Original Article

TUBERCULOSIS AMONG CONSTRUCTION WORKERS FROM DORMITORY HOUSINGS IN CHIBA CITY

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Abstract [Background] Tuberculosis (TB) control in a low socio-economic society is an important program for urban area of industrialized countries. Some construction workers live in Hanba, a kind of dormitory housings that have crowded living conditions, and possibly give rise to *Mycobacterium tuberculosis* transmission. The pulmonary tuberculosis detection rate by chest X-ray screening in Hanba is higher than the general population, and therefore TB incidence among Hanba construction worker is also estimated to be as high as that of homeless.

[Purpose] To analyze the ratio of the TB patients from Hanba in Chiba City from 1993 through 2006, and analyze the treatment outcome and speculate the factors affecting them, especially the effects of the inpatients DOTS (Directly Observed Treatment Short-course) policy introduction after 2001.

[Methods] TB registration records in the Public Health Center, Chiba City, Japan, were retrospectively analyzed.

[Results] Pulmonary TB patients from Hanba were 121 (male: 121, female: 0), representing 3.8% of the total 3,179 TB patients from 1993 through 2006. Restricting to male patients aged 40−59 years-old, TB patients from Hanba were 78, representing 10.7% of 729 male TB patients of the same age groups. All of TB patients from Hanba developed pulmonary TB (PTB) and treatment outcome of chemotherapy was cured or completed: 69 (57%), defaulted or failed: 43 (36%), and died 9 (7%) respectively. When compared with PTB in Chiba and Japan, defaulted or failed was higher. In the multi-variated analysis, extensive lesions more than one lung (Adjusted odds ratio [AOR]: 0.13, 95% confidence interval [CI]: 0.04−0.37, P＜0.001) and smear-positive (AOR: 0.17, 95% CI: 0.04−0.65, P＝0.009) were negative factor for cured and completed. However, hospitalization during initial period of treatment was positive factor (AOR: 7.92, 95% CI: 1.73−36.2, P＝0.008). After inpatients DOTS introduction, the rate of cured or completed increased from 50% to 67%, and the rate of failed or defaulted decreased from 46% to 22% (P＜0.05).

[Conclusion] TB patients from Hanba, a kind of dormitory housings for construction workers, occupied 3.8% of total TB patients in Chiba City. Higher rate of defaulted or failed cases leads to poor treatment outcome in TB patients of Hanba construction workers who were possibly associated with an elevated risk of urban tuberculosis. DOTS might improve adherence to treatment and result in a decrease of failed or defaulted cases.

Key words: Pulmonary tuberculosis, Urban city, Dormitory housing for construction worker, DOTS

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Short Report

EFFICIENCY OF PERIODIC QuantiFERON®-TB GOLD TEST IN HOSPITAL NURSES

Kunihiko ITO

Abstract [Purpose] To estimate the efficiency and costs of the annual QuantiFERON®-TB Gold tests (QFT) for QFT-negative female hospital nurses, and treatment of latent tuberculosis infection for QFT positive converters.

[Method] Calculation based on the models.

[Result] Risk reduction of active tuberculosis disease is estimated 48.8% on the most favorable model for the efficiency of periodic QFT tests. Total number and costs of QFT tests necessary to prevent one tuberculosis case are estimated at 4,426 tests and 13.3 million yen (137 thousand US$); to prevent one bacilli-positive pulmonary tuberculosis case, 9,357 tests and 28.1 million yen (289 thousand US$); to prevent one sputum-smear-positive pulmonary tuberculosis case, 22,814 tests and 68.4 million yen (706 thousand US$).

[Conclusion] Estimated cost of annual QFT tests among general female nurses in Japan to prevent tuberculosis disease is very high, and annual QFT tests could not be recommended.

