cases of intestinal-bacteria-related disease resulted from immigration.
4. Conducting analyses of pathogen and molecular epidemiology in an attempt to understand the relatedness among various pathogens.
5. Conducting primary research on antibiotic resistance and gene level of pathogens in order to study the antibiotic resistance mechanism.
6. To provide islands such as Kinmen and Matzu with technical support on inspection of the aquatic products in the market, ensuring the food safety there.
7. To inspect and keep track of the etiology of mass food poisoning in an attempt to discriminate the difference between food poisoning and infectious diseases.

Pulse field gel electrophoresis of Shigella dysentery



8. To set up a tuberculosis reference laboratory.

9. Completed a PFGE molecular pattern determination for N.meningitidis , S.pyogenes and B.pertussis, which were collected in recent years till 2003.

10. Improved the culture methods to result in the findings of 20 strains of human clinical legionelosis cases.

11. Accomplished the EM photographing of SARS-CoV sampled from the first Taiwanese patient.

Respiratory, Enteric and Emerging Viruses Laboratory:

1. To carry out regular enterovirus inspection, including testing specimens from Acute Flaccid Paralysis (AFP) patients and those who have come into contact with enterovirus. A variety of testing, including isolation of viruses and typing of the isolates and enterovirus neutralization antibody test, is done.

2. The "Laboratory System for Inspection and Verification of Polio Virus" for long- term virus surveillance is under construction.

3. The laboratory took the laboratory proficiency testing for enterovirus organized by Victorian Infectious Disease Reference Laboratory, World Health Organization Western Pacific Region, and scored a full mark.

4. A rapid serological diagnosis of enterovirus 71 infections by application of IgM ELISA was developed. The application has so far significantly shortened the examination time of EV71 infection diagnosis and improved effectiveness of our routine.

5. Strengthen CDC's capacity to serve as the national reference laboratory for diagnosis of infectious diseases and promote the development and production of diagnostic and reference reagents for use by public health laboratories.

6. Rapid and quantitative diagnosis of coronavirus associated with severe acute respiratory syndrome in Taiwan.

7. Constructed multiplex real time RT-PCR to differentiate SARS virus and influenza virus from clinical materials.

8. Surveillance the activity of human influenza viruses in Taiwan, including virus subtyping results and antigenic changes detection.

9. Report the isolates to WHO influenza reference laboratories for global vaccine determination.

10. Set up real time PCR methods for other respiratory viruses, including adenovirus, RSV, HSV, avian influenza H5 and H7 subtypes, to monitor human infection and person-to-person transmission.

Arbovirus and Rickettsia Laboratory:

1. To carry out routine diagnoses, including dengue, Japanese encephalitis, yellow fever, hantavirus, scrub typhus, typhus fever, and Q fever.

2. To develop a rapid diagnostic system based on modern serological and molecular methods, including various forms of ELISA and real-time PCR.

3. To apply the rapid diagnostic system to the fever screening program at the airports for early identification of imported dengue cases.

4. To study serological and molecular

epidemiology of dengue, Japanese encephalitis and hantavirus infections.

5. The laboratory helped to organize the "2003 APEC Control of Dengue Outbreaks: Regional Cooperation Workshop".

Parasites Laboratory:

1. The laboratory have constructed a molecular diagnostic system for the enteric amebiasis examination. The system has been established and applied to the confirmation of pathogenic amebiasis; it facilitates case reporting and alien worker health examination.. This new set-up would eliminate approximately more than 90% of non-pathogenic cases, thus reducing unnecessary spending on medication, disease control measure and repatriation of alien workers to a minimum.
2. The laboratory initiated the molecular epidemiology project of amebic infection for the high risk group, such as institutional psychiatric patients.
3. To construct a molecular surveillance system for malaria to assist microscope examination in case finding and mixed infection detection.
4. The laboratory organized two enteric amebiasis and two malaria laboratory training short courses for lab workers from the branch offices of CDC Taiwan and local health departments.
5. The laboratory got full marks on the CPA tests, "Parasitology Survey" and the "Blood Parasite Survey".

Mycopathogen, Chlamydia and Mycoplasma laboratory:

1. To set up rapid molecular diagnoses of pathogenic fungi, including PCR, PCR-EIA, and real-time PCR.
2. To apply typing techniques such as PFGE (pulse field gel electrophoresis), REAG (restriction endonuclease analysis of genomic DNA), Rep-PCR techniques for the study of molecular epidemiology and genotype diversity of pathogenic fungi in Taiwan.
3. To develop diagnostic methods for Chlamydia pneumoniae, which includes MIF, IFA, ELISA and real-time PCR.
4. To develop diagnostic methods for Mycoplasma pneumoniae, which includes ELISA and real-time PCR.
5. The laboratory organized the "2003 Symposium of Medical Mycology".

Reference laboratory of Mycobacteriology

Vitek 2 automatic yeast identification system

PFGE machines for analysis of fungal DNA fingerprints

1.Diagnosis and identification

- Establish BSL-3 laboratory
- Standardize conventional and molecular diagnosis methods (PCR, real-time PCR, PCR-RFLP etc.)

2.Outbreak and pseudo-outbreak investigation

- Including school, hospital, long-term care facilities, etc.

