The Status of Anti-Tuberculosis Efforts in Taiwan

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Abstract

It has been 7 years since the Centers for Disease Control completed its take over of all anti-tuberculosis programs. From the over-emphasis on the reporting of suspected cases, at the same time, overlooking the diagnostic quality and tuberculosis case-management in its early phase, to the implementation of directly observed therapy- short course (DOTS) programs and the establishment of multidrug resistant treatment teams in recent years, CDC seems gradually stepping into the right direction by fostering close cooperation between clinical and public health aspects of tuberculosis care. This article briefly reviews the evolution of organizational manpower, TB patient registries, case detection, and drug resistant tuberculosis management. I hope that through this review, we can all look forward to stable, continuous growth of the anti-tuberculosis efforts, removing all obstacles those block patients from reaching medical care, fighting against tuberculosis side by side with TB patients.

Key words: anti-tuberculosis organization, tuberculosis patient central registration, case detection, directly observed therapy- short course (DOTS), drug resistant tuberculosis

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Introduction

In 2001, anti-tuberculosis (TB) efforts in Taiwan made a historic change by re-structuring. The initial system was established with help from the World Health Organization (WHO) and combined prevention agencies and health department nurses into a single entity with both public health and clinical divisions. The new structure separated the two areas. The public health division, which comprised of the Centers for Disease Control (CDC), health bureaus and health clinics, and the clinical division, which consisted of medical facilities, would now cooperate to push anti-TB efforts.

In the 1950s, the transmission of TB in Taiwan was very severe: the TB mortality rate reached as high as 300 per 100,000 persons in 1947, that is, 3 out of every 1000 persons died of TB. Tuberculosis prevalence survey was conducted for the first time in 1957, the prevalence of radiographically significant TB was 5% and bacteriologically proved TB, 1%, among adults.

Plans for Taiwan's anti-TB efforts started in the 1950's. Although the efforts started from humble beginnings, perseverance through many hardships in the past 50 years resulted in the reduction of TB mortality to 6 per 100,000 persons in 2001. The incidence rate for that same year was 69 per 100,000 persons. If only adults are counted and with an average disease duration of 1 year, their TB prevalence rate would be 88 per 100,000 adults. Compared to the situation 50 years ago, this is truly remarkable. In addition, most of the present-day TB patients are clustered in the generation born before 1950. For those born after 1950, the number of TB cases shows an obvious decline, with the trend getting more notable with younger age. Thus, the systematic anti-TB efforts that began in the 1950's resulted in a large reduction in the risk

of TB infection.

Seven years have passed since the re-structuring, and many people have gradually forgotten the contributions made in the war against TB during the last half-century. In the past 7 years, there was initial over-emphasis on the reporting of suspect cases and the professional ability of physicians to correctly diagnose TB. As a result, important measures such as diagnostic quality control and patient management were neglected until the 2005 plan to halve the number of TB cases within 10 years. This was when we started to face those problems and diligently carried out directly observed therapy- short course (DOTS). In 2007, we began to establish a professional care system for multidrug-resistant TB (MDR-TB) in order to prevent the emergence of drug resistance due to poor diagnostic quality and inadequate patient management. These steps indicated that the new organization had begun to set off in the right direction.

This article attempts to provide a brief description on the topics such as organizational manpower, TB patient registries, case detection, and drug-resistant TB. In addition, we focus on the evolution of anti-TB efforts with a review of the past and predictions for the future. The defeat of TB requires not distinguishing between you and me or the old and new. This fight requires cooperation from all of us.

Organizational Manpower

Before abolition of the Taiwan Provincial Government in 1999, the anti-TB campaign was governed by the Department of Health's Prevention Section. The anti-TB forces comprised of the Chronic Disease Control Yuan of Taipei City Government, the Chronic Disease Control Center of Kaohsiung

City Government, and the Chronic Disease Control Bureau (CDCB) in Taipei, and three Chronic Disease Control Yuans (CDCY) (in Taichung, Chiayi and Tainan) for the Taiwan Provincial Government, as well as the Chronic Disease Control Centers (CDCC) in local city and county governments. In addition, the provincial government was also in charge of the public health nurses dispatched by each city or county government's health bureau to the local health stations in villages and towns. The Chronic Disease Control structures were simply changed from the former TB Control structures (TB Control Bureau, TB Control Yuan and TB Control Center) in 1989. In 1999, the Provincial Chronic Disease Control Bureau and Yuan created a personnel quota of 571, and total manpower approached 800 including those worked in the city and county levels. After abolition of the provincial government in 1999, provincial Chronic Disease Control Bureaus and Yuans came under the jurisdiction of the Department of Health and were governed by the Department's Central Regional Office. In that same year, the Department of Health's Centers for Disease Control (CDC) was established and became responsible for leading the nation's anti-TB efforts.