Key words: Tuberculosis, Hospital infection control, QuantiFERON®-TB Gold, Treatment of latent tuberculosis infection, Nurse

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TUBERCULOSIS PREVALENCE SURVEY IN JAPAN

Tadao SHIMAO

Abstract Chest X-ray examination had been used rather soon after the discovery of X-ray by Röntgen K in 1895 as it was possible to detect chest abnormality by simple radiography. After the discovery of radiophotography independently by Abreu M and Koga Y in 1936, it was applied as a method of mass screening for TB in Japan, and Imamura A made a special lecture on "The mass screening for TB" using radiophotography in 1940 in the Annual Meeting of the Japanese Society for TB. From experiences of mass screening, it was found that there were many cases of TB who do not aware of their own disease, and to know the prevalence of TB, the screening of survey subjects by X-ray examination is indispensable.

Noticing the importance of mass health examination by chest X-ray, Dr. Tanaka S, then director of information division, JATAHQ, edited a book entitled "How to carry out mass health examination for TB" in 1951, then he moved to the Ministry of Health and Welfare and engaged in the preparation of the first TB prevalence survey. Random sampling technique was already developed, and health center network covering the whole country was already completed in early 1950s. Using these background, the first TB prevalence survey was conducted in 1953. TB Prevalence Survey Committee was organized asking cooperation of experts in TB, epidemiology and statistics, and the survey in sampled area was carried out by a survey team headed by the director of health center in charge of the sampled area. The survey teams engaged in the survey with enthusiasm, and the rate of response to the survey was 99.3%.

The result of this survey was published in the WHO Bulletin, 1955.

After the survey in 1953, the following prevalence surveys were carried out in 1958, 1963, 1968 and 1973. Outline of these surveys was shown in Table 1, and the rate of examination was high in all, except the survey in 1973. In this year, TB prevalence survey was carried out in conjunction with the national nutritional survey and the national mental health survey, and unfortunately, there were some opponent groups against the national mental health survey, which affected the rate of response to the TB survey, too.

In addition to the 5 prevalence surveys, one thirds of the survey population in 1953, 1958 and 1963 was surveyed in the next year to know the incidence of TB. Follow-up survey on active TB cases found in the 1953 and 1958 survey was carried out in 1964, and similar follow-up survey was carried out in 1968 for active TB cases found in 1953, 1958 and 1963 surveys. Moreover, survey subjects excluding active TB cases in 1968 were followed up until 1973, and the incidence of newly registered TB cases during this period was surveyed.

Summarized results of TB prevalence surveys are reported. The first survey was carried out in 1953, and had been repeated every 5 years until 1973. As national TB control program (NTP) under new TB Control Law had been implemented since 1951, the results of 5 surveys clearly indicated the outcome of NTP of Japan.

Age-specific prevalence of active TB in 5 surveys is shown in Fig. 1. Due to advances in chemotherapy, there was certain difference in the definition of active TB in 1953 and 1958, and chemotherapy was indicated more widely for those with TB pathology in lung in 1958. Comparing the age-specific prevalence of active TB in 1953 and 1958, the prevalence decreased in 1958 below 35 years of age, and increased above 35 years. The decline in the prevalence of active TB in age groups below 35 in spite of widening of definition of active TB in 1958 indicated the efficacy of TB control with mass screening and BCG vaccination and treatment for detected cases. As the definition of active TB had been unchanged since 1958 up to 1973, the decline in the prevalence of active TB seen in all age groups clearly indicated the achievements of NTP.

Overall trend of prevalence of active TB, cavitary TB,

bacillary TB and smear＋PTB in 5 surveys is shown in Fig. 2 together with epidemiological figures obtained from vital registration, namely incidence of TB, prevalence of active TB at the end of the year and TB mortality. In analyzing the results, we have to take note of the difference in bacteriological examination methods. As laryngeal swab method was used in 1963 and 1968, culture positive rate was lower and no information about smear examination, however, from 1958 to 1973, all indices had declined exponentially with similar speed including prevalence of smear＋PTB and bacillary TB if results in 1958 and 1973 were connected directly. Based on this results and the fact that marked decline in the prevalence of active TB requiring much larger sample size for the survey, TB prevalence survey was stopped, and data from vital register has been used since then to evaluate the TB situation.

Results of 3 incidence surveys were shown in Fig. 3. Shift of higher incidence from younger age groups to higher age groups was clearly shown from 1954 survey to 1964 survey. The results of routine follow-up by vital registration of 1968 survey population excluding TB cases found in 1968 survey were shown in Table 2, and high risk groups were clearly shown in this table.