3.Molecular epidemiological studies

- Surveillance of Beijing strain
- Transmission in aboriginal villages
- Surveillance of multiple-drug resistance Mycobacterium tuberculosis strains

4.Genomic database

- Molecular genotyping of mycobacteria (RFLP, spoligotyping, VNTR-MIRU)
- Sequence analysis of nontuberculous mycobacteria
- Establish mycobacteria strain bank

5.Training and education

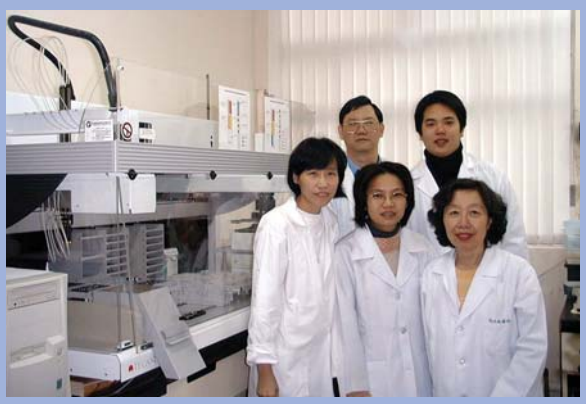
Zoonosis Laboratory:

1. To construct an alternative, cultivation-independent diagnosis system for infectious pathogens.
2. To carry out regular Lyme disease, Leptospirosis, Cat screech disease, Brucellosis and Toxoplasmosis inspection, including testing specimens from those who have come into contact with these diseases.
3. To set up a zoonosis reference laboratory.

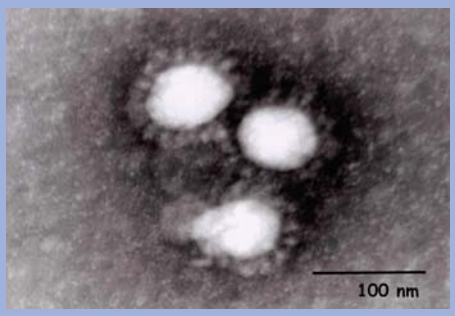
2003 Major Accomplishments:

1. Development of a rapid diagnostic system for flavivirus infection:

A rapid diagnostic system for the detection and differentiation of various flavivirus was developed. For serological diagnosis, various forms of ELISA were applied that can be easily and reliably used to differentiate: (1) Japanese Encephalitis and dengue virus infections, (2) Japanese Encephalitis vaccination and infection, (3) primary vs. secondary dengue virus infection, and (4) dengue virus serotyping. For molecular diagnosis, an automated real time one-step RT-PCR system was developed. Based on the combined analyses of real time one-step RT-PCR and E/M-specific capture IgM and IgG ELISA, the rapid diagnostic system can be used to detect and differentiate various flavivirus infection within 24-48 hours. Study from a total of 959 acute- and convalescent-phase sera from 799 confirmed dengue patients showed that 95% of them could be identified as confirmed or probable cases by acute phase sera based on


Vitek 2 automatic yeast identification system


PFGE machines for analysis of fungal DNA fingerprints



EM picture of SARS-CoV


PFGE machines for analysis of fungal DNA fingerprints

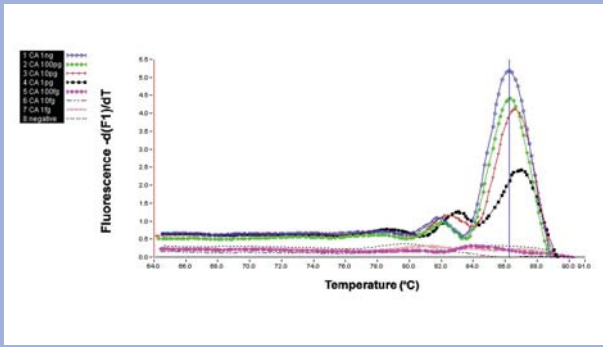
these two assays.

2.To assist in the construction of the genetic database of pathogens:

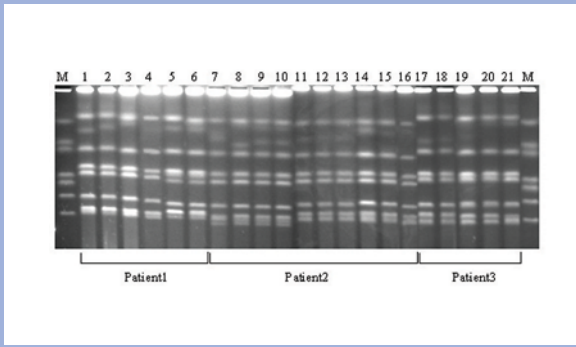
On the perspective of the respiratory virus disease, the Center for Disease Control (CDC) reinforced the existing influenza surveillance system and helped in the construction of the genetic database of pathogens. The CDC conducted the genomic sequencing of the H and N fragments from the collected and isolated influenza viruses from designated clinics. On the other hand, there are cases of animal influenza once in a while; therefore the CDC has constructed an animal influenza detection surveillance system and a real-time PCR inspection in order to locate the pathogen more accurately and more promptly. Moreover, the CDC has set up a real-time PCR detection system in response to the H5 and H7 influenza viruses that are currently active among poultry in Hong Kong and Europe. Therefore, the CDC will be able to locate and confirm the pathogen readily and precisely when there are mutated strains of influenza virus and to provide reference information for disease control. The CDC has sent about 40 local isolated influenza strains to the reference laboratories of the WHO and the US CDC for confirmation of types and to provide the WHO with the influenza virus activity in the Asian region as a reference for the global influenza vaccine strain choice.

3.SMYF (San-Ma Yi-Feng) Program continues:

The WHO is determined to eradicate measles after the polio eradication. America and various countries in Europe and the Mediterranean countries have all set a targeted polio eradication date in 2000, 2007 and 2010 respectively. The CDC has been actively promoting the SMYF program in Taiwan since July 1991. The number of measles cases has been decreasing and it is now controlled within ten cases. To keep up with the goal of measles eradication in America and Europe, we have to stop the transmission of endogenous measles and control the number of infection population. In addition, the laboratory has been participating assiduously in the measles eradication. The laboratory uses the traditional serological diagnosis for early detection and it has set up ways to conduct measles strains isolation and molecular biological sequencing in order to cooperate with the global measles virus molecular epidemiologic surveillance. There are 26 cases that are detected by the serological diagnosis this year. 15 cases are in Taichung while 9 cases out of the 15 are student. Three measles strains are isolated from the small infection population in Taichung. Two measles strains are isolated from urine while one from blood. After a



Real-time PCR detection of Candida albicans.



