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Original Article

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ESTIMATION OF THE NUMBER OF NECESSARY BEDS  
FOR TUBERCULOSIS PATIENTS, IN JAPAN

Takashi YOSHIYAMA and Kazuhiro UCHIMURA

**Abstract** [Objective] To estimate the number of necessary beds for tuberculosis patients in Japan from the view point of isolation of the source of infection.

[Methods] We calculated the number of necessary beds for tuberculosis cases separately for the initial phase and for the chronic excreters. For the initial phase we calculated by multiplying the number of detected tuberculosis cases and the duration of hospitalization. The number of detected cases is based on the figures in 2002 and the duration of hospitalization is assumed to be 90 days for sputum smear positive cases and 60 days for sputum smear negative cases. We calculated the number of necessary beds using the Monte Carlo simulation for each prefecture on the assumption that the incidence and the duration of diseases will be under the effect of random fluctuation with the Poisson's distribution for the number of cases and with the log normal distribution for the duration of hospitalization. We also considered the seasonal fluctuation.

[Results] Our calculation revealed that around 6,413 beds would be necessary for the initial phase and 200–400 beds for chronic excreters in Japan. There are several prefectures

which only requires less than 30 beds.

[Discussion] Currently, Japan has around 17,000 beds secured for tuberculosis patients. Our calculation showed that this was much more than needed. In many areas, one ward will provide more than sufficient number of tuberculosis beds. Specialist consultation system must be improved because of the reduction in the number of TB cases treated at hospitals with TB wards and TB specialists. For the treatment of non-infectious TB, ambulatory DOT system, TB shelter and nursing care facilities would be necessary to guarantee compliance to treatment.

**Key words:** Hospital beds, Tuberculosis, Isolation

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Original Article

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MISS-MANAGEMENTS IN TREATMENT FAILURE OF  
PULMONARY TUBERCULOSIS<sup>1</sup>Kunihiko ITO, <sup>2</sup>Takashi YOSHIYAMA, <sup>1</sup>Masako WADA, and <sup>2</sup>Hideo OGATA

**Abstract** [Purpose] To investigate the risk factor of treatment failure of pulmonary tuberculosis excluding multi-drug resistant cases from the standpoint of both clinical management and tuberculosis control.

[Object and Method] Retrospective chart review of patients who admitted to Fukujuji Hospital for treatment failure of pulmonary tuberculosis excluding multi-drug resistant cases from Jan. 1993 to Dec. 2003.

[Results] Out of 24 treatment failure cases available for analysis, 4 cases were associated with chronic tuberculous empyema with broncho-pleural fistula, and among them, chronic empyema was considered to be the main cause of treatment failure in one case. In 6 cases, poor adherence to medication was confirmed or suspected, and 2 of these 6 cases was also associated with miss-management. In 9 cases miss-management was found without poor adherence or chronic empyema, and in 8 out of these 9 cases, miss-management was considered to be the main cause of treatment failure. In 5 cases no apparent risk factor was found, but in 2 out of these 5 cases the ignorance of the results of drug sensitivity tests (and, therefore, miss-management) was strongly suspected. Summing up, in 10 out of 24 cases (41.7%), the miss-management was considered to be the main cause of treatment failure,

and it was more frequently seen than poor adherence to medication.

[Conclusion] Clinicians should be aware of these risk factors of treatment failure such as chronic empyema, weak regimen in bacteriological negative cases, rifampicin + ethambutol regimen, and miss-management of drug adverse effect. From the standpoint of tuberculosis control in Japan we considered that, in addition to DOT, strategy to secure the quality of tuberculosis treatment is by all means needed.

**Key words** : Miss-management, Acquired drug resistance, Drug sensitivity test, Chronic tuberculous empyema, Poor adherence

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## A CASE OF PULMONARY TUBERCULOSIS IN LATE STAGE OF PREGNANCY

Norihiko NAKANISHI, Tomonori MORITAKA, and Nobuo UEDA

**Abstract** A 28-year-old woman who was a nurse was admitted to our hospital because her sputum was positive for *M.tuberculosis*. She was pregnancy of 35 weeks. First, she was administered INH, RFP, PZA and was treated with cesarean section on the 21st day after starting tuberculosis chemotherapy. The operation was done in operating room of negative pressure ventilation. The patient returned to the tuberculosis ward, and the newborn infant entered to a newborn nursery room after confirming negative tubercle bacilli in amnionic fluid by PCR examination. EB was added to the regimen of chemotherapy after childbirth. In general hospitals, infection control is an important issue as seen in this case.