In 2001, the CDC began to take over the national anti-TB program and carry out the merging of CDCB and CDCY. Starting from July 2001, public health officials, including personnel dispatched to local health clinics, in the CDCB and CDCY were all re-located to the CDC. The remaining clinical staff became involved in diagnostic and treatment efforts after the establishment of the Chest Hospitals in Taipei and Tainan in February 2002. At the same time, the CDCY in Taichung and Chiayi were consolidated. In August 2002, the Chest Hospital in Taipei merged with its counterpart in Tainan. After its completion, the clinical and public health areas became completely

seperated. The old anti-TB organization was then disintegrated, and many city and county governments also chose to abolish their CDCS's.

TB Patient Registries

Beginning in the 1950's, anti-TB drugs were continually being discovered, proving that TB could be treated effectively (at that time, a recurrence rate of <5% upon treatment completion was considered an effective treatment). However, treatment needed to continue for more than 1 year. If treatment was interrupted or an incorrect regimen was prescribed, drug resistance could easily emerges. In addition, evidence has shown that with effective drug therapy, there is no difference in whether or not a patient is isolated in terms of treatment outcome or infectiousness. Since then, aggressive case detection plus effective therapy administered at home has become the most powerful weapon for TB control.

Starting from 1950, Taiwan has primarily used sputum smear for TB case finding. The Taipei Tuberculosis Control Center was established in Taipei City. The Center, which is located on Chingdao East Road, has just begun to have preliminary medical collaborations with National Taiwan University Hospital. Along with the Chiayi Tuberculosis Control Center, located on Minchuan Road in Chiayi City, the Taiwan Provincial Tuberculosis Control Department in Nankang (originally the Songshan Sanatorium), and the Tainan County Tuberculosis Sanatorium, these were the diagnostic and treatment centers for TB. The Taiwan Provincial Tuberculosis Association, a non-government organization, established in 1952, also joined the anti-TB team. In earlier years, the various veterans general hospitals primarily admitted TB patients. In 1954, an outreach chest x-ray mobile team was created, and it

used a roaming bus with x-ray equipment to supplement sputum examination for finding patients. In those years, resources were deficient and transportation was inconvenient. Patients who were identified still relied on sanatoriums or treated at their own expense.

Until 1957, the government relied on subsidies from the WHO and UNICEF to start implementing free drug therapy for TB. TB patients eligible for free treatment were recruited in the TB patient central registration, so that they could get free drug treatment at home under the supervision of health workers in the local health station.

Initially, only bacteriologically positive TB cases were eligible for free treatment. Along with improvements of the economic situation, enrichments of medical resources in Taiwan, the Insurances for Civil servant, Labor and Farmer began to pay for the costs of TB treatment. As a result, more and more TB patients got access to the free treatment. As the start of National Health Insurance (NHI) in 1995, treatment expenses for all TB patients were covered by the NHI. All TB patients were recruited in the TB patients central registration and get the free drug treatment under supervision since then. The evolution of TB patients who were included in the registry was as follows:

1957 sputum smear or culture positive pulmonary TB

1969 cavitary pulmonary TB

1974 far advanced pulmonary TB

1978 TB pleurisy

1981 pathologically-confirmed extrapulmonary TB

1984 moderately advanced, non-cavitary TB patients in indigenous villages, high-risk areas, and TB contacts

1988 TB patients with minimal lesion from indigenous villages

1991 all pulmonary TB

1997 all pulmonary and extrapulmonary TB

Due to changes in the inclusion criteria, the number of cases in the TB patient registration increased. This means that the number of patients managed under the system has increased, or that the case management coverage rate has gone up. It does not indicate that the real number of TB patients has actually risen.

Likewise, as medical resources have gradually become more common, accessing healthcare has become easier. The proportion of TB patients who are treated at general hospitals has increased. Beginning in the 1990's, annual hospital conferences have promoted TB cases reporting. In 1997, the Bureau of National Health Insurance implemented a "No report, no reimbursement" policy for TB patients medical care.. As of 2000, 70-80% of cases in the patient registry have been reported from general hospitals. The reported number of TB patients was then approaching the true TB incidence.