PFGE-karyotyping of Candida albicans clinical isolates.

comparison between 456 nucleotides at the measles NP protein COOH- end and the genetic sequencing of a typical measles strain posted by the WHO, the three isolated strains are H1 type and are very similar to the isolated strains in China.

4. Research on rapid diagnosis and epidemiology of fungal infections in Taiwan:

The aim of our research is to develop rapid diagnosis and molecular typing tools for rapid species identification and epidemiology surveillance of clinically important fungi in Taiwan. In 2003, we have devised a real-time rapid identification system and a PCR-EIA assay for species identification of the seven clinically most frequently encountered fungal species, namely Candida albicans, Candida glabrata, Candida krusei, Candida parapsilosis, Candida tropicalis, Candida guilliermondii and Cryptococcus neoformans. The identification results of both PCR-EIA and real-time PCR matched biochemical identification results. The real-time PCR assay offers a high sensitivity of 1pg/É›l. We have also developed various molecular typing methods such as PFGE-karyotyping, PFGE-SfiI, PFGE-BssHII and rep-PCR to delineate the clonal relatedness of clinical isolates from HIV-infected patients as well as isolates collected from 22 hospitals in Taiwan. These fingerprinting methods are able to trace long-term colonization of C. albicans in patients. We hope to gain a better understanding of the strain diversity and epidemiology of fungal pathogens in Taiwan.

5. Distribution of the Beijing Family Genotypes of Mycobacterium tuberculosis in Taiwan (J. Clinical Microbiology, revised)

To investigate the distribution of Beijing family genotypes of M. tuberculosis in Taiwan, 421M. tuberculosis complex clinical isolates were randomly collected from four geographic regions of Taiwan and were analyzed by spacer oligonucleotide typing (spoligotyping) in 2003. There were 113 resolved spoligotypes, among which 28 (24.8%) clusters were identified. One hundred eighty seven (44.4%) isolates were Beijing family genotypes and consisted of 172 (40.9%) Beijing genotype and 15 (3.6%) Beijing-like genotypes. A substantial proportion of tuberculosis patients were infected with Beijing family genotypes in the Northern (51.6%) and Eastern (46.2%) Taiwan, while 31.6% and 28.0% of tuberculosis isolates in the Central and Southern Taiwan, respectively, were Beijing family genotypes. The proportion of Beijing genotype isolates among younger age group (<24, 61.5%) patients was the highest, among middle age groups (45-54, 34.0%) the lowest, and among the elder population (>65, 46.8%) the second

highest. Multivariate analysis revealed that northern and eastern regions and age less than 24 year-old were associated with Beijing family genotype. The proportion of antituberculosis drug resistance among the Beijing family strains (46.4%) was higher than that of the non-Beijing strains (34.3%), mainly due to the proportion of Beijing genotype strains resistant to ethambutol and isoniazid were higher than that of the non-Beijing strains. The results implied that M. tuberculosis Beijing family genotypes have been dominant for several decades and also cause a significant proportion of the recent transmission of tuberculosis in Taiwan.

6. Genetic Polymorphisms of Multidrug-Resistant Mycobacterium tuberculosis Isolates in Taiwan (J. Clinical Microbiology, submitted)

To evaluate the genetic diversity, phyogenetic correlation and transmission dynamics of multidrug-resistant (MDR) tuberculosis in Taiwan, genomic sequence, IS6110 restriction fragment length polymorphism (RFLP), and spacer oligonucleotide typing (spoligotyping) were applied in this study. DNA sequencing was performed for 162 MDR and 40 susceptible Mycobacterium tuberculosis (M. tuberculosis) isolates to study various mutations of the rpoB gene associated with rifampin resistance. Of the 162 MDR isolates, 146 (90.1%) had mutations in an 81-bp region of the rpoB gene, while no mutation was found in those 40 susceptible strains. A total of 32 distinct changes were detected, including 30 single-nucleotide substitutions, one insertion, and one deletion. Of the 146 mutated MDR isolates, 134(91.8%) had a single mutation site: 80 strains (54.8%) carrying a mutated codon at position 531, 33 strains (22.6%) at position 526, and 14 strains (9.6%) at position 516. The changes in codons Ser531, His526 and Asp516 accounted for the majority (124/162, 76.5%, 3 strains have double mutations) of rifampin resistance. Secondary structure predictions of the most prevalent mutated codons (531, 526 and 516) did not reveal any significant alteration in conformation. There were eleven novel alleles recognized in this investigation. The study indicates that the development of MDR correlates well with the mutation of rpoB gene. In addition, genotyping results revealed that 60.5% of the studied MDR isolates belonged to Beijing family spoligotypes. The RFLP analysis revealed that the MDR strains were genetically diverse, suggesting that most of the MDR strains probably developed resistance independently.

7. Laboratory Investigation of A Nosocomial Outbreak of Tuberculosis in Taiwan

Nosocomial outbreak of tuberculosis is unusual and the contact investigation is usually difficult to confirm. This report depicts a molecular epidemiologic study of a possible tuberculosis outbreak in a district general hospital in Taiwan during the 2003-2004 SARS period. Of the 35 isolates of Mycobacterium tuberculosis (M. tuberculsis) collected, 9 from health care workers (HCWs) and 7 from patients were identified to be of the same strain by genotyping of IS6110 restriction fragment length polymorphism (RFLP), spacer oligonucleotide typing (spoligotyping) and variable number tandem repeat°Vminisatellite interspersed repetitive unit (VNTR-MIRU) methods. The clustered causative strain has a

19-band RFLP pattern and Beijing genotype. Sequence analyses of putative mutator genes (mut T2, mut T4 and ogt) also revealed W-Beijing family genotype. In addition, the rpoB gene analysis in conjunction with the drug susceptibility test demonstrated that the 16 clustered isolates were all drug susceptible strains. The remaining 19 isolates showed no genotypic evidences of transmission and epidemiological linkage. Besides, 2 nontuberculous mycobacteria (NTM) strains were isolated from 2 highly suspected index patients. The newly developed molecular methods therefore provide powerful tools for epidemiologic studies of nosocomial infection of tuberculosis.