**Key words** : Pulmonary tuberculosis, Pregnancy, Infection control

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## PULMONARY *MYCOBACTERIUM FORTUITUM* INFECTION WITH MULTIPLE NODULAR SHADOWS IN A HEALTHY MAN

Tetsuro INOUE, Eisaku TANAKA, Minoru SAKURAMOTO, Yuji MAEDA,  
Ko MANIWA, and Yoshio TAGUCHI

**Abstract** We report a case of pulmonary *Mycobacterium fortuitum* infection with multiple nodular shadows. A 52 year-old male was admitted complaining of fever and chest abnormal shadows. He didn't have pulmonary or systemic underlying diseases. Chest radiograph and computed tomography scan showed multiple nodular shadows in the both lung fields. Isoniazid, rifampicin and ethambutol were administered based on the presumptive diagnosis of tuberculosis. Cultures of the sputum and bronchial washing fluid were repeatedly positive for *M. fortuitum*, and the case was diagnosed as pulmonary *M. fortuitum* infection. Although the *in vitro* susceptibility was resistant to isoniazid, rifampicin and ethambutol, abnormal shadows on the X-ray showed improvement by the combined

use of INH, RFP and EB. There are no signs of recurrence after completion of the treatment for 12 months.

**Key words:** Nontuberculous mycobacteriosis, Atypical mycobacteriosis, *Mycobacterium fortuitum*, Rapidly growing mycobacteria, Multiple nodular shadow

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## AN OUTBREAK OF TUBERCULOSIS IN A LONG-TERM CARE UNIT OF A MENTAL HOSPITAL

<sup>1</sup>Masaki OTA and <sup>2</sup>Manabu ISSHIKI

**Abstract** A descriptive epidemiology on an outbreak of tuberculosis (TB) in a long-term care unit of a mental hospital was conducted.

A female inpatient of 60 years with pulmonary TB was reported to the local health department (LHD) from the hospital in July 1999. Her sputum was negative both by smear and culture. From then to Mar 2001, a total of ten TB cases were reported. All of them were inpatients or workers of the hospital. Among them, four cases turned out to be culture positive and for three out of them a Restriction Fragment Length Polymorphism (RFLP) analysis was performed. All three turned out to be the identical strain suggesting that the outbreak was derived from one index case.

After November 1999, the active case findings were conducted by the LHD, however no case of possible source of the outbreak was found. On the other hand, the retrospective investigation revealed that a female inpatient (case Z) of 70 years must have been pulmonary TB. She had had respiratory symptoms such as severe cough and sputum for two years and consequently died of pneumonia in February 1999, five months before the onset of the TB outbreak. She had a thoracic CT scan test and a sputum PCR test just before her death in another outpatient clinic and turned out to have a cavity in a lung and to be PCR positive for *Mycobacterium*

*tuberculosis* complex. However the result was never reported to the hospital nor to the LHD, because she died before the PCR test was completed. She had had close contact with all of the TB cases except one for over two years.

Considering all these epidemiological results, case Z was suggested to be the source of this outbreak.

To prevent this kind of TB outbreak, institutions like mental and/or long-term care units should carefully prepare a proper precaution plan against the nosocomial infection of TB. In addition, if two or more TB cases are reported from the same unit or institution, LHDs should pay special attention and investigate the possibility of nosocomial infection.

**Key words:** Tuberculosis, Outbreak, Nosocomial infection, Mental Hospital, Active case finding for contacts, Descriptive epidemiology

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## REFORM OF JAPAN'S NTP AND ITS TECHNICAL PERSPECTIVES

Toru MORI

**Abstract** The 1951 Tuberculosis Control Law of Japan is now faced with tremendous changes that have occurred during the last 50 years in tuberculosis epidemiology and in the environment in tuberculosis control implementation. The law is also challenged with the shift of the paradigm for the National Tuberculosis (TB) Programme. In order to respond properly to these changes, the Tuberculosis Panel of the Health Science Council of the Ministry of Health, Labor and Welfare submitted its report for the amendment of the law in March 2002. Based on this report, a new Tuberculosis Control Law was passed in Parliament last June, and related decrees of the Cabinet and the Ministry are now being revised in preparation for its enactment in April 2005. In this special lecture, the main points and framework of the revisions were discussed with the perspective of the development of new technical innovations relevant to each area of the revised TB control legislation.

1. Case detection. There will be a shift from the current "indiscriminate" screening scheme to a selective one regarding periodic mass health examination. Only subjects aged 65 or older will be eligible for the screening, supplemented with selected occupational groups who are considered to be at a higher risk of TB, or may be a danger to others if they develop TB, such as health-care providers and school teachers. In addition, local autonomies are responsible for offering screening to the socio-economic high-risk populations, such as homeless people, slum residents, day laborers, and/or workers in small businesses. This means that the efforts of the autonomies are critical for the new system to be effective. The extraordinary examination will be limited to only the patient's contacts, and will be mandatory for those contacts so they cannot refuse to be examined by the Health Center. The public services used in the contact investigations will be greatly facilitated by such new technologies as DNA fingerprinting of TB bacilli and a new diagnostic of TB infection using whole-blood interferon-gamma determination (QuantiFERON). The quality of clinical diagnosis and monitoring of treatment should also be improved by introducing an external quality assurance system of commercial laboratory services.