At that time, all reported cases needed to be reviewed by a physician from the Chronic Disease Control Bureaus' or Yuans' Treatment Advisory Group. Cases reported by physicians specializing in pulmonology or infectious diseases were only evaluated based on paper documents. Otherwise, patients would need to have their medical charts pulled or chest x-rays examined in order to determine whether or not the patient had active TB and needed to receive treatment. As soon as the case is entered into the registry, chemotherapy and case holding, case management is launched. Patients who require further investigation to confirm the diagnosis are followed-up by health clinic personnel who report back within a specified time. Every TB patient is assigned to a specific public health nurse who is responsible for managing their

case until treatment completion or death. During the treatment period, there are 2-month, 6-month, and further periodic evaluations as necessary. At each stage, a physician from the Treatment Advisory Group monitors the appropriateness of regimen, the progress during the treatment, and whethier the treatment can be completed at the end of 6m or 9m chemotherapy.. Although 70-80% of the patients are diagnosed at general hospitals, all of their management duties, including health education, follow-up, and contact investigation, fall under the responsibility of the anti-TB system.

As mentioned above, the purpose of the TB patient registry in the past has focused on treatment and case management. For patients diagnosed with active TB from the preliminary examination and subsequently entered into the registry, about 7% have had a change in diagnosis afterwards.

Beginning in September 2001, the CDC emphasized that all licensed physicians should have the ability to diagnose and treat TB case properly and should report any case with the suspicion of TB in order to shorten the time from reporting to registering. However, CDC neglected the fact that not all reported suspect patients require treatment or need to undergo case management. Approximately 30-40% of reported suspect patients have their TB diagnosis excluded eventually. During that time, the TB patient registry has evolved into a “registry for suspect TB cases”. Not everyone enrolled in the registry needs to undergo patient management procedures. This created a lot of unnecessary work loads and confusions on the necessity of any supervised antiTB treatment. Undoubtedly, the time from reporting to registering has shortened, but has the time from suspect to confirmed case and start of treatment also decreased at the same time? Or, has the time shortened from being a suspect case to excluding TB diagnosis?

In recent years, the CDC has addressed these issues by making strategic changes. Suspect cases without a confirmed diagnosis in 2 months need to be discussed by a review board using follow-up data and medical records. Within these cases, some patients may not need 2 months for confirming or excluding diagnosis. We need to think of strategies to improve the timeliness of confirming diagnosis in suspect patients while avoiding unnecessary treatments.

Case Detection

Active TB case finding is compensatory for passive TB case findings based on clinical symptoms. During the period when medical resources were scarce, the economy was weak, and access to care was inconvenient, it was not easy for symptomatic TB patients to receive medical treatment. Active case finding by sputum examinations and chest x-rays in villages, combined with free treatment, was highly productive in the early years. The mobile chest x-ray unit moving around villages and towns for free CXR examinations for indwellers or or groups such as military recruits and teachers. The radiographs were read by specialists from the CDCB or CDCYs, and the local health departments were responsible for the follow-up examinations such as sputum smear and culture or a repeat chest x-ray examination for all those chest x-ray showed suspicious TB lesions. Every CDCS, local health stations with x-ray equipment or contract radiography clinics were provided free x-ray films by the CDCB for free chest x-rays on symptomatic patients or contacts. Similarly, the films were read by a bureau or yuan physician, and the local health clinic did the followed-up. Each suspect patient was followed until a diagnosis was confirmed or ruled out, and confirmed patients who needed

treatment were entered into the registry for case management.

After 2001, case detection emphasized a passive approach by finding symptomatic patients who sought treatment. The hope was that examinations performed in medical facilities could find the most infectious TB patients and put them on antiTB treatment effectively. The focus for active case finding was placed on high-risk populations. The strategy neglected the fact that not every physicians were all sophisticate enough to diagnose TB correctly. As a result, the number of reported suspect cases increased significantly, as did the number of re-treatment cases. There were registered cases who obviously did not need to be reported; and there were cases with obvious healed fibrotic lesions were repeatedly given antiTB treatment for several times. These steps led to increasing amounts of unnecessary treatment, wasted a lot of manpower, and caused much headache for patient management. In recent years, the CDC has made strategic changes to address these problems. For those retreatment cases without bacteriological evidence, medical charts must be collected and discussed by a review board. This is similar to the review practices of the CDCB or CDCY physician in the past. The problem now is that the timeliness of the review board needs to be improved.

Nowadays, the chest x-rays that are part of the physical examination for military recruits, teachers, foreign laborers, and workers are performed by general hospitals. The normal procedure involves a reading by the radiologist and then a final evaluation by a family medicine physician. The problem is that the x-ray report often indicates presence of infiltration, fibrosis, or granulomas, etc. In the final evaluation, the family medicine physician often only base their decision on the x-ray report, without going through old chest radiography or consulting with other chest or tuberculosis specialists. Even if

the physical examinations found suspect patients, there is no one available to follow-up with sputum tests or repeat examinations. After sic months or a year, the patient was reported after having been infectious for a long time. Reviewing old films of these patients would indicate that disease was already suspected but not dealt with then. Without a doubt, suspect cases must be reported. However, if physicians do not even suspect disease for an obvious TB case, then naturally both reporting and treatment will be delayed.