8. SARS is a new human disease caused by a novel coronavirus.

Since identification of the culprit virus in late March 2003, a network has been established in Taiwan CDC and other medical centers to provided centralized laboratory diagnostic service for patients with suspected cases of SARS. The diagnostic method was based on real-time PCR system, operated either in ABI or Roche light cycler. Taiwan CDC not only standardizes the protocol but also provide the necessary primer sets and probes for the medical centers to run the diagnostic test for SARS.

Future Prospects:

1. To develop advanced fungal typing methods, which are simple, reproducible and digitally portable, and to gain access to the international typing data exchange network.
2. To apply the rapid fungal diagnosis techniques in clinical specimens and to promote the application of these methods in clinical settings.
3. To develop and set up the NPEV typing in order to determine the prevalent enterovirus type, making the enterovirus diagnosis system more efficient.
4. To construct a database of all the local pathogens and their genetic information.
5. To build a standardized laboratory of epidemic pathogen in an attempt to provide prompt tuberculosis surveillance and warning as well as formulating prevention methods based on massive outbreak of the disease and scientific proof.
6. To develop an advanced rapid pathogen examination and molecular typing method for long term surveillance on pathogen to study its pattern of outbreak and its antibiotic activity as well as to construct a pathogen reference laboratory and genetic database.
7. To set up an internationally recognized flavivirus research center. The final goal is to establish a dengue network with laboratory based surveillance system among all APEC member economies. A standardized information exchange system will be implemented to facilitate the communication of member economies in dengue surveillance, clinical and laboratory diagnoses, prevention, clinical treatment and control.
8. To set up a database center for research on infectious and parasitic diseases in Taiwan and for containing the parasitic pathogen genetic information.
9. To build up an international exchange and technology cooperation mechanism.

Post 2003 SARS Outbreaks Bio-safety Issues Concerning Laboratories in Taiwan

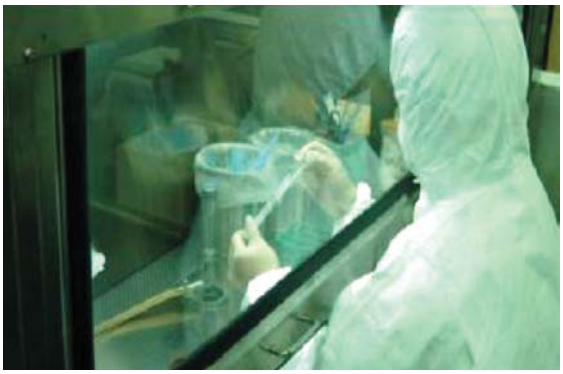
Upgrade the bio-safety level of SARS contract laboratories.

Funds have been diverted to the construction of nine BSL-3 laboratories and the upgrade of five existing BSL-2 laboratories.

Since a laboratory-acquired SARS case occurred in Singapore, CDC-Taiwan responded with several actions, including conducting a SARS virus inventory survey, keeping on daily temperature monitoring of all health workers and laboratory personnel as WHO recommended, compiling our own BSL-3 regulatory guidelines in Chinese version, and educating laboratory personnel about BSL-3 operations and the use of various bio-safety cabinets.

Inspect bio-safety in operations at BSL-3 and BSL-4 laboratories.

A senior research scientist in Taipei was confirmed to have acquired SARS in his own laboratory, and all BSL-3 and BSL-4 laboratories across the nation were shut down for fumigation. The aforesaid laboratories were only allowed to resume their routine functions after they had passed an evaluation procedure conducted by a CDC ad hoc task force, BIWG. WHO also dispatched their experts, Drs. Roth, Previsani, and Della-Porta, to Taiwan in Jan of 2004. Later, two experts from the USA, Dr. Thomas G. Ksiazek and Japan, Dr. Kazuyoshi Sugiyama were invited to join our taskforce to conduct its final certification and evaluation. Eventually, all laboratories were qualified, certified, and allowed to reopen after March 15, 2004.



Formulate regulations governing the management of pathogens

Due to the SARS outbreak, the Legislative Yuan passed an amendment to the "The Communicable Disease Control Act," which was formulated for the purposes of infection control and spread of communicable diseases. According to the revised version, CDC-Taiwan is designated as the lawful exclusive agency to supervise and regulate the overall management of pathogens, including their import, export, manipulation, holding, storage, and relocation. In addition to the general principle prescribed in the above-mentioned Act, implemental regulations governing bio-safety and bio-security issues are still in processing as well.

Project for Setting up a Database for Pathogen Genetic Information

Powerful tools of molecular genetics are often utilized in infectious disease research and control activities. Recent advances in nucleic acid sequencing and bioinformatics allow researchers to differentiate related strains of a virus, and deduce the relationships between

viruses isolated from different outbreaks or individual patients. With databases containing a large number of pathogen genetic information, nucleic acid sequences of pathogens from local outbreaks can be compared. Hence, the dissemination of viruses can be tracked both locally and globally.

Approach of implementation

Starting from 2003, according to the Communicable Disease Control Act, CDC has selected 15 notifiable communicable disease pathogens (see Table 1 below) and divided them into three priority groups. The first priority group consists of acute and serious diseases, the second group comprises chronicle diseases, and the third one covers other less common or less serious diseases. CDC-Taiwan commenced to set up a pathogen genetic database containing epidemiological information and genetic information of pathogen strains of notifiable communicable diseases.