As routine X-ray examination was done by radiography in 1963 survey, it was possible to pick up any slight TB pathology, and the age-specific prevalence of any TB finding, that of healed findings and of calcified lesions were shown together with BCG vaccination coverage in Fig. 4. In the age groups above 40, the prevalence of any TB finding, as well as of healed and calcified findings was very high, while the coverage of BCG vaccination was below 20%. BCG vaccination was started in Japan in 1943, and those above 40 years of age in 1963 were then already 20 years of age or above, and only few were vaccinated with BCG when BCG vaccination was expanded to cover higher age groups thereafter.

TB prevalence survey has now come to be used as one of methods to estimate the incidence of TB under the impact of HIV/AIDS epidemic, and its significance is now re-evaluated.

Key words: Tuberculosis prevalence survey, Mass health examination for TB, TB incidence survey, Follow-up survey of TB cases found in the TB prevalence surveys

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The 84th Annual Meeting Invited Lecture

TUBERCULOSIS: A NEW VISION FOR THE 21ST CENTURY

Peter M. SMALL

Abstract Tuberculosis is a global problem that we can't afford to keep ignoring. In 2006, tuberculosis killed 1.7 million people— almost twice as many people as malaria— and it is the leading cause of death among people living with HIV/AIDS. This is all the more tragic because these deaths are preventable. For a long time the world thought that we had defeated tuberculosis, but just because tuberculosis doesn't make headlines doesn't mean it has gone away. The fact is that tuberculosis is getting worse, as complacency and lack of adequate tools and funding fuel the disease and the spread of drug resistance. Drug resistant tuberculosis is the wake-up call, it is an airborne epidemic of increasingly untreatable disease. Drug resistant tuberculosis develops when tuberculosis patients take low-quality drugs, do not finish their full course of treatment, or pass drug resistant tuberculosis from one person to another. In 2007, there were approximately 500,000 cases of drug resistant tuberculosis globally. MDR-TB is resistant to the two most commonly used first-line TB drugs, and requires long, complex and expensive treatment. XDR-TB is resistant to first- and second-line drugs, severely limiting treatment options. While progress is being made, much more is needed. Basic tuberculosis control is one of the most cost-effective interventions in global health. Appropriate treatment can save a life and stop the spread of disease for US$14. It is essential that countries implement the World Health Organization's (WHO) internationally recommended Stop TB strategy, which includes DOTS. But due to outdated tools and methods, DOTS alone is not enough. The remarkable fact is that global control of tuberculosis, a disease that kills someone every 20 seconds, depends upon a 125-year-old test, an 85-year-old vaccine and drugs that take six months to cure and haven't changed in four decades. To successfully treat tuberculosis and prevent resistance, we need to use current tools better and accelerate the development of new tools for the future. Simple improvements in tuberculosis control, such as expanding the use of under-utilized technologies, can have enormous impact. Fixed-dose combinations have existed for over 25 years, and could help ensure that more patients complete treatment; yet globally, only 15 percent of patients are using them. We also need new drugs, vaccines and diagnostics, as well as innovations in tuberculosis control and case management. Better diagnostics are already available, and new drugs and vaccines are coming. But more commitment and resources are needed. Better prevention and control of tuberculosis is the surest way to stop drug resistance. To ensure that drug resistance does not pose a wider threat, we need to employ a number of equally important approaches. These include improved basic tuberculosis control, increased use of under-utilized technologies such as fixed-dose combinations, and new technologies and health systems innovations. At the same time, we should expand access to M/XDR-TB treatment and diagnostics for those who already have drug resistant tuberculosis. Some of the most innovative solutions can come from the private sector and through partnerships. An untapped market of two billion people carries the tuberculosis bacterium. Since tuberculosis requires a comprehensive approach, companies should also explore opportunities to work together and pool complementary technologies to ensure new tools are used most effectively. Japan is poised to play a leading role in the discovery, development and delivery of tuberculosis solutions in the 21st century.