From the case of the 14-year-old girl who died of TB last year, we can learn many lessons. First, the patient was poor, did not have health insurance and had many obstacles against accessing medical care. Second, the school was careless in waiting months after she developed a cough before helping her seek care. Third, most doctors did not have enough vigilance for TB, resulting in delayed diagnosis. When the TB diagnosis was made, it was already too late. Aside from needlessly sacrificing a young life, teachers and students at the school were exposed to mycobacteria for long periods of time. This incident proved that the passive detection of symptomatic TB patients who seek care is very inadequate even today.

The growing number of severe TB in youngsters indicates that the risk of TB infection is on the rise (recently infected people have higher risk of developing active disease) and that diagnosis and treatment are delayed in young TB patients. Treating latent TB infection can undoubtedly lower the risk of developing active disease for newly infected persons. However, it is more worrisome that infections in young people seemed to have increased. Are there more infectious patients in the community (especially younger patients) who have not been diagnosed correctly or given proper therapy? Eliminating barriers to accessing care for suspect patients and reducing

physician delays in diagnosis and treatment might be more important than treating latent infections.

Drug-resistant Tuberculosis

Before 2001, only the CDCB and CDCY had second-line anti-TB drugs. Patients who had difficulty in their treatment, such as treatment failure, drug resistance and side effects, will be referred to the anti-TB organization for treatment. At that time, 20-30% of the TB patients treated under the anti-TB system were considered difficult cases by the general hospitals. The CDCB and CDCY have accumulated lots of experience with reading films, examining specimens, and treating patients. As a result, it has served as a training and research center for TB control and has also fostered several TB experts. For instance, many of the chairpersons for the MDR-TB treatment teams had been affiliated with the anti-TB organization.

After the restructuring of the anti-TB organization in 2001, CDC could not develop a quick action plan against MDR-TB. Hospitals treated these patients inappropriately, leading to treatment failure, using inadequate number of drugs or inadequate dosages. The importance of good patient management was ignored, and the result was an increase in the number of patients who acquired MDR-TB. If general hospitals do not have enough vigilance for MDR-TB or do not handle cases properly, more drug resistance will develop. TB will evolve from being single-drug resistant to multi-drug resistant, and finally develop into extensively drug resistant TB. Drug-resistant patients who are cured in general hospitals within 6 months to 1 year might start to go in and out of different hospitals, further facilitate the transmission of drug-resistant mycobacteria in the community and hospitals. The result is that primary

drug-resistant TB will increase rapidly. The rise of drug-resistant TB in recent years has presented a difficult problem that requires aggressive action.

In reality, anti-TB efforts cannot completely separate the clinical diagnosis of TB patients and the patient management duties of public health. In 2001, the CDC and the Bureau of National Health Insurance requested that hospitals create TB case managers who would help with patient management. Later, they hoped that hospitals could establish TB centers to help control the quality of TB diagnosis and strengthen the communication and cooperation between clinical and public health agencies.

After the SARS outbreak in 2003, CDC started created TB patient review boards in each branch office to assist in diagnosis and treatment of difficult cases. Advice and suggestions for diagnosis and treatment were given by the review board. In addition, CDC also started to examine hospitals' application for using second-line TB drugs. However, patient management is still lax.

In 2006, the Executive Yuan passed a proposal to halve the number of TB cases in 10 years. The budget for TB control increased enormously. CDC started to address the problems of poor diagnostic quality in hospitals and loose patient management. It vigorously pushed for managing patients using DOTS. In 2007, the CDC created an MDR-TB advisory team to focus on the issue of drug resistance and control the use of second-line drugs. This advisory team has yet to start running, but hopefully these professional groups can continue operating for a long time. In addition, it is our hope that they can collaborate closely with the public health system and re-establish an effective anti-TB organization.

Conclusion

Like combats, the first step of disease control is recognizing the enemy. In the battle against TB, the real enemy is TB bacilli. Unfortunately, people used to mistake TB patients as the enemy!

In the battle against TB, the patient is the soldier who has the worst experience by standing in the front line. The anti-TB system needs to provide the front-line fighters with all the resources and support that they need during the battle. TB patients have the right to receive examinations and proper treatment with dignity. During treatment, patients also have the right to continue their education or work and should not be discriminated against or stigmatized.

When every patient can be diagnosed and cured rapidly of their TB, the number of infection sources in the environment will naturally decrease. Younger generations will no longer face the risk of mycobacterial infection, and the eradication of TB will be just around the corner.