Study Design

The study will start with a collection of specimens of reported cases sent by local health units and sentinel physicians to either contract laboratories (Figure2.) or CDC-Taiwan laboratories. The specimens will be duly received and examined through a standard culture process, and the received pathogen will be selected according to a certain principle specified on the case epidemiological data. The obtained isolate will then be sent to a core laboratory of CDC-Taiwan for further genetic experiments and analyses, such as VPI gene sequencing for enteroviruses, HA and NA gene sequencing for influenza viruses. The important gene for a given pathogen is selected based on the suggestion made by a group of domestic experts and professionals. Furthermore, after the experiments and analyses, the pathogenic isolates will be stored at the Bio-material Section, which is the storage center for all pathogens in the country.

Table.1 A total of fifteen pathogens selected for construction of genetic database

Year	Commencing year for construction each pathogen genetic database
2003	Enterovirus, influenza virus, dengue virus, Mycobacterium tuberculosis
2004	HIV, Japanese B Encephalitis virus, adenovirus, rotavirus
2005	Hepatitis virus, Shigella dysenteriae, Bordetella pertussis, Group A Streptococcus
2006	Rickettsia, Salmonella, enterohemorrhagic E. coli

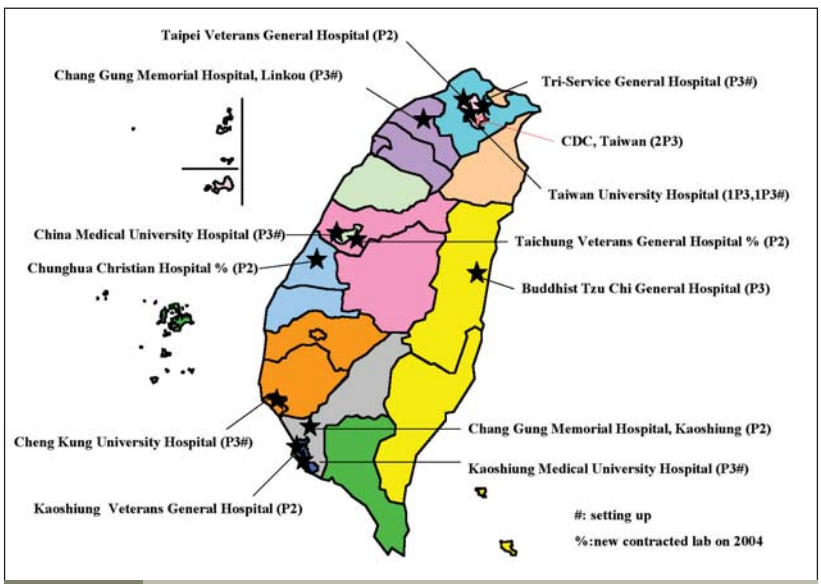
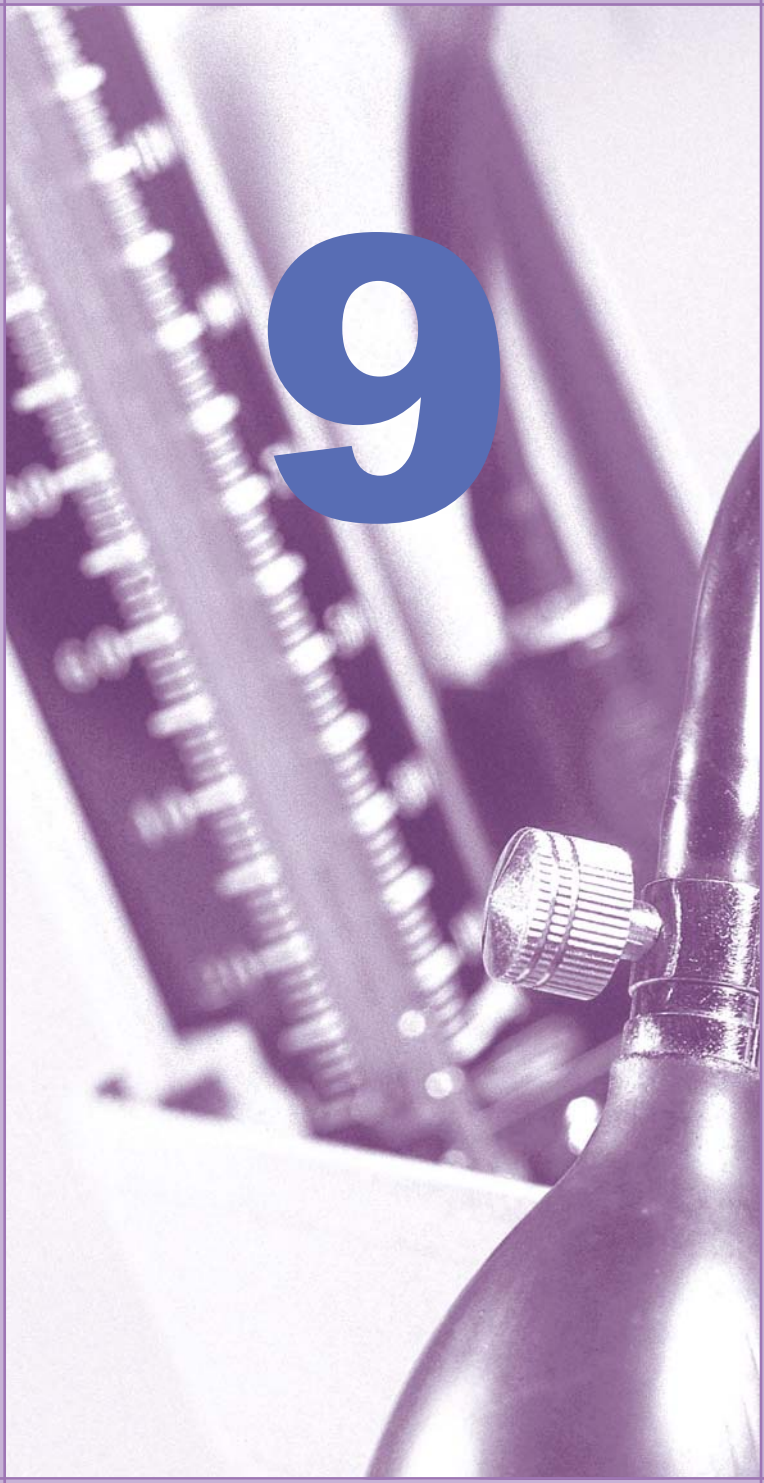