2. Chemoprophylaxis. Although not explicitly defined in the new legislation, the expansion and improvement of chemoprophylaxis to cover anyone with any risk of clinical development of TB would have a tremendous effect in Japan, especially since 90% of patients who developed TB were infected tens of years ago. These technical innovations in diagnosis of TB infection will be very helpful. Development of new drug regimens for the preventive treatment is also badly needed.

3. Immunization. Prior to the amendment of the Law, the BCG vaccination of students entering primary and junior high schools has been already abandoned. In order to encourage the early primary vaccination for infants, the new Law will adopt the direct vaccination scheme in which babies will be given the BCG vaccine without tuberculin testing. This program will be implemented safely, only if it is given to young babies, e.g., less than one year old, as defined by the decree. It is essential to maintain the high level of vaccination coverage under the new program. The autonomy may encounter difficulty mobilizing client babies shortly after their birth (only one year, as compared with the current four years). To avoid the possible, though very rare, adverse health effects due to the vaccination of infected babies, careful questioning should be conducted regarding the risk of exposure to infection prior to vaccination. A ready course of treatment and examinations for abnormal reactions after vaccination (Koch's phenomenon) is also warranted.

4. Treatment and patient care: The revised Law clearly states the governmental responsibility for treating TB patients in close cooperation with a doctor. This is an important legal basis for the expansion of the DOTS Japan version. While the development of new anti-tuberculosis drugs will be realized in the near future, Japan still has to overcome the issue of improper practice of treatment, as well as the government's slow process for approving new drugs to be used for multi-drug resistant TB and non-tuberculous mycobacterioses.

5. Prefectural TB Control Plan: In order to resolve the problems specific to the respective prefectures in terms of epidemiological parameters or available resources, the new Law requests every prefecture to develop its own TB control plan.

In order for the new TB Control Law to be effective, strong government commitment supported by technological innovation is mandatory. It is for that reason that the Japanese Society of Tuberculosis should aggressively join the global movement to stop TB along with the general public of Japan.

**Key words:** National Tuberculosis Programme, Epidemiology, Future prediction, DOTS, Disease control

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The 79th Annual Meeting Symposium

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## PRESENT STATE OF REGIONAL TUBERCULOSIS HEALTH CARE AND FUTURE ACCOMMODATIONS

Chairpersons: <sup>1</sup>Kenichi TAKEUCHI and <sup>2</sup>Akira SHIMOUCHI

**Abstract** [Introduction] The issue of implementing tuberculosis countermeasures in the city of Osaka is of an incomparably large scale with that in regional areas, and is accompanied by a correspondingly level of difficulty. The national government has no intention of solving the problem in a single blow by concentrating assistance in areas of human, monetary and physical resources, but rather has deployed a more widespread approach in the name of regional decentralization of authority. Although attention tends to be focused on large cities, progress has also been slow in regional areas, and although effects are difficult to be seen, “hard-working tuberculosis health care personnel” are striving with what little resources they have to continue with the struggle of implementing countermeasures against tuberculosis.

Dr. Makito Sato discussed screening in the city of Sendai from the viewpoint of finding tuberculosis patients as related to the present state of regional tuberculosis health care and future accommodations. Even the city of Sendai with its population of one million residents is confronted with considerable problems, and its screening program, including new efforts such as early evening screening times, has entered its third year. Dr. Sato discussed the present state of that program along with its track record.

Next, Dr. Hideo Maeda discussed the present state and countermeasures regarding patient transport. Last year, patients in the Tohoku region presenting with multi-drug resistant tuberculosis were brought in from across three prefectures, exposing specific problems including their accommodation and transport. Dr. Maeda provided a detailed description of these topics by focusing primarily on the tuberculosis emergency care network in Tokyo.

There are also facilities in large cities where public health centers have been reorganized and integrated into a single tuberculosis screening center for testing numerous cases. In regional areas however, there are locations that have difficulties even in establishing such screening centers. There is the problem of the absence of tuberculosis specialists. Dr. Takayoshi Miyakawa discussed the real problems facing regional areas in view of the current situation while also offering some suggestions.

Next, a presentation was also made by a physician who is actively involved in tuberculosis countermeasures despite working at a regional facility having only a small number of beds. Dr. Kiyoyasu Fukushima introduced the concept of critical path to tuberculosis treatment, and is concentrating efforts on the implementation of educational activities by holding information meetings with patients and their family

members. Dr. Fukushima has also held numerous conferences from the viewpoint of the importance of patient education.