The 84th Annual Meeting Special Lecture

FIGHT AGAINST URBAN TUBERCULOSIS PROBLEMS AND PROGRAM EFFECTS IN OSAKA CITY

Akira SHIMOUCHI

Abstract In Osaka City, tuberculosis (TB) incidence rate (909.7) was already twice as high as national average in 1950. It had been reduced thereafter but was stagnated above 100 in the 1980's and 90's and it has become the worst in the country. To improve the situation, the 10 year plan of TB control was formulated and practiced since 2001. The plan mainly consists of proper treatment promotion to use 4 drugs including pyrazinamide at initial phase, introduction of DOTS, and expansion of chest X-ray screening among homeless which leads to early case finding. As an effect of plan after 8 years have passed, implementation rate of DOTS virtually reached 80% as targeted. As a result, defaulter and failure rate was reduced from 13.7% to less than 5%. The rate of retreatment cases among homeless patients was reduced from 43% to 17%. Multidrug resistant rate among patients without previous treatment was reduced from 1.1% in 2001−2004 to 0.6% in 2005−2008. And overall TB incidence rate became half (50.6) in 2008 from 100 per 100,000 population before the plan started.

Factors contributing to the above success seem to be as follows: formulation of long term control plan with indicators, integration of tuberculosis diagnostic committee, introduction of DOTS, strengthening and expansion of chest X-ray screening for the homeless, and unified implementation of contact examination in congregate settings, etc. Moreover patient management has been discussed in the regular meeting on cohort analysis at all public health offices in the city. When they had any questions on the treatment, they can now communicate with medical staff as necessary. It was indispensable to collaborate with welfare department and coordinate with NPOs to solve problems regarding homeless patients.

Key words: Urban area, Tuberculosis control, Indicators, DOTS, Homeless, Contact examination in congregate settings

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The 84th Annual Meeting Educational Lecture

MEDICAL ECONOMICS IN TUBERCULOSIS MANAGEMENT: WHAT WILL COME NEXT TO TB WARD?

Hideki YOTSUMOTO

Abstract Current unprofitability of medical services in tuberculosis (TB) ward in Japan has been induced by low medical fee and long-term hospital stays, aggravated by unoccupied beds due to the decrease in the number of patients. For the solution of this issue, the increase of medical fee, shortening of the length of hospital stay and drastic reduction of oversupplied beds are essential. An increment of medical fee by the change in the system would be appreciated, but even under the current system, the balance between revenue and expenditure could be obtained by reducing the length of hospital stay toward 4 weeks, and the elimination of deficit in TB ward could be accomplished by these efforts; shortening of length of hospital stay and reduction of TB beds. Although the latter might result in the difficulty of sustaining TB wards, these patients could be treated in the infectious disease ward. The integration of TB Control Law to Infectious Disease Control Law suggests that TB is not a special disease in Japan. If a true "short course therapy" era would be realized by novel anti-tuberculosis drugs, a dramatic change in TB management would occur in the near future.

Key words: Management of tuberculosis, Medical economics, TB ward, Medical expenses, Infectious Diseases Control Law

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Abstract Statistics on tuberculosis (TB) in foreigners have been obtained since 1998 in Japan. The number of foreign TB patients increased from 739 in 1998 to 945 in 2008. In contrast, the number of Japanese TB patients decreased during this period and hence the proportion of foreign TB patients increased from 2.1% in 1998 to 3.9% in 2008, excluding those of unknown nationality. Especially, the proportion of those aged 20−29 years increased greatly from 9.1% in 1998 to 26.3% in 2008.

Although the number of nationalities was 47, the majority of patients were from China (27.7%), the Philippines (24.8%) and Korea (10.2%) in 2008.

The number of foreign TB patients aged 20−29 years was 468, accounting for 49.5% of all foreign TB patients in 2008. Seventy-seven percent of foreign patients aged 20−29 years had developed TB within 5 years of entering Japan. The equivalent proportion was 49% of those aged 30−39 years and 32% of those aged 40−49 years. Regarding occupation, 39.7% of foreign patients aged 20−29 years were full-time workers, 28.6% were students and 13.7% were part-time workers.

Key words: Tuberculosis, Foreigner, Nationality, Sex-age specific, Trend, Regional distribution, Occupation

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