Figure.2 Location of twelve virus contract laboratories in Taiwan

Major Challenges for the Future



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Major Challenges for the future

Major Challenges for the Future

In the 21st century, with well-developed scientific technology and transportation, viruses and communicable diseases spread rapidly and globally. CDC's mission is to promote health and quality of life by preventing and controlling disease. The vital principals, "flexibility, information-based strategies, professionalization, involvement of all people and internationalization", are developed and sustained to build an achieved preventing system against diseases. The system is to detect, intercept and block the disease before outbreak occurs. The challenges that CDC faces in the future are as below. CDC's missions and programs clearly focus upon these challenges. Specific action steps for each challenge are described briefly.

1. Building up a well-developed Disease Surveillance Network:

To build a diverse Notification Disease Surveillance System in an attempt to detect early epidemic and effectively block the spreading of disease.

2. Strengthening Quarantine Activities at Boarder

Implement quarantine and preventing activities at international ports and upgrade the ability to deal with emergency epidemic situation. Therefore, it can sieve out the possible cases from abroad and prevent the spreading of epidemic in Taiwan.

3. Building up the nosocomial Infection Surveillance System

1) Strengthen the quality of nosocomial infection control as well as fever screening to lower the nosocomial infection rate and cluster infection event. In addition, it upgrades the medical quality so as to promote the health quality for the general public and the personnel of medical centers.

2) Set up the Communicable Disease-Control Commodity Classified Storage System and a checking mechanism to catch the real-time information of the in-and-out of important supplies. Therefore, CDC may control the commodity supplying and distribute the commodity efficiently.

4. Building up the Symdromic Surveillance System:

1) Set up a surveillance system that integrates the symdromic medicine and public health; Implement the classified medical caring system; Reinforce the bio-protection function in attempt to increase the emergency contingency abilities in medical centers.

2) Build-up a high bio-security system and proceed bio-war drills with related resources to increase the contingency abilities and to lower the impact of bio-terrorism in case it happens in Taiwan.

5. Establishing the Disease Prevention Laboratory Network

1) Intensify the disease prevention laboratory force; building-up an

international-level disease prevention laboratory network to be able to detect early bio-terrorism attack as well as SARS and other new communicable diseases.

2) Set up an infectious bio-commodity management system and ensure the secure management and transportation mechanism in laboratories. The system also guarantees the safety of laboratory personnel and general public.

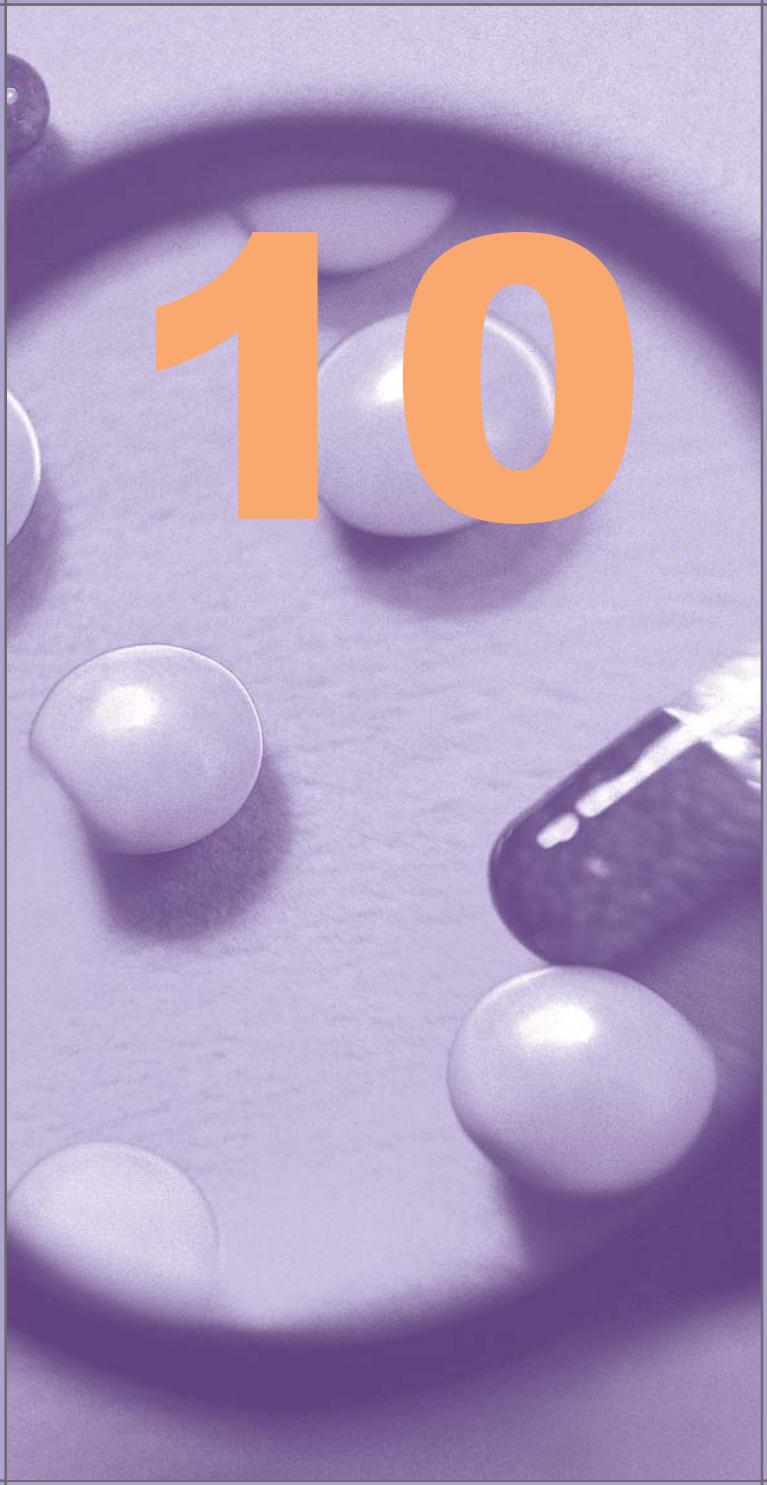
6. Strengthening the global Communication Network