Finally, Dr. Kosho Yoshikawa, the progenitor of the theme of this gathering, provided a discussion of the accommodations made by acute stage hospitals and their collaboration with regional public health centers. There is considerable need for collaboration between hospitals and public health centers in regional areas, and this has gotten underway in some areas. However there are also locations where collaboration is not proceeding smoothly. Dr. Yoshikawa discussed some of the problems and solutions actually encountered at such facilities.

Although the results of these discussions may not have led to a definitive conclusion, it was found that regional areas have their own concerns and problems and that so-called “hard-working tuberculosis health care personnel” are doing the best they can to deal with these concerns and problems. It appears that an approach involving the deployment of a “TB package”, in which local public health centers play a central role in providing services ranging from uncovering tuberculosis patients, diagnosing and treating those patients and finally providing support, is likely to be the most effective.

1. Program for early detection of tuberculosis in the city of Sendai: Makito SATO (Health and Welfare Bureau, Sendai, Miyagi Prefecture)

Early detection of patients who pose a risk to public health is the most effective tuberculosis control measures. Services for early detection should be focused on periodic chest X-ray examinations, especially for high risk group, shortening of the patient’s delay, shortening of the doctor’s delay, and reinforcement of extraordinary health examinations by health center. The concrete and detailed measures were introduced.

2. Present state of tuberculosis emergency care countermeasures and related problems in the city of Tokyo: Hideo MAEDA (Infectious Disease Countermeasures Section, Health Services Department, Bureau of Health, Tokyo Metropolitan Government)

Accompanying the decreasing prevalence of tuberculosis, shorter hospitalization times and modernization of health care facility management, the number of beds allocated for the treatment of tuberculosis is continuing to decrease. Consequently, this has resulted in a relative decrease in the number of beds available to accommodate emergency treatment of tuberculosis patients when such treatment becomes necessary.

In addition, since tuberculosis hospitals have evolved primarily in the form of sanatoriums, and these sanatoriums

have not been established for the purpose of emergency treatment, there are cases in which it is difficult to accept emergency patients at these facilities.

Moreover, in urban areas in particular, the risk of becoming afflicted with tuberculosis tends to be disproportionately higher among the homeless and other persons leading an unstable lifestyle who are hesitant to seek medical attention. This delay in seeking medical attention causes their condition to become more serious, thereby resulting in an increase in the number of patients requiring emergency care the first time they are examined.

In consideration of these circumstances, prompt diagnosis and accommodation of cases requiring hospitalization immediately after making a definitive diagnosis are becoming serious issues due to the increasing severity of symptoms and resulting complications associated with this disease. In the city of Tokyo, efforts are being made to deal with these issues by constructing a tuberculosis emergency care network by coordinating efforts with health care facilities within the city.

3. The point at issue and the ideal method of carrying out tuberculosis advisory committee in the country: Takayoshi MIYAKAWA (Health and Sanitation Division, General Department of Health and Welfare, Aomori Prefecture)

Tuberculosis advisory committee, established in 1951, has played an important role in improving the quality of tuberculosis control program in Japan. But nowadays, experts in tuberculosis control are on the decrease in number, and so tuberculosis advisory committee is getting weak in the country. In order to improve the quality of tuberculosis treatment, the first thing we must do is to bring up medical practitioners who treat for tuberculosis.

4. Medical treatment of tuberculosis in a local area: introduction of critical path, etc.: Kiyoyasu FUKUSHIMA (Nagasaki Prefecture Tarami Hospital)

Tuberculosis (TB) is still a critical health problem in

Japan because of its higher prevalence rate than advanced countries. Critical pathways (CPs) are management plans that display goals for patients and provide the corresponding ideal sequence and timing of staff actions necessary to achieve those goals with optimal efficiency. We practice the CP for TB (TB-CP) to specify tests or therapeutic plans and maintain treatment of TB. Introduction of the TB-CP including DOT (directly observed therapy) during admission was useful for improving patient satisfaction or outcomes. We aim to treat TB patients with patient's oriented medicine by introducing such as CP, DOT, and the education program named "TB forum".

5. Public health center and regional hospital are putting into operation for tuberculosis (TB) treatment: Kosho YOSHIKAWA (Daido Hospital)

One of the most important points to decrease the prevalence rate of tuberculosis in Japan is achievement of treatment success rate of at least 85–90%. The DOTS strategy (the 21st century Japanese DOTS strategy) is the most effective implement for this. We share the information of TB patients with public health center and treat inpatients by DOTS at first. Our collaboration project with public health center is key point in TB treatment. It is required that political commitments sustain the cooperation between public health center and regional hospital.

**Key words:** Tuberculosis, Regional areas, Public health center

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