To build an global cooperation platform; proactively arrange the training programs for the relevant personnel on international health and communicable diseases prevention; place an international epidemic surveillance area association mechanism to effectively apply international resources and upgrade the epidemic prevention force in Taiwan.

7. Organizing an Up-to-Date Communicable Disease Control Information Network

Organize a real-time communicable disease control commanding center and information communication network; Strengthen the exchange of communication platform and Internet connection between central and local government facilities. In addition, CDC needs to provide real-time and creditable information to communities and medical centers; Integrate communicable disease control reporting system to set up the domestic and global disease prevention information databases as references for decision makers and control the outbreak of communicable diseases as soon as possible.

Appendix



10

CDC Major Timeline in 2003

CDC Major Timeline in 2003

January

1. Under the authorization of Executive Yuan, the "human vaccine self-produce program" was devolved to National Health Research Institute.

2. Completed the national-wide smallpox vaccination training program.

3. Jan 30, Dr. Nechiporenko, Russia visited Vaccine Center.

February

1. Feb 26, Korean NHI team visited CDC.

2. Feb 27, CDC held the " Nocosomial Infection Control District Guidance & Perspective Conference".

3. Completed the" National-wide Planning of Smallpox Vaccination Program".

4. Completed the Smallpox Vaccination Mobilizing Drill.

March

1. In response to the SARS outbreak, the WHO guidelines: "The Suggestion for SARS Medical Management", and "The Guidance for Hospital Infection Control of Severe Acute Respiratory Syndrome (SARS)" were translated and publicized on CDC's website.

2. Mar 10, the first SARS case was reported from National Taiwan University Hospital.

3. Mar 15, CDC held the "Dengue Fever Prevention Workshop" in Tainan.

4. Mar 17, The Department of Health established the "Severe Acute Respiratory Syndrome Response Center".

5. Mar 28, The Department of Health classified SARS as a Type 4 notifiable communicable disease.

6. Mar 23, co-organized the World Tuberculosis Day Conference with Formosan Tuberculosis Medical Association.

7.Mar 25, the Health Minister of Senegal visited CDC.

April

1. Apr 17, CDC co-organized "Build up a Non-Tuberculosis Homeland " with Nurse Association.

2. Beginning on April 10, monitoring all arriving passengers body temperature are required and related strategies ware implemented.

3. Beginning the noontime of April 23, compulsory body temperature taken for outbound passengers were required.

4.April 20-21," International symposium on SARS Outbreaks" was hosted by DOH, Taipei.

5.April 22, the first SARS cluster infection event appeared in Taipei Municipal Hoping Hospital.

6. April 23, president Chen Shui-bian visited CDC.

7. April 26, premier Yu Shyi-Kun visited CDC and attended "SARS Prevention and Coordination meeting".

8. April 28, Executive Yuan established "SARS Prevention and Relief Committee"

9. Completed the analysis research for the Foreign Brides who are from Mainland China & Southeast Asia without Health Insurance.

May

1. May 02, CDC announced the " Provisional Regulations Governing the Prevention and Relief of SARS".

2. May 3, two WHO experts arrived Taiwan.

3. Bulletined all in-and-out harbor fishermen must have temperature taken and fill in SARS survey form.

4. May 9, WHO announced travel Advisory for Taipei.

5. Beginning May 09, the tourists from China, Hong Kong and Macau must report the staying period in Taiwan.

6. May 16, compulsory home Quarantine and related regulations were announced.

7. May 21, WHO announced that Taiwan was included in the list of travel advisory.

8. May 21, announced that the tourists from China, Hong Kong and Macau must fill in the SARS and other communicable diseases survey form.

9. May 22, the "Aircraft Disinfection Process of SARS" was publicized.

10. May 23, the " International aircraft SARS prevention Process" was publicized.

11. May 26, the " SARS Nocosomial Infection Prevention Evaluation Program (Draft)" and Evaluation Education Program" were discussed.

12. May 28, the " Guideline for Close Contact to SARS Cases and Home Quarantine (A)" was bulletined.

13. May 28, the " Guideline for Management of probable and suspected SARS Cases in the Aircraft" was publicized.

14. May 26-28, the "24th APEC ISTWG " was held in Rotorura, New Zealand.

15."Smallpox Vaccination Technique Brochure" was published.

16. Spot-checking of Abnormal Fever for Island-wide Regional Hospital Medical Members were processing.

June

1. Jun 10, modified the quarantine objects t of SARS level A and the period of home quarantine.

2. Jun 11, SARS videoconference with Dr. Balaji Sadasivan, Health Minister of Singapore.

3. Jun 13, WHO has downgraded Taiwan SARS outbreak from level C to level B.

4. Jun 17, Taiwan was removed from WHO's list of travel advisory.

5. June 17-18, Taiwan was invited and participated in the WHO Global Conference on Severe Acute Respiratory Syndrome（SARS）"Where Do We Go From Here?" in Malaysia.

6. Jun 23, CDC Taiwan reclassified the SARS probable cases by either SARS PCR positive or antibody positive.

7. Jun 24, Roy Andersen from the Imperial College, UK visited CDC.

8. June 27-28, a group of CDC officials led by Minister Chien-Jen Chen attended the "APEC Special SOM Meeting and Health Minister Meeting"held in Bangkok, Thailand.

July

1. July 5, WHO lifted Taiwan from the list of areas with recent local transmission of SARS.

2."Communicable Disease Prevention Medical Network" was set up.

3. Announced that the tourists form Hong Kong, Macaw and Mainland China with fever must report actively.

4. July 28-29, Dr. Noako Ishigawa, NIID, Japan visited CDC.

August

1. Aug 1,"Bacterial Infectious Disease Conference" & " SARS appreciation party" was held.

2. August 19, SARS was redefined as a Type-1 notifiable communicable disease.

3. Accomplished " The MMR Serum Epidemiology Survey".

4. Accomplished "World wide focus and update epidemic" and broadcasted update epidemic on the lobby of CDC.

5.Published the "Prevention and Control of SARS in Taiwan" and held a press conference.

6.Established the"Surveillance & Analysis Division" in "Influenza and SARS Task Force Organization"; organized " Influenza and SARS reporting data analysis flowchart", " SARS data bank application flowchart", "SARS secondary data application flowchart", " Epidemic hotline & consultation flowchart".

7."WHO SARS Newsletter and Isolation Policy" was announced.

8.Aug 13, " WHO SARS Epi working group Teleconference" was held.

Aug 23, the "Influenza Global Prevalence—Expert Meeting" was held.

September

1. Organized the" CDC recruiting hospital infectious prevention professional program".

2. Accomplished the evaluation of more than 500 regional hospitals infectious control in the after SARS period.

3. Sep 5, the first malaria case was reported in Tai-mar-lee Township of Taitung County. This is the first malaria case after Taiwan announced of being a malaria eradication area 40 years.

4. Sep 15-17, the "25th APEC ISTWG Meeting" was held in Sinpagore.

5. Sep 25-26, Dr. Su visited Hanoi, Vietnam for HIV/AIDS project.

October

1. Oct 29, CDC organized and held the "Communicable Disease Medical Network & Offshore SARS cases Transportation Drill".

2. Organized the " Influenza Prevention Committee".

3. Accomplished the certifiable documents for the effort of Polio eradication.

4. Started the stage 2 of " the fever patients in fever screening center automatic surveillance program".

5. Oct 7-11, Dr. Su participated in " Influenza Pandemic Conference" in Okinawa, Japan.

6. Oct 7-14, " 2003 Taiwan International Public Health Workshop" was held in Taipei.

7. Oct 28-31, CDC organized and held the "2003 International Conference on Influenza and the Resurgence of SARS".

November

1. Implemented "The Communicable Disease Medical Network" first stage contrast sign-up with regional hospitals.

2. Nov 3-4, the " National Communicable Diseases Control Summit" was hosted by Taiwan CDC.

3. Nov 12, bilateral MOU was signed with Japan.

4. Nov 17-21, Co-organized " APEC Dengue Fever Outbreak Area Cooperation Conference" with Kaohsuing City Government.

5. Publicized "The Notification and Guideline of Self Health management for Close Contact to Reported SARS Cases", " The Self Health Management Notification for the Incoming Tourists from SARS Outbreak Area, Guideline and Home Quarantine Notification".

6. The " Sentinel Surveillance System" has performed national wide, 248 sentinel physicians joined the program.

7. Nov 25,a meeting held by AIDS Prevention Committee of Executive Yuan, Vice Premier Lin Hsin-Yee as the moderator and confirmed the AIDS prevention program in 2004.

8. Nov 26, CDC held the "Care AIDS, From Your Heart " press conference and started the promotion activities of the World AIDS Day.

9. Nov 26 to Dec 7, CDC organized a caring AIDS across-island campaign.

10.Organized the " National Disease Control Conference" in Miaoli County.

December

1. Dec 17, in response to the lab-acquired SARS confirmed case, SARS responsive level B has been activated.

2. Modified the" SARS Prevention of Personal Protective Equipment Sheet" and "The Guideline of Avian flu Infectious Control Process" as the references for hospitals.

3. Dec 3, publicized that all incoming passengers have to fill in the " Communicable Disease Prevention Survey Form".

4. Dec 7, "The Exhibition of AIDS" was held in front of President Office, vice president Lu and the headship of twelve ministries have joined the beginning ceremony.

5. In response to the SARS outbreak, the precautionary activity has conducted for all outbound passengers (included three small links).

6. Publicized that in response to the prevention need of SARS, some precautionary activities have been operated for the outbound fishermen.

7. Dec 8, Dr. Su visited Pasteu, Belgium.

8. Dec 10, bilateral meeting with the Minister of Health and Leiden University, Netherland.

9 Dec 16, a SARS infected case caused by incaution operation in the Lab was reported from Tri-Service General Hospital.

10. Dec 17, the Department of Health announced that SARS responsive level has upgraded to level B.

11. Dec 31, announced the SARS responsive level B has been deactivated.

12.Actuated and conducted the "In 2003-2004 Influenza Prevalence, the Antecedent Program of Using Antivirus drugs".

13. Accomplished the National Bio-medicine Lab controlling Process.

14.Set up "The Preparedness Program in response to the Prevalent of Influenza"

15.Accomplished the SARS information exchange platform of " Unknown Pneumonia Examination & Registration System", "Case and Contactor Surveillance System", " Notifiable Communicable Disease Reporting System" and " SARS Data Analysis and Statement Practice System"

16.The first SARS probable case was reported from Kwanchou, Kengtung Province in the winter of 2003.

17.Accomplished the " SARS Hospitalization Reporting System" and "Epidemic Reporting & Information Center".

[CDC Annual Report 2004